Original Investigation

Psychotic Experiences in the General Population
A Cross-National Analysis Based on 31 261 Respondents From 18 Countries

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IMPORTANCE Community-based surveys find that many otherwise healthy individuals report histories of hallucinations and delusions. To date, most studies have focused on the overall lifetime prevalence of any of these psychotic experiences (PEs), which might mask important features related to the types and frequencies of PEs.

OBJECTIVE To explore detailed epidemiologic information about PEs in a large multinational sample.

DESIGN, SETTING, AND PARTICIPANTS We obtained data from the World Health Organization World Mental Health Surveys, a coordinated set of community epidemiologic surveys of the prevalence and correlates of mental disorders in representative household samples from 18 countries throughout the world, from 2001 through 2009. Respondents included 31 261 adults (18 years and older) who were asked about lifetime and 12-month prevalence and frequency of 6 types of PEs (2 hallucinatory experiences and 4 delusional experiences). We analyzed the data from March 2014 through January 2015.

MAIN OUTCOMES AND MEASURES Prevalence, frequency, and correlates of PEs.

RESULTS Mean lifetime prevalence (SE) of ever having a PE was 5.8% (0.2%), with hallucinatory experiences (5.2% [0.2%]) much more common than delusional experiences (1.3% [0.1%]). More than two-thirds (72.0%) of respondents with lifetime PEs reported experiencing only 1 type. Psychotic experiences were typically infrequent, with 32.2% of respondents with lifetime PEs reporting only 1 occurrence and 31.8% reporting only 2 to 5 occurrences. We found a significant relationship between having more than 1 type of PE and having more frequent PE episodes (Cochran-Armitage $z = -10.0$; $P < .001$). Lifetime prevalence estimates (SEs) were significantly higher among respondents in middle- and high-income countries than among those in low-income countries (7.2% [0.4%], 6.8% [0.3%], and 3.2% [0.3%], respectively; χ^2_2 range, 7.1-58.2; $P < .001$ for each) and among women than among men (6.6% [0.2%] vs 5.0% [0.3%]; $\chi^2_1 = 16.0$; $P < .001$). We found significant associations with lifetime prevalence of PEs in the multivariate model among nonmarried compared with married respondents ($\chi^2_2 = 23.2$; $P < .001$) and among respondents who were not employed ($\chi^2_4 = 10.6$; $P < .001$) and who had low family incomes ($\chi^2_3 = 16.9$; $P < .001$).

CONCLUSIONS AND RELEVANCE The epidemiologic features of PEs are more nuanced than previously thought. Research is needed that focuses on similarities and differences in the predictors of the onset, course, and consequences of distinct PEs.

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n recent years, interest in the epidemiologic landscape of hallucinations and delusions has grown.[1,2] These psychotic experiences (PEs) are reported by a sizeable minority of the general population. A recent meta-analysis based on 61 studies[2] reported that the median lifetime prevalence of PE was 7.2%. Because this prevalence is substantially higher than the lifetime morbid risk for psychotic disorders, such as schizophrenia (median morbid risk, 0.7%),[3] the field of psychiatric epidemiology has been forced to rethink how PEs fit into the epidemiologic landscape of psychotic disorders. The terms used to describe these experiences have also evolved over time. Although *psychoticlike experiences* has been used, we will use the general term *psychotic experiences* to encompass *hallucinatory experiences* (HEs) and *delusional experiences* (DEs).[2]

Early work on the epidemiologic features of PEs[4] focused on these experiences as risk indicators for later conversion to full psychosis. This type of research has an appealing logic because many of the risk factors associated with PEs are also associated with schizophrenia and psychosis.[5] Additional evidence has accumulated that PEs are also associated with the subsequent onset of a wide array of common mental disorders, including anxiety, mood, and substance use disorders,[6-8] and with an increased risk for suicidal ideation and intent.[9-11] Thus, awareness is growing that the presence of PEs may reflect a vulnerability to a wide range of adverse mental health outcomes (in addition to psychotic disorders).[4,12-16] These findings and the concern that antipsychotics may be inappropriately used to treat individuals with isolated PEs may have influenced the decision to exclude *attenuated psychosis syndrome* in recently revised diagnostic criteria.[17]

As the empirical data have accumulated, systematic reviews[2,15,18,19] have pooled prevalence estimates and applied meta-regression techniques to explore the sociodemographic correlates of PEs. These reviews provide valuable clues to the nature of PEs but also highlight important gaps in the literature. Four of these gaps are of special importance for the present study.

First, the use of pooling in systematic reviews of PEs has encouraged the use of coarse dichotomous measures (eg, presence or absence of lifetime prevalence) to harmonize the wide array of scales and diagnostic instruments used to assess PEs.[2] This dichotomy has reduced the subtlety of the associations examined in these reviews. Second, the studies included in the systematic reviews have varied in many key design elements. As noted by Linscott and van Os,[2] substantial heterogeneity in the data has hampered analyses related to the relationship between PEs and sociodemographic variables. Third, most of the community studies of PE prevalence and correlates have been performed in high-income countries. A major exception is the World Health Survey, which included 4 brief PE questions in surveys of 52 nations.[20] However, the World Health Survey assessment of PEs had several limitations (eg, it lacked information on the frequency of PE occurrence, and questions about DEs were not asked in a fashion that excluded experiences related to alcohol, illicit drugs, or sleep). Finally, to allow pooling of data from different studies, some reviews have collapsed different variables across orthogonal axes. For example, Kaymaz et al[15] compiled composite variables related to weak and strong PEs that in theory could be built from data related to (1) the count of different types of PEs, (2) the frequency of occurrence, (3) associated distress, (4) comorbidity, and/or (5) certainty (eg, confidence in the psychotic nature of the experience).

Leading commentators have repeatedly called for more fine-grained analyses of PEs to guide the field.[1,21] The present report provides initial results of analyses designed to address the above limitations by examining data collected in the World Health Organization World Mental Health (WMH) surveys, a series of population-based surveys administered in many countries using consistent instruments and field procedures designed to facilitate pooled cross-national analyses of the prevalence and correlates of mental disorders. These data provide an unprecedented opportunity to explore the epidemiologic landscape of PEs.

Methods

Participants

The WMH surveys are a coordinated set of community epidemiologic surveys administered in probability samples of the household population in countries throughout the world (http://www.hcp.med.harvard.edu/wmh/). Data were collected from 2001 through 2009. Eighteen of the 26 completed WMH surveys administered the Composite International Diagnostic Interview (CIDI) psychosis module. These 18 countries are distributed across North and South America (Colombia, Mexico, Peru, Brazil [São Paulo], and the United States), Africa (Nigeria), the Middle East (Iraq and Lebanon), Asia (People's Republic of China [Shenzhen]), the South Pacific (New Zealand), and Europe (Belgium, France, Germany, Italy, the Netherlands, Portugal, Romania, and Spain). All 18 surveys were based on multistage, clustered-area probability, household sampling designs (**Table 1**). The weighted mean response rate across all 18 countries was 72.1%. Most surveys were based on nationally representative sample frames, but a few excluded rural areas (ie, Colombia and Mexico) or focused on particular regions (ie, Nigeria and China) or cities (Brazil). Participating sites were grouped into 3 country-level income strata according to World Bank criteria[22,23] as low- and lower middle-income countries (Colombia, Iraq, Nigeria, China, and Peru), upper middle-income countries (Brazil, Lebanon, Mexico, and Romania), and high-income countries (the European countries, New Zealand, and the United States). The age ranges reported herein include 18 years and older except in 3 countries (Mexico, Colombia, and Peru) in which 65 years was the upper age limit.

In keeping with previous studies of PEs,[10,12,24-29] we made the a priori decision to exclude individuals who had PEs with positive findings of a screen for possible schizophrenia and/or psychosis and manic depression and/or mania (ie, respondents who reported schizophrenia, psychosis, or manic depression and/or mania in response to the question, "What did the doctor say was causing this/these experiences?" and those who ever took any antipsychotics for these symptoms). This

Table 1. WMH Sample Characteristics by Income Categories and Final Sample for PEs[a]

Country by Income Level[b]	Sample Characteristics[c,d]	Field Dates	Age Range, y	Sample Size, No. of Respondents		Response Rate, %[e]
				Part 1	With PE	
Low and Lower Middle						
Colombia	All urban areas of the country	2003	18-65	4426	722	87.7
Iraq	Nationally representative	2006-2007	18-96	4332	4329	95.2
Nigeria	21 of the 36 states in the country	2002-2003	18-100	6752	1417	79.3
PRC[f]	Shenzhen metropolitan area	2006-2007	18-88	7132	2468	80.0
Peru	Nationally representative	2004-2005	18-65	3930	530	90.2
Total	NA	NA	NA	26 572	9466	84.7
Upper Middle						
Brazil	São Paulo metropolitan area	2005-2007	18-93	5037	2922	81.3
Lebanon	Nationally representative	2002-2003	18-94	2857	1029	70.0
Mexico	All urban areas of the country	2001-2002	18-65	5782	715	76.6
Romania	Nationally representative	2005-2006	18-96	2357	2357	70.9
Total	NA	NA	NA	16 033	7023	75.8
High						
Belgium	Nationally representative	2001-2002	18-95	2419	319	50.6
France	Nationally representative	2001-2002	18-97	2894	301	45.9
Germany	Nationally representative	2002-2003	18-95	3555	408	57.8
Italy	Nationally representative	2001-2002	18-100	4712	617	71.3
Netherlands	Nationally representative	2002-2003	18-95	2372	348	56.4
New Zealand[f]	Nationally representative	2003-2004	18-98	12 790	7263	73.3
Portugal	Nationally representative	2008-2009	18-81	3849	2053	57.3
Spain	Nationally representative	2001-2002	18-98	5473	1159	78.6
United States	Nationally representative	2002-2003	18-99	9282	2304	70.9
Total	NA	NA	NA	47 346	14 772	65.5
Total	NA	NA	NA	89 951	31 261	72.1

Abbreviations: NA, not applicable; PRC, People's Republic of China; PEs, psychotic experiences; WMH, World Mental Health.

[a] Exclusions are described in the Participants subsection of the Methods section; 31 261 respondents remained after exclusions.

[b] Based on data from the World Bank Data and Statistics 2008.[22]

[c] Surveys were administered by the Colombian National Study of Mental Health, Iraq Mental Health Survey, Nigerian Survey of Mental Health and Well-being, La Encuesta Mundial de Salud Mental en el Peru, Lebanese Evaluation of the Burden of Ailments and Needs of the Nation, Mexico National Comorbidity Survey, Romania Mental Health Survey, European Study of the Epidemiology of Mental Disorders, New Zealand Mental Health Survey, Portugal National Mental Health Survey, and US National Comorbidity Survey Replication.

[d] Most WMH surveys are based on stratified, multistage, clustered-area probability household samples in which samples of areas equivalent to counties or municipalities in the United States were selected in the first stage, followed by 1 or more subsequent stages of geographic sampling (eg, towns within counties, blocks within towns, households within blocks) to arrive at a sample of households, in each of which a listing of household members was

created and 1 or 2 people were selected from this listing to be interviewed. No substitution was allowed when the originally sampled household resident could not be interviewed. These household samples were selected from census area data in all countries other than France (where telephone directories were used to select households) and the Netherlands (where postal registries were used to select households). Several WMH surveys (Belgium, Germany, and Italy) used municipal resident registries to select respondents without listing households. Thirteen of the 18 surveys are based on nationally representative household samples.

[e] The response rate is calculated as the ratio of the number of households in which an interview was completed to the number of households originally sampled, excluding from the denominator households known to be ineligible because of being vacant at the time of initial contact or because the residents were unable to speak the designated languages of the survey. The weighted mean response rate is 72.1%.

[f] For the purposes of cross-national comparisons, we limit the sample to those older than 18 years.

process resulted in the exclusion of 140 respondents (0.4% of all respondents), leaving 31 261 respondents for this study (Table 1).

Measures and Assessments

All WMH surveys were conducted face to face in the homes of respondents by trained lay interviewers. Written informed consent was obtained before beginning the interviews in all countries. Procedures for obtaining informed consent and protecting individuals (ethical approval) were approved and monitored for compliance by the institutional review boards of the

collaborating organizations in each country.[30] Full details of these procedures are described elsewhere.[31,32]

All WMH interviews had 2 parts. Part 1 was administered to all respondents and contained assessments related to core mental disorders. Part 2 included additional information relevant to a wide range of survey aims, including assessment of PEs. All respondents who met criteria for any part 1 *DSM-IV* mental disorder and a probability sample of other respondents were administered part 2. Respondents to part 2 were weighted by the inverse of their probability of selection for part 2 to adjust for differential sampling. Within the different sites,

questions related to PEs were administered to all respondents or a random sample of those administered part 2. Analyses in this study were based on the weighted part 2 subsample of respondents administered the CIDI psychosis module. Additional weights were used to adjust for differential probabilities of selection within households and for nonresponse and to match the samples to sociodemographic distributions in the population.

The instrument used in the WMH surveys was the World Health Organization CIDI,[33] a validated, fully structured diagnostic interview designed to assess the prevalence and correlates of a wide range of mental disorders according to the definitions and criteria of the diagnostic systems of the *DSM-IV*[34] and *International Statistical Classification of Diseases, 10th Revision*.

The CIDI psychosis module included questions about the following 6 PE types: 2 related to HEs (visual and auditory hallucinations) and 4 related to DEs (2 bizarre delusional items [thought insertion and/or withdrawal and mind control and/or passivity] and 2 paranoid delusional items [ideas of reference and plot to harm and/or follow]) (eTables 1 and 2 in the Supplement). For example, respondents were asked if they ever experienced PEs (eg, "Have you ever heard any voices that other people said did not exist?"). This question was followed by a probe question to determine whether the reported PEs ever occurred when the person was not "dreaming or half-asleep or under the influence of alcohol or drugs." Only responses of the latter type are considered herein. The sequence of these follow-up probe types differed slightly between the first 6 WMH surveys, which were administered in Europe (Belgium, France, Germany, Italy, the Netherlands, and Spain), and those in the remaining 12 countries (eTables 1 and 2 in the Supplement).

Respondents who reported PEs were then asked about the presence of the PEs in the past 12 months and the frequency and/or occurrences of the PEs in their lifetime. In this study, we present prevalence estimates for any PE, any HE (with or without associated DEs), any DE (with or without associated HEs), pure HEs (without DEs), and pure DEs (without HEs). In addition, we will present the following 2 key PE-related metrics: (1) count of types of PEs (henceforth referred to as PE type metric) and (2) frequency of occurrence of PE episodes (henceforth referred to as PE frequency metric). Respondents may have had more than 1 hallucination and/or delusion type associated with a single episode of PE. For the PE frequency metric, reported frequency of lifetime PE episodes was divided into the following 5 categories: 1 time only, 2 to 5 times, 6 to 10 times, 11 to 100 times, and 101 times or greater. This 5-category scheme was collapsed into 1 to 10 vs 11 or more times in the analyses of sociodemographic correlates of PE frequency among respondents with lifetime PEs.

The sociodemographic factors considered herein include sex, age, number of years of education, employment history, marital status, family income, and nativity (ie, born inside the country of assessment). For the bivariate and multivariate analyses, the sociodemographic variables were stratified into broad categories based on methods described elsewhere.[30]

Statistical Analysis

Data were analyzed from March 2014 through January 2015. Weighted prevalence estimates were calculated for the various PE types and related metrics. Odds ratios and design-corrected 95% CIs are reported. Because the WMH survey data featured geographic clustering and weighting, SEs of parameter estimates were generated using the design-based Taylor series linearization method[35] implemented in a commercially available macro (SAS, version 9.4; SAS Institute, Inc). Multivariate significance was evaluated using Wald χ^2 tests based on design-corrected coefficient variance-covariance matrices. The association between the PE type metric and the PE frequency metric was evaluated using the Cochran-Armitage test.[36] Statistical significance was evaluated consistently using 2-tailed .05-level tests.

Results

Prevalence of PEs

Table 2 presents country-specific lifetime PE prevalence estimates. Lifetime prevalence (SE) of at least 1 PE was reported by 5.8% (0.2%) of the 31 261 respondents. Lifetime prevalence of any HE was 5.2% (0.2%); of any DE, 1.3% (0.1%). The median (interquartile range) of lifetime PEs, HEs, and DEs were 5.5% (2.8%-7.5%), 4.4% (1.8%-6.5%), and 1.3% (0.9%-1.8%), respectively (eFigures 1-3 in the Supplement present the cumulative distribution of PE, HE, and DE estimates, respectively). Twelve-month prevalence (SE) of any PE was 2.0% (0.1%), whereas the median (interquartile range) was 1.4% (1.0%-2.8%).

Lifetime prevalence (SE) of PEs was significantly higher among women than men (6.6% [0.2%] vs 5.0% [0.3%]; $\chi_1^2 = 16.0$; $P < .001$). Similar sex differences were found for prevalence of HEs (5.9% [0.2%] vs 4.3% [0.3%]; $\chi_1^2 = 19.4$; $P < .001$) but not DEs (1.4% [0.1%] vs 1.3% [0.1%]; $\chi_1^2 = 0.3$; $P = .61$). The significant sex difference was also found for respondents with pure HEs (5.2% [0.2%] vs 3.7% [0.3%]; $\chi_1^2 = 19.3$; $P < .001$) but not pure DEs (0.7% [0.1%] vs 0.7% [0.1%]; $\chi_1^2 = 0.1$; $P = .80$).

Significant differences were found across the 3 country-level income strata in lifetime prevalence of any PE, any HE, and any DE. In each comparison, the prevalence estimates were significantly higher among respondents in middle- and high-income countries than among those in low-income countries (χ_2^2 range, 7.1-58.2; $P < .001$ for each) (Table 2).

Prevalence of Individual PEs and the Distribution of the PE Type Metric

Table 3 shows the lifetime prevalence estimates (SE) of individual PE types and counts of different PE types. The most common PE type overall was visual hallucinations (3.8% [0.2%]), followed by auditory hallucinations (2.5% [0.1%]). Prevalence estimates of individual DE types were low (0.3%-0.7%). Among those with any lifetime PE, 72.0% (representing 4.2% of the total sample) reported only 1 PE type; 21.1% (representing 1.2% of the total sample), exactly 2 types; and 6.8% (representing 0.4% of the total sample), 3 or more types.

Table 2. Lifetime and 12-Month Prevalence of PEs in the WMH Surveys

Country by Income Level[a]	Prevalence, No. (%) [SE][b]				Total Sample, No. of Respondents[c]
	Lifetime			12-mo PE	
	Any PE	Any HE	Any DE		
Low and lower middle					
Colombia	73 (7.5) [1.2]	68 (7.1) [1.2]	11 (0.9) [0.3]	25 (2.1) [0.5]	722
Iraq	51 (1.2) [0.2]	46 (1.1) [0.2]	13 (0.4) [0.2]	25 (0.7) [0.2]	4329
Nigeria	39 (2.2) [0.5]	32 (1.7) [0.4]	16 (1.0) [0.4]	15 (1.0) [0.4]	1417
PRC	151 (5.3) [0.8]	116 (3.8) [0.6]	54 (1.8) [0.4]	45 (1.4) [0.3]	2468
Peru	36 (6.4) [1.4]	33 (6.1) [1.4]	7 (1.1) [0.4]	18 (3.3) [0.9]	530
Total	350 (3.2) [0.3]	295 (2.6) [0.2]	101 (0.9) [0.1]	128 (1.2) [0.2]	9466
Upper middle					
Brazil	548 (14.9) [0.9]	471 (13.3) [0.9]	183 (3.6) [0.3]	230 (5.6) [0.4]	2922
Lebanon	37 (1.9) [0.4]	30 (1.6) [0.4]	14 (0.6) [0.3]	15 (0.9) [0.4]	1029
Mexico	53 (4.1) [1.0]	49 (3.6) [0.9]	12 (0.8) [0.4]	22 (1.4) [0.4]	715
Romania	24 (1.0) [0.4]	21 (0.9) [0.4]	5 (0.1) [0.1]	9 (0.3) [0.1]	2357
Total	662 (7.2) [0.4]	571 (6.4) [0.4]	214 (1.7) [0.1]	276 (2.7) [0.2]	7023
High					
Belgium	32 (8.3) [2.5]	19 (5.0) [1.6]	20 (5.7) [2.3]	11 (4.1) [2.4]	319
France	27 (5.7) [1.4]	23 (4.9) [1.3]	7 (1.6) [0.6]	6 (1.3) [0.7]	301
Germany	25 (2.8) [0.5]	16 (1.8) [0.4]	13 (1.3) [0.3]	6 (1.0) [0.2]	408
Italy	38 (4.5) [0.8]	31 (3.5) [1.0]	16 (1.9) [0.6]	12 (1.3) [0.5]	617
The Netherlands	47 (10.8) [2.5]	41 (10.1) [2.5]	11 (1.6) [0.5]	13 (3.0) [1.2]	348
New Zealand	724 (6.9) [0.4]	667 (6.5) [0.4]	134 (0.9) [0.1]	271 (2.4) [0.2]	7263
Portugal	140 (5.2) [0.7]	106 (3.9) [0.5]	66 (2.6) [0.5]	43 (1.7) [0.3]	2053
Spain	91 (6.7) [1.5]	77 (5.8) [1.5]	35 (1.4) [0.4]	19 (0.9) [0.2]	1159
United States	249 (8.6) [0.9]	232 (8.2) [0.9]	41 (1.3) [0.2]	79 (2.8) [0.4]	2304
Total	1373 (6.8) [0.3]	1212 (6.2) [0.3]	343 (1.4) [0.1]	460 (2.2) [0.2]	14 772
All	2385 (5.8) [0.2]	2078 (5.2) [0.2]	658 (1.3) [0.1]	864 (2.0) [0.1]	31 261

Abbreviations: DE, delusional experience; HE, hallucinatory experience; PRC, People's Republic of China; PE, psychotic experience; WMH, World Mental Health.

[a] Based on data from the World Bank Data and Statistics 2008.[22]

[b] Numbers indicate the unweighted number of respondents who reported the PEs. Prevalence estimates are based on weighted data. PEs indicate any of 6 types; HEs, any of 2 types; and DEs, any of 4 types.

[c] Indicates the total unweighted number of respondents who were asked about PEs.

Distribution of the PE Frequency Metric and the Relationship Between PE Type and Frequency Metrics

Psychotic experiences were typically infrequent, with 32.2% of the respondents with lifetime PEs reporting only 1 episode (Table 4). An additional 31.8% of respondents with lifetime PEs experienced only 2 to 5 PE episodes. Thus, for nearly two-thirds of respondents (64.0%) with lifetime PEs, these experiences occurred only 1 to 5 times in their lives. An additional 10.0% of respondents with lifetime PEs reported 6 to 10 lifetime episodes; 20.0%, 11 to 100 episodes; and 6.0%, 101 or more episodes. The relationship between the PE type metric and the PE frequency metric is best displayed in Table 5. Those respondents with more PE types are disproportionately more likely to have more PE episodes (Cochran-Armitage z, −10.0; $P < .001$).

Associations Between Sociodemographic Factors With Lifetime PEs, HEs, and DEs

eTable 3 in the Supplement shows the association of sociodemographic variables with lifetime PEs, HEs, and DEs in bivariate and multivariate models. The following sociodemographic variables were associated with increased odds ratios for PEs, HEs, and DEs in both models: (1) being a homemaker or classified as having other employment (eg, looking for work or disabled) vs employed (for PEs, multivariate model, $\chi_4^2 = 10.6$; $P < .001$); (2) being nonmarried (ie, never married or

separated, widowed, or divorced) vs married (for PEs, multivariate model, $\chi_2^2 = 23.2$; $P < .001$); and (3) lower vs high household income level (for PEs, multivariate model, $\chi_3^2 = 16.9$; $P < .001$). In addition to these findings, several sociodemographic variables were associated with only 1 type of PE. Young respondents (aged 18-29 years) were significantly more likely to have DEs (compared with those older than 60 years), whereas age was unrelated to HEs (and overall PEs). Although female sex was associated with an increased prevalence of PEs (in both models), this finding was driven by an increased risk for HEs (but not DEs). Low educational level, in comparison, was associated with an increased risk for DEs (but not HEs). Unexpectedly, those born outside the country (ie, migrants) were significantly less likely than the native born to report HEs (but not DEs) in the bivariate and multivariate models.

Associations of Sociodemographic Factors With PE Type and PE Frequency Metrics

Among the factors that influence the PE type metric (in those who had experienced PEs) in the multivariate model, the 3 younger strata (ie, spanning 18-59 years) were significantly more likely to have more than 1 PE type (compared with those aged ≥60 years) (eTable 4 in the Supplement). None of the other sociodemographic characteristics was associated with the PE type metric. Among the correlates of the PE frequency metric, student status was significantly associated with a lower fre-

Table 3. Lifetime Prevalence of Individual PEs in the WMH Surveys

Type[a]	Lifetime Prevalence, No. (%) [SE][b]
HE	
Visual	1545 (3.8) [0.2]
Auditory (verbal)	1051 (2.5) [0.1]
Any	2078 (5.2) [0.2]
DE	
Thought insertion and/or withdrawal	193 (0.4) [0.0]
Mind control and/or passivity	148 (0.3) [0.0]
Ideas of reference	209 (0.4) [0.0]
Plot to harm and/or follow	328 (0.7) [0.1]
Any	658 (1.3) [0.1]
PE	
Any	2385 (5.8) [0.2]
No. of PE types	
1	1631 (4.2) [0.2]
2	544 (1.2) [0.1]
≥3	210 (0.4) [0.0]
All[c]	31 261 (100)[0.0]

Abbreviations: DE, delusional experience; HE, hallucinatory experience; PE, psychotic experience; WMH, World Mental Health.

[a] PEs indicate any of 6 types; HEs, any of 2 types; and DEs, any of 4 types.

[b] Numbers indicate the unweighted number of respondents who reported the PEs. Prevalence estimates are based on weighted data.

[c] Indicates the total unweighted number of respondents who were asked about PEs.

quency of PE occurrence. None of the other sociodemographic variables was associated with PE frequency (eTable 5 in the Supplement).

Discussion

Based on cross-national samples from 18 countries, we found that 5.8% of respondents reported having 1 or more PEs at least once in their lifetime and 2.0% in the previous year. These overall estimates are broadly consistent with those in the previous literature.[2] Our study contributes important new information regarding the count of PE types and frequency of PEs that go beyond the issues considered in previous community-based studies of PEs. Perhaps the most striking finding is that PEs are infrequent for most of the individuals who experience them, with 32.2% reporting 1 PE episode in their life and 64.0% reporting no more than 5 lifetime occurrences. In the general population, those with 2 or more types of PEs are also significantly more likely to have more PE episodes. For example, of those who reported 3 or more PE types, nearly one-quarter (24.5%) reported 101 or more occurrences.

Our findings provide an empirical foundation on which to investigate factors that influence the persistence of PEs.[1] When viewed within the context of the gap between 12-month and lifetime PE estimates from the present study (ie, 2.0% vs 5.8%), we can infer that most individuals do not have persistent PEs (mindful that lifetime prevalence estimates for mental health disorders are often biased downward owing to underreporting).[37] Lin-

scott and van Os[2] estimated that of those individuals who report any PEs, approximately 80% would have had transient experiences. This estimate is consistent with our empirical finding that about 64.0% of individuals with PEs report only 1 to 5 lifetime occurrences.

Based on the set of PEs examined, our study confirms that HEs were more common than DEs (5.2% vs 1.3%), and this general pattern was consistent across the 3 country-level income strata. Lifetime prevalence of PEs was lower in the low-income to lower middle–income countries (3.2%) compared with the upper middle–income and high-income countries (7.2% and 6.8%, respectively). Although we cannot compare our results directly with the single previous cross-national study of PEs[20] owing to differences in how the PEs were assessed, both studies (optimized for consistent design and PE assessment) provided insights in variation between sites.

One of the strengths of cross-national studies, such as the WMH Survey, is that they are able to identify risk factors that exist consistently across countries despite site-specific cultural factors. We found an increased prevalence of HEs and DEs associated with being unmarried or not employed and having a lower household income level. However, certain demographic features were differentially associated with HEs but not DEs and vice versa. For example, women had a significantly higher prevalence of HEs but not DEs. We found a significant relationship between being younger and having DEs but not HEs. Unexpectedly, migrants in our study were significantly less likely to report lifetime HEs (compared with native-born respondents). These novel findings provide important points of distinction between the epidemiologic features of psychotic disorders and PEs.[5,38]

Although several sociodemographic variables were significantly associated with the lifetime prevalence of PEs, these features were not associated with the PE type metric or the PE frequency metric. We speculate that comorbid psychiatric illness (eg, depression and anxiety disorders) and other risk factors known to be associated with PEs and mental disorders (eg, family history, substance use, and trauma exposure) may contribute to these PE-related metrics. The comprehensive nature of the WMH survey will allow us to explore these hypotheses in future analyses.

Although our study has many strengths (eg, large sample size, range of countries, uniform methods for data collection, and innovative analysis of PE-related metrics), several limitations are notable. In keeping with other population-based surveys, we relied on trained lay interviewers to administer the questionnaire. Although we excluded those individuals who had screen-positive findings for possible psychotic disorders, we did not have access to valid measures of clinical psychotic disorders. Lifetime prevalence estimates are prone to underreporting.[37] We only assessed 4 types of DEs, and these probes may have been insensitive to culture-specific delusional beliefs.[16]

Conclusions

We have provided, to our knowledge, the most comprehensive description of the epidemiologic landscape of PEs published to date. Although the lifetime prevalence of PEs is 5.8%,

Table 4. Frequency of Lifetime Occurrence of PEs Among Respondents Who Reported Ever Having 1 or More PEs in the WMH Surveys

	PE Frequency Metric					
	Row Sample Size, No.[a]	Prevalence by No. of PEs, % (SE)[b]				
Sample by Type		1	2-5	6-10	11-100	≥101
Non-ESEMed						
Visual HE	1379	31.9 (1.7)	32.0 (1.7)	10.5 (1.0)	18.7 (1.4)	6.7 (0.9)
Auditory (verbal) HE	965	20.8 (1.9)	31.7 (2.2)	11.1 (1.3)	26.5 (1.9)	9.9 (1.3)
Any HE	1871	30.4 (1.4)	32.4 (1.4)	10.0 (0.8)	20.6 (1.3)	6.6 (0.8)
Thought insertion and/or withdrawal DE	162	28.9 (4.1)	27.1 (3.9)	9.7 (2.0)	15.6 (2.9)	18.8 (3.3)
Mind control and/or passivity DE	136	27.1 (5.0)	18.2 (3.5)	11.8 (2.5)	24.2 (4.5)	18.8 (4.6)
Ideas of reference DE	169	15.5 (2.6)	24.5 (4.5)	13.2 (2.8)	23.7 (4.0)	23.1 (5.2)
Plot to harm and/or follow DE	278	36.4 (3.5)	26.2 (2.8)	12.6 (2.2)	18.7 (2.4)	6.0 (1.8)
Any DE	556	29.1 (2.5)	27.6 (2.1)	12.6 (1.5)	18.2 (1.8)	12.5 (2.0)
Any PE[c]	2125	31.7 (1.4)	31.9 (1.3)	10.1 (0.7)	20.0 (1.2)	6.4 (0.7)
1 PE type[c]	1452	37.5 (1.7)	32.3 (1.5)	8.9 (0.8)	18.0 (1.4)	3.3 (0.7)
2 PE types[c]	491	16.7 (3.3)	35.3 (3.6)	12.8 (2.5)	24.9 (2.5)	10.3 (1.9)
≥3 PE types[c]	182	17.2 (2.8)	17.6 (3.5)	13.8 (3.4)	25.6 (3.9)	25.8 (4.3)
ESEMed[c]						
Any PE	260	36.4 (3.3)	30.7 (2.9)	9.5 (1.5)	20.3 (2.3)	3.2 (0.9)
1 PE type	179	43.0 (3.9)	29.6 (3.7)	4.3 (1.4)	21.0 (2.1)	2.1 (0.9)
2 PE types	53	23.6 (8.6)	33.7 (4.7)	32.3 (5.7)	6.8 (1.3)	3.6 (1.4)
≥3 PE types	28	2.1 (0.6)	34.0 (12.1)	2.5 (1.0)	48.2 (12.5)	13.2 (5.6)
All[c]						
Any PE	2385	32.2 (1.3)	31.8 (1.2)	10.0 (0.7)	20.0 (1.1)	6.0 (0.6)
1 PE type	1631	38.1 (1.5)	32.0 (1.4)	8.4 (0.7)	18.3 (1.2)	3.2 (0.6)
2 PE types	544	17.4 (3.1)	35.1 (3.3)	14.6 (2.3)	23.2 (2.2)	9.7 (1.8)
≥3 PE types	210	15.6 (2.5)	19.3 (3.3)	12.7 (3.1)	27.9 (3.9)	24.5 (3.9)

Abbreviations: DE, delusional experience; ESEMeD, European Study of the Epidemiology of Mental Disorders; HE, hallucinatory experience; PE, psychotic experience; WMH, World Mental Health.

[a] Indicates the unweighted number of respondents who reported PEs.

[b] Prevalence estimates are based on weighted data.

[c] Types include any of 6.

Table 5. Cross-Table of PE Frequency Metric and PE Type Metric in the WMH Surveys

		PE Frequency Metric						
PE Type Metric[a]	Row Sample Size, No.[b]	Prevalence by No. of PEs, % (SE)[c]			Cochran-Armitage z Statistic	P Value for z Statistic[d]	χ² Test	P Value for χ²[d,e]
		1	2-5	≥6				
1	1631	38.1 (1.5)	32.0 (1.4)	29.9 (1.5)	−10.0	<.001	32.1	<.001
≥2	754	16.9 (2.4)	31.2 (2.6)	51.8 (2.9)				

Abbreviations: PE, psychotic experience; WMH, World Mental Health.

[a] Includes any of 6 types.

[b] Indicates the unweighted number of respondents who reported PEs in all countries.

[c] Prevalence estimates are based on weighted data.

[d] Significant at .05 level, 2-sided test.

[e] Indicates df of 2.

these events are typically rare. For nearly one-third of individuals who have PEs (ie, 32.2%), these events were solitary (ie, 1 event only). In the general population, a small subgroup of individuals has multiple types of PEs and experiences these types of PEs more frequently. The research community needs to leverage this fine-grained information to better determine how PEs reflect risk status. Our study highlights the subtle and variegated nature of the epidemiologic features of PEs and provides a solid foundation on which to explore the bidirectional relationship between PEs and mental health disorders.

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