Chapter 19

Psychotic Experiences

John J. McGrath, Sukanta Saha, Carmen C. W. Lim, Oye Gureje, Silvia Florescu

Introduction

Community-based surveys have identified that a substantial proportion of individuals who do not have a confirmed psychotic disorder endorse items related to the presence of hallucinations and delusions (psychotic experiences, PEs). For example, a meta-analysis (based on 61 studies) reported a median lifetime prevalence of PEs of 7.2% (Linscott & van Os 2013). These estimates were substantially higher than the lifetime prevalence of psychotic disorders such as schizophrenia (median estimate 0.4%) (Saha *et al.* 2005), and the field of psychiatric epidemiology has reappraised how these experiences 'fit' into the epidemiologic landscape of psychotic disorders. The terminology to describe these experiences has also been revised in recent years. Sometimes referred to as psychotic-like experiences or psychosis-like symptoms, we will use the general term psychotic experiences (PEs), and the specific terms hallucinatory experiences (HEs) and delusional experiences (DEs) in this chapter.

Understandably, early work on the epidemiology of PEs was focused on the utility of these experiences as risk indicators for later conversion to full psychosis (Hanssen *et al.* 2005; Werbeloff *et al.* 2012). There was an appealing logic to this research, as many of the risk factors associated with PEs are also associated with schizophrenia/psychosis (e.g. cannabis, trauma, physical health) (Scott *et al.* 2007; Kelleher & Cannon 2010; Saha *et al.* 2011a). More recently, the evidence has indicated that PEs are also associated with a wide array of common mental disorders including anxiety, mood, and substance-use disorders (Johns *et al.* 2004; Freeman & Fowler 2009; Saha *et al.* 2011a; Varghese *et al.* 2011b; Yung *et al.* 2011; Saha *et al.* 2012). A prospective population-based study from Israel confirmed that those with PEs at baseline had an increased risk of being hospitalized for both psychotic disorders and non-psychotic (mental) disorders over the following 24 years (Kaymaz *et al.* 2012). There is also evidence that individuals who report PEs have a significantly increased risk of suicidal ideation, intent, and attempts (Nishida *et al.* 2010; Saha *et al.* 2011a–2011e; Kelleher and Cannon 2010; Kelleher *et al.* 2014). As the empirical data have accumulated, there has been debate about whether PEs represent a continuum of psychopathology (analogous with mild vs. severe depression), and/or a '*form fruste*' or attenuated expression of psychosis that may persist and worsen over time (David 2010; Kaymaz & van Os 2010; Lawrie *et al.* 2010; Sommer 2010).

The first wave of studies on PEs had several major limitations. First, the studies contributing to the systematic reviews have assessed PEs using a wide array of scales and diagnostic instruments – 20 different instruments were identified in the most recent systematic review (Linscott & van Os 2013). In order to allow synthesis of these data, PE data are usually dichotomized (lifetime prevalence present/absent). There is a need for studies that can efficiently measure different types of PEs and retain more fine-grain data related to PEs. Second, much of the previous research has examined associations between lifetime PEs and lifetime mental disorders regardless of temporal priority. There is a lack of empirical data on whether temporally primary common mental disorders are associated with an increased risk of subsequent first onset of PEs, and conversely, which mental disorders are predicted by pre-existing PEs. The World Mental Health (WMH) surveys provide a suitable cross-national platform to explore the epidemiology of PEs. For example, WMH analyses provide more textured information about comorbidity between PEs and other mental disorders, and can take into account the temporal order of these events based on retrospective reports of ages of onset. The surveys also allow us to provide much more detailed information than previous studies about risk factors, with a special focus on parental psychopathology, childhood adversities, and exposure to traumatic experiences that precede the onset of the PEs. The aim of this chapter is to present the lifetime and 12-month prevalence of PEs, DEs and HEs and explore key socio-demographic correlates of PEs based on the WMH surveys data.

https://doi.org/10.1017/9781316336168.019 Published online by Cambridge University Press

Methods

Eighteen WMH surveys completed the Composite International Diagnostic Interview (CIDI) Psychosis Module (Kessler & Üstün 2008). In keeping with previous studies of PEs (Scott *et al.* 2007; Saha *et al.* 2011a–e, 2012, 2013; Varghese *et al.* 2011a), we made the *a priori* decision to exclude individuals who had PEs but who also screened positive for possible schizophrenia/psychosis, and manic-depression/mania. Thus, we excluded respondents who (a) reported (1) *schizophrenia/psychosis* or (2) *manic-depression/mania* in response to the question '*What did the doctor say was causing (this/these) experiences?*' or (b) reported lifetime use of an antipsychotic medication for these symptoms. This resulted in the exclusion of 140 respondents (0.4% of all respondents), leaving 31,261 respondents for this study. Analyses in this chapter were based on the weighted Part II subsample of respondents administered the CIDI Psychosis Module.

The CIDI Psychosis Module included questions about six PE types – two related to HEs (visual hallucinations, auditory hallucinations) and four related to DEs (two 'bizarre' delusional items – thought insertion/withdrawal, mind control/passivity; two 'paranoid' delusional items – ideas of reference, plot to harm/follow). For example, respondents were asked if they ever experienced PEs (e.g. '*Have you ever heard any voices that other people said did not exist?*') (Table 19.1). This was followed by a probe question to determine if the reported PEs ever occurred when the person was '*not dreaming, not half-asleep, or not under the influence of alcohol or drugs*'. Only responses of the latter type are considered here.

Respondents who reported PEs were then asked about: (a) presence of the PEs in the past 12 months and (b) frequency/occurrences of the PEs in their lifetime. We present prevalence estimates for any PEs, any HEs (with or without associated DEs), any DEs (with or without associated HEs), 'pure' HEs (without DEs), and 'pure' DEs (without HEs). In addition, we present key PE-related metrics: (a) count of types of PEs (henceforth referred to as *PEs type metric*) and (b) cumulative or annual frequency of occurrence of PEs episodes. Respondents who reported PEs were also asked probe questions about the age-of-onset (AOO) of PEs (i.e. *How old were you the very first time (this/either of these things/any of these things*) happened to you?).

Generic statistical methods are detailed in Chapter 3. This chapter includes an additional analysis that investigated bi-directionality in comorbidity with mental disorders. For this, discrete-time survival analyses (Singer & Willett 1993) with person-year as the unit of analysis and time-varying measures for prior onset of other mental disorders were used to examine the predictive associations of temporally prior disorders with the subsequent onset of each mental disorder considered in the analysis. We estimated survival models that examined bivariate associations between PEs and only one common mental disorder at a time (with adjustment for age-cohorts, gender, person-year, education, marital and employment status, and country) as well as multivariate models that included information on all temporally primary common mental disorders to predict the outcome disorder. The latter models included measures of number of prior mental disorders.

Table 19.1 Six CIDI psychotic experiences items

Saw a vision: Did you ever see something that wasn't really there that other people could not see?
Heard voices: Did you ever hearing things that other people said did not exist, like strange voices coming from inside your head talking to you or about you, or voices coming out of the air when there was no one around?
Thought insertion: Did you ever believe that some mysterious force was inserting many different strange thoughts – that were definitely not your own thoughts – directly into your head by means of x-rays or laser beams or other methods?
Mind control/passivity: Did you ever feel that your mind had been taken over by strange forces with laser beams or other methods that were making you do things you did not choose to do?
Ideas of reference: Did you ever believe that some strange force was trying to communicate directly with you by sending special signs or signals that you could understand but that no one else could understand. Sometimes this happens by special signs coming through the radio or television?
Plot to harm/follow: Did you ever believe that there was an unjust plot going on to harm you or to have people follow you that your family and friends did not believe existed?

Results

Prevalence

Table 19.2 presents country-specific lifetime PEs prevalence estimates. In all countries combined, lifetime prevalence of any PE is 5.8%, of any HE it is 5.2%, and of any DE it is 1.3%. Twelve-month prevalence of any PEs is 2.0%. From additional analyses reported in a prior publication, prevalence of lifetime PEs is

https://doi.org/10.1017/9781316336168.019 Published online by Cambridge University Press

Table 19.2 Prevalence of psychotic experiences in the World Mental Health surveys

Country	Lifetime prevalence										12-month prevalence		12-month prevalence of PEs among lifetime cases		Sample size used
	Psychotic experiences		Hallucinatory experiences		Delusional experiences		Pure hallucinatory experiences		Pure delusional experiences		Psychotic experiences				
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	
Low/lower-middle-income countries	**3.2**	**0.3**	**2.6**	**0.2**	**0.9**	**0.1**	**2.3**	**0.2**	**0.6**	**0.1**	**1.2**	**0.2**	**36.3**	**3.8**	**9,466**
Colombia	7.5	1.2	7.1	1.2	0.9	0.3	6.7	1.2	0.4	0.2	2.1	0.5	27.5	6.5	722
Iraq	1.2	0.2	1.1	0.2	0.4	0.2	0.8	0.2	0.1	0.1	0.7	0.2	54.9	10.7	4,329
Nigeria	2.2	0.5	1.7	0.4	1.0	0.4	1.2	0.4	0.4	0.3	1.0	0.4	46.7	12.7	1,417
Peru	6.4	1.4	6.1	1.4	1.1	0.4	5.3	1.2	0.3	0.2	3.3	0.9	52.3	9.3	530
PRC (Shenzhen)	5.3	0.8	3.8	0.6	1.8	0.4	3.4	0.6	1.5	0.4	1.4	0.3	25.7	5.0	2,468
Upper-middle-income countries	**7.2**	**0.4**	**6.4**	**0.4**	**1.7**	**0.1**	**5.5**	**0.4**	**0.8**	**0.1**	**2.7**	**0.2**	**37.2**	**3.0**	**7,023**
Brazil	14.9	0.9	13.3	0.9	3.6	0.3	11.3	0.8	1.6	0.3	5.6	0.4	37.4	3.4	2,922
Lebanon	1.9	0.4	1.6	0.4	0.6	0.3	1.3	0.4	0.3	0.1	0.9	0.4	50.3	12.5	1,029
Mexico	4.1	1.0	3.6	0.9	0.8	0.4	3.3	0.9	0.5	0.3	1.4	0.4	33.2	10.3	715
Romania	1.0	0.4	0.9	0.4	0.1	0.1	0.8	0.4	0.1	0.0	0.3	0.1	27.3	8.6	2,357
High-income countries	**6.8**	**0.3**	**6.2**	**0.3**	**1.4**	**0.1**	**5.4**	**0.3**	**0.7**	**0.1**	**2.2**	**0.2**	**32.0**	**2.0**	**14,772**
Belgium	8.3	2.5	5.0	1.6	5.7	2.3	2.6	1.2	3.2	1.9	4.1	2.4	49.3	18.6	319
France	5.7	1.4	4.9	1.3	1.6	0.6	4.2	1.4	0.8	0.3	1.3	0.7	22.6	10.5	301
Germany	2.8	0.5	1.8	0.4	1.3	0.3	1.5	0.3	0.9	0.3	1.0	0.2	37.0	7.1	408
Italy	4.5	0.8	3.5	1.0	1.9	0.6	2.6	0.9	0.9	0.4	1.3	0.5	29.2	11.5	617
New Zealand	6.9	0.4	6.5	0.4	0.9	0.1	6.0	0.4	0.4	0.1	2.4	0.2	34.0	2.7	7,263
Portugal	5.2	0.7	3.9	0.5	2.6	0.5	2.6	0.5	1.3	0.4	1.7	0.3	32.1	6.2	2,053
Spain	6.7	1.5	5.8	1.5	1.4	0.4	5.3	1.5	0.9	0.3	0.9	0.2	13.4	4.4	1,159
Netherlands	10.8	2.5	10.1	2.5	1.6	0.5	9.2	2.4	0.7	0.4	3.0	1.2	27.9	10.3	348
United States	8.6	0.9	8.2	0.9	1.3	0.2	7.3	0.9	0.4	0.1	2.8	0.4	32.4	4.2	2,304
All countries combined	**5.8**	**0.2**	**5.2**	**0.2**	**1.3**	**0.1**	**4.5**	**0.2**	**0.7**	**0.1**	**2.0**	**0.1**	**34.2**	**1.5**	**31,261**
WHO regions[a]															
Region of the Americas	10.4	0.5	9.5	0.5	2.1	0.2	8.3	0.5	0.9	0.1	3.7	0.2	35.8	2.4	7,193
African region	2.2	0.5	1.7	0.4	1.0	0.4	1.2	0.4	0.4	0.3	1.0	0.4	46.7	12.7	1,417
Western Pacific region	6.5	0.3	5.8	0.3	1.1	0.1	5.4	0.3	0.7	0.1	2.1	0.2	32.3	2.4	9,731
Eastern Mediterranean region	1.4	0.2	1.2	0.2	0.5	0.1	0.9	0.2	0.2	0.1	0.7	0.2	53.7	8.5	5,358
Western European region	5.8	0.5	4.6	0.4	2.2	0.3	3.6	0.4	1.2	0.2	1.7	0.2	28.4	3.9	5,205
Eastern European region	1.0	0.4	0.9	0.4	0.1	0.1	0.8	0.4	0.1	0.0	0.3	0.1	27.3	8.6	2,357
Comparison between countries[b]	**$F_{17,v} = 24.7$*, $P < 0.001$**		**$F_{17,v} = 23.4$*, $P < 0.001$**		**$F_{17,v} = 13.6$*, $P < 0.001$**		**$F_{17,v} = 21.7$*, $P < 0.001$**		**$F_{17,v} = 4.8$*, $P < 0.001$**		**$F_{17,v} = 13.6$*, $P < 0.001$**		**$F_{17,v} = 1.3$, $P = 0.185$**		
Comparison between low-, middle-, and high-income country groups[b]	**$F_{2,v} = 49.5$*, $P < 0.001$**		**$F_{2,v} = 58.3$*, $P < 0.001$**		**$F_{2,v} = 7.1$*, $P = 0.001$**		**$F_{2,v} = 52.0$*, $P < 0.001$**		**$F_{2,v} = 0.8$, $P = 0.446$**		**$F_{2,v} = 21.3$*, $P < 0.001$**		**$F_{2,v} = 1.3$, $P = 0.284$**		
Comparison between WHO regions[b]	**$F_{5,v} = 75.8$*, $P < 0.001$**		**$F_{5,v} = 70.6$*, $P < 0.001$**		**$F_{5,v} = 42.5$*, $P < 0.001$**		**$F_{5,v} = 67.3$*, $P < 0.001$**		**$F_{5,v} = 14.4$*, $P < 0.001$**		**$F_{5,v} = 38.3$*, $P < 0.001$**		**$F_{5,v} = 1.7$, $P = 0.128$**		

*Significant at the 0.05 level, two-sided test.
[a]**Region of the Americas** (Colombia, Mexico, Brazil, Peru, United States); **African region** (Nigeria); **Western Pacific region** (PRC Shen Zhen, New Zealand); **Eastern Mediterranean region** (Iraq, Lebanon); **Western European region** (Belgium, France, Germany, Italy, Netherlands, Spain, Portugal); **Eastern European region** (Romania).
[b]Wald design-corrected F-tests were used to determine if there is variation in prevalence estimates across countries. The denominator degree of freedom, v, is 841.
PRC: People's Republic of China

significantly higher among women than men (6.6% vs. 5.0%) (McGrath *et al.* 2015). Similar gender differences are found for prevalence of HEs but not DEs. The significant gender difference is also found for respondents with 'pure' HEs, but not 'pure' DEs. Significant differences are evident across the three country income groups in lifetime prevalence of any different PEs (Table 19.2). In each comparison the prevalence estimates are lower among respondents in low/lower-middle-income countries than in upper-middle- and high-income countries. Significant differences are also found between WHO regions. For example, regions of the Americas, Western Pacific, and Western European have higher prevalence compared to other regions that represent low-income countries.

More detailed analyses reported in our prior publication found the most common PE type overall to be visual hallucinations (3.8%) followed by auditory hallucinations (2.5%) (McGrath *et al.* 2015). Prevalence estimates of individual DEs types were low (0.3–0.7%). Among those with any lifetime PEs, 72.0% (representing 4.2% of the total sample) reported only one PE type, 21.1% (representing 1.2% of the total sample) exactly two types, and 6.8% (representing 0.4% of the total sample) three or more types. We also found that PEs are typically infrequent, with 32.2% of the respondents with lifetime PEs reporting only one solitary episode. An additional 31.8% of respondents with lifetime PEs experienced only 2–5 PEs episodes. Thus, for nearly two-thirds of respondents (64.0%) with lifetime PEs, these experiences occurred only 1–5 times in their lives. This lack of persistence of PEs across the lifetime is also indicated in Table 19.2 by the proportion of lifetime cases of PE with 12-month prevalence being relatively low (34.2% in all countries combined). This 12-month/lifetime ratio is an indicator of the course of symptoms (persistence or recurrence) and it is notable that at 34%, this proportion is substantially lower than the corresponding proportions observed for most of the mental disorders featured in this volume (see Chapter 22).

Socio-demographic Correlates

Table 19.3 shows the association of socio-demographic variables with lifetime onset of PEs, HEs, and DEs, and course of any PE, in bivariate models. Several socio-demographic variables are associated with increased lifetime risk of PEs, HEs, and DEs: (a) being younger (compared to those over 60 years); (b) being classified as 'other' employment (looking for work, disabled, etc.) (vs. employed); (c) being separated/widowed/divorced (vs. married); and (d) lower household income (vs. high income). In addition to these findings, several socio-demographic variables are associated with only one type of PE. Female gender is associated with HE and through this with any PE, but not with DE (as also noted in the section above on prevalence). Being never married is associated with DE, but not PE or HE. Lower education is associated with any PE and HE, but less consistently with DE. In general, associations between socio-demographic variables and the pure subtypes of HE and DE are similar to those for PEs in general.

In contrast to these associations between a wide range of socio-demographic variables and lifetime onset of PEs, it is notable that few socio-demographic factors are associated with course/persistence of PEs (12 months/lifetime). Employment status and educational outcomes warrant closer attention in future studies.

Age-of-Onset

Most people experience PEs early in their lives; 5% of all cases will have experienced a PE by age eight years, 25% by age 17, 50% by age 26, 75% by age 41, and 99% by age 62 (Table 19.4). The age-of-onset (AOO) distributions for PEs, DEs, and HEs do not differ by gender. The projected AOO distribution is marginally earlier for low/low-middle- (median AOO = 23, IQR = 15–41) and high-income countries (median AOO = 24, IQR = 16–40) when compared to upper-middle-income countries (median AOO = 28, IQR = 18–42) ($\chi^2_2 = 18.3$, $P < 0.001$).

The projected lifetime risk for all countries combined at age 75 is 7.8%. This is higher than the lifetime prevalence estimate (5.8%). The gap between lifetime prevalence estimates and the projected lifetime risk is 2.0%. This suggests that a small proportion of respondents who had not experienced PEs prior to survey interview can be expected to experience PEs before 75 years. Across the three country income groups, the projected lifetime risk is 53%, 38%, and 21% higher among high-, upper-middle-, and low/lower-middle-income countries respectively, compared to lifetime prevalence estimates. When classified by WHO regions, the highest projected lifetime risk for PEs is found in the Americas (14.2%) followed by Western Pacific regions (8.2%), and Western European regions (7.4%).

https://doi.org/10.1017/9781316336168.019 Published online by Cambridge University Press

Table 19.3 Bivariate associations between socio-demographic correlates and psychotic experiences, all countries combined

Correlates	Lifetime PE[a,b]		Lifetime HE[a,b]		Lifetime DE[a,b]		Lifetime pure HE[a,b]		Lifetime pure DE[a,b]		12-month PE among lifetime cases[c]	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Age-cohort												
18–29	**5.4***	(4.2–7.1)	**4.6***	(3.5–5.9)	**14.0***	(7.4–26.4)	**4.2***	(3.2–5.6)	**36.6***	(12.3–109.14)		
30–44	**2.6***	(2.0–3.2)	**2.3***	(1.8–2.9)	**4.9***	(2.8–8.4)	**2.2***	(1.7–2.8)	**9.8***	(3.8–25.3)		
45–59	**1.7***	(1.3–2.0)	**1.5***	(1.2–1.8)	**2.9***	(1.7–4.8)	**1.4***	(1.1–1.8)	**5.6***	(2.5–12.6)		
60+	**1.0**		**1.0**		**1.0**		**1.0**		**1.0**			
Age-cohort difference[d]	$\chi^2_3 = 210.3$*, P < 0.001		$\chi^2_3 = 170.3$*, P < 0.001		$\chi^2_3 = 92.8$*, P < 0.001		$\chi^2_3 = 122.7$*, P < 0.001		$\chi^2_3 = 55.5$*, P < 0.001			
Gender												
Female	**1.3***	(1.1–1.5)	**1.4***	(1.2–1.6)	**1.1**	(0.8–1.3)	**1.4***	(1.2–1.6)	**1.0**	(0.7–1.3)	**1.0**	(0.8–1.3)
Male	**1.0**		**1.0**		**1.0**		**1.0**		**1.0**		**1.0**	
Gender difference[d]	$\chi^2_1 = 12.6$*, P < 0.001		$\chi^2_1 = 15.3$*, P < 0.001		$\chi^2_1 = 0.2$, P = 0.627		$\chi^2_1 = 15.2$*, P < 0.001		$\chi^2_1 = 0.1$, P = 0.818		$\chi^2_1 = 0.0$, P = 0.878	
Employment status												
Student	**1.3**	(0.9–1.9)	**1.3**	(0.9–2.0)	**0.9**	(0.5–1.7)	**1.4**	(0.9–2.2)	**1.1**	(0.4–2.7)	**1.3**	(0.7–2.3)
Homemaker	**1.2**	(1.0–1.4)	**1.2***	(1.0–1.5)	**1.0**	(0.7–1.5)	**1.2**	(1.0–1.5)	**0.6**	(0.3–1.1)	**1.2**	(0.9–1.8)
Retired	**0.7***	(0.5–1.0)	**0.7***	(0.5–0.9)	**1.1**	(0.5–2.2)	**0.7***	(0.5–0.9)	**1.8**	(0.7–4.4)	**0.9**	(0.5–1.6)
Other	**1.5***	(1.2–1.8)	**1.5***	(1.2–1.8)	**2.2***	(1.6–3.0)	**1.2**	(1.0–1.6)	**1.4**	(0.9–2.3)	**1.5***	(1.0–2.1)
Employed	**1.0**		**1.0**		**1.0**		**1.0**		**1.0**		**1.0**	
Employment status difference[d]	$\chi^2_4 = 25.8$*, P < 0.001		$\chi^2_4 = 25.6$*, P < 0.001		$\chi^2_4 = 26.6$*, P < 0.001		$\chi^2_4 = 14.3$*, P = 0.006		$\chi^2_4 = 11.4$*, P = 0.023		$\chi^2_4 = 6.4$, P = 0.174	
Marital status												
Never married	**1.2**	(1.0–1.4)	**1.1**	(0.9–1.3)	**1.9***	(1.4–2.6)	**1.0**	(0.8–1.2)	**2.1***	(1.3–3.3)	**1.2**	(0.9–1.7)
Divorced/separated/widowed	**1.6***	(1.3–1.9)	**1.5***	(1.2–1.8)	**1.8***	(1.3–2.6)	**1.5***	(1.2–1.9)	**2.3***	(1.4–3.8)	**1.0**	(0.7–1.4)
Currently married	**1.0**		**1.0**		**1.0**		**1.0**		**1.0**		**1.0**	
Marital status difference[d]	$\chi^2_2 = 20.0$*, P < 0.001		$\chi^2_2 = 14.1$*, P = 0.001		$\chi^2_2 = 25.7$*, P < 0.001		$\chi^2_2 = 13.5$*, P = 0.001		$\chi^2_2 = 17.5$*, P < 0.001		$\chi^2_2 = 1.6$, P = 0.453	
Education level												
No education	**1.9***	(1.0–3.6)	**1.9**	(1.0–3.7)	**3.4***	(1.0–11.0)	**1.5**	(0.7–3.2)	–		**2.8***	(1.1–7.0)
Some primary	**1.6**	(0.9–2.8)	**1.8***	(1.0–3.2)	**1.7**	(0.6–5.1)	**1.6**	(0.9–2.9)	**0.4**	(0.2–1.2)	**1.3**	(0.7–2.2)
Finished primary	**0.9**	(0.6–1.4)	**0.9**	(0.6–1.4)	**0.9**	(0.3–2.6)	**0.9**	(0.5–1.5)	**0.8**	(0.2–3.6)	**1.9**	(1.0–3.8)
Some secondary	**1.3**	(1.0–1.8)	**1.3**	(1.0–1.8)	**1.4**	(0.8–2.7)	**1.3**	(0.9–1.8)	**1.0**	(0.4–2.6)	**1.0**	(0.6–1.6)
Finished secondary	**1.4***	(1.0–1.8)	**1.4***	(1.0–1.9)	**1.4**	(0.7–2.7)	**1.3**	(1.0–1.8)	**1.0**	(0.4–2.7)	**0.9**	(0.5–1.5)
Some college	**1.6***	(1.2–2.1)	**1.6***	(1.2–2.2)	**1.3**	(0.6–2.6)	**1.6***	(1.2–2.2)	**1.2**	(0.4–3.4)	**1.0**	(0.6–1.6)
Finished college	**1.0**		**1.0**		**1.0**		**1.0**		**1.0**		**1.0**	

Table 19.3 (*cont.*)

Correlates	Lifetime PE[a,b]		Lifetime HE[a,b]		Lifetime DE[a,b]		Lifetime pure HE[a,b]		Lifetime pure DE[a,b]		12-month PE among lifetime cases[c]	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Education level difference[d]	$\chi^2_6 = 17.7$*, P = 0.007		$\chi^2_6 = 19.0$*, P = 0.004		$\chi^2_6 = 5.7$, P = 0.457		$\chi^2_6 = 14.6$*, P = 0.024		$\chi^2_6 = 7.9$, P = 0.247		$\chi^2_6 = 10.7$, P = 0.097	
Household income												
Low	**1.6***	(1.4–1.9)	**1.7***	(1.4–2.0)	**1.7***	(1.3–2.3)	**1.6***	(1.3–1.9)	**1.3**	(0.8–2.0)	**1.4**	(1.0–2.0)
Low-average	**1.2**	(1.0–1.4)	**1.2**	(1.0–1.5)	**1.0**	(0.7–1.3)	**1.2**	(1.0–1.5)	**0.8**	(0.5–1.2)	**1.3**	(0.9–2.0)
High-average	**1.1**	(0.9–1.3)	**1.1**	(0.9–1.3)	**1.0**	(0.7–1.4)	**1.1**	(0.9–1.4)	**0.9**	(0.6–1.4)	**1.1**	(0.7–1.6)
High	**1.0**		**1.0**		**1.0**		**1.0**		**1.0**		**1.0**	
Household income difference[d]	$\chi^2_3 = 38.6$*, P < 0.001		$\chi^2_3 = 32.4$*, P < 0.001		$\chi^2_3 = 22.0$*, P < 0.001		$\chi^2_3 = 20.1$*, P < 0.001		$\chi^2_3 = 5.6$, P = 0.133		$\chi^2_3 = 4.6$, P = 0.203	
Age-of-onset												
Early											**1.5***	(1.0–2.3)
Early-average											**1.0**	(0.7–1.4)
Late-average											**1.1**	(0.7–1.6)
Late											**1.0**	
Age-of-onset difference[d]											$\chi^2_3 = 6.4$, P = 0.096	
Time since onset (continuous)											**0.98***	(0.97–0.99)
N[e]	**1,278,613**		**12,282,275**		**1,308,724**		**1,288,506**		**1,314,955**		**2,385**	

*Significant at the 0.05 level, two-sided test.
[a]PE, Psychotic Experiences; HE, Hallucinatory Experiences; DE, Delusional Experiences.
[b]These estimates are based on survival models adjusted for age-cohorts, gender, person-years, and country.
[c]These estimates are based on logistic regression models adjusted for time since PE onset, age of PE onset, gender, and country.
[d]Chi-square test of significant differences between blocks of socio-demographic variables.
[e]Denominator N: 2,385 = number of lifetime PE cases. The denominator in other models are referring to the number of person-years in the survival models.

Table 19.4 Standardized age-of-onset distributions of psychotic experiences (PE) with projected lifetime risk at age 75

Country	Ages at selected percentiles								Lifetime prevalence of PE		Projected risk at age 75	
	5	10	25	50	75	90	95	99	%	SE	%	SE
Low/lower-middle-income countries	**7**	**10**	**16**	**23**	**41**	**54**	**56**	**56**	**3.2**	**0.3**	**4.9**	**0.5**
Colombia[a]	13	13	24	41	56	56	56	56	7.5	1.2	13.8	3.8
Iraq	17	17	22	26	45	46	49	49	1.2	0.2	1.9	0.4
Nigeria	6	6	14	21	41	41	41	41	2.2	0.5	3.3	0.8
Peru[a]	13	13	21	25	39	50	50	50	6.4	1.4	8.8	2.5
PRC (Shenzhen)	6	8	16	27	54	54	54	54	5.3	0.8	8.3	1.8
Upper-middle-income countries	**8**	**12**	**18**	**28**	**42**	**49**	**50**	**61**	**7.2**	**0.4**	**9.9**	**0.7**
Brazil	8	14	18	27	42	49	49	61	14.9	0.9	20.8	1.8
Lebanon	29	32	50	50	50	50	50	50	1.9	0.4	3.8	1.2
Mexico[a]	8	8	8	18	36	38	38	38	4.1	1.0	6.9	1.4
Romania	6	8	19	20	29	29	29	29	1.0	0.4	1.0	0.4
High-income countries	**7**	**9**	**16**	**24**	**40**	**54**	**54**	**65**	**6.8**	**0.3**	**8.2**	**0.4**
Belgium	19	19	45	48	52	52	52	52	8.3	2.5	14.6	4.7
France	9	9	9	15	19	36	36	36	5.7	1.4	5.9	1.4
Germany	8	8	8	11	23	23	23	23	2.8	0.5	3.3	0.7
Italy	6	6	16	26	36	44	44	44	4.5	0.8	5.0	1.0
New Zealand	8	9	15	22	36	46	54	54	6.9	0.4	8.1	0.5
Portugal	5	10	16	36	40	54	54	54	5.2	0.7	6.1	1.1
Spain	13	13	14	19	48	62	62	62	6.7	1.5	8.8	2.1
Netherlands	5	5	17	21	54	65	65	65	10.8	2.5	15.3	4.3
United States	7	11	19	26	40	54	61	62	8.6	0.9	10.1	1.5
All countries combined	**8**	**10**	**17**	**26**	**41**	**52**	**54**	**62**	**5.8**	**0.2**	**7.8**	**0.3**
WHO regions												
Region of the Americas	8	12	18	26	41	49	58	62	10.4	0.5	14.2	0.9
African region	6	6	14	21	41	41	41	41	2.2	0.5	3.3	0.8
Western Pacific region	6	8	15	20	35	48	54	54	6.5	0.3	8.2	0.5
Eastern Mediterranean region	17	19	23	31	49	50	50	50	1.4	0.2	2.3	0.4
Western European region	6	10	15	26	48	54	62	65	5.8	0.5	7.4	0.8
Eastern European region	6	8	19	20	29	29	29	29	1.0	0.4	1.0	0.4

[a]The projected risk for these countries is at age 65 because the age range of these surveys is between 18 and 65.
PRC: People's Republic of China.

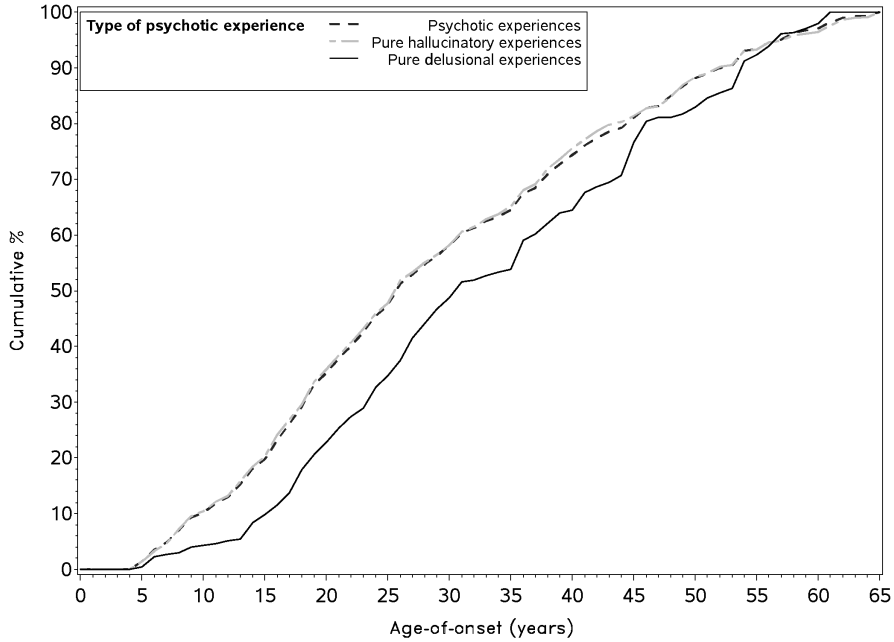

Figure 19.1 Cumulative age-of-onset distribution of psychotic experiences, all countries combined.

Figure 19.1 shows the cumulative AOO distributions of PEs and related subtypes based on projected data for the various PEs subgroups, including those with PEs, pure HEs, and pure DEs. A key feature that emerges from these distributions relates to the delayed AOO for those with pure DEs. Those with pure DEs have a later AOO distribution. The AOO for pure HEs is significantly earlier than that for pure DEs ($X^2_1 = 590.5$, $P < 0.001$).

The Bi-directional Associations between PEs and Mental Disorders

When we examined the prevalence of mental disorders among respondents with and without PEs (without considering temporal sequence), compared to those with no PEs those with PEs had significantly higher odds of having 20 of the 21 mental disorders examined (McGrath *et al.* 2016b). In this chapter we present summary results of these associations from multivariate models in Figure 19.2. We first examined temporally prior PEs and found in these models that those with PEs are significantly more likely to subsequently experience 8 of 21 disorders (major depressive disorder, bipolar disorder, generalized anxiety disorder, social phobia, posttraumatic stress disorder, adult separation anxiety disorder, bulimia nervosa, alcohol abuse). When we examined the associations between preceding mental disorders and the subsequent onset of PEs in multivariate models, we found that 18 of the 21 mental disorders are significantly associated with the later onset of PEs.

Discussion

Based on these 18 WMH samples, we found that 5.8% of respondents reported having one or more psychotic experiences at least once in their lifetime and 2.0% in the previous year. These overall estimates are broadly consistent with the previous literature (Linscott & van Os 2013). Our data have contributed important new information regarding the count of psychotic experiences types and frequency of psychotic experiences that go beyond the issues considered in previous community-based studies of psychotic experiences. Perhaps the most striking finding is that psychotic experiences were not persistent for most of the individuals who experience them, with 32.2% reporting only one psychotic experience episode in their life; 64.0% reporting no more than five lifetime occurrences and only around a third of lifetime cases reporting PEs in the past year. This suggests that in the general population,

https://doi.org/10.1017/9781316336168.019 Published online by Cambridge University Press

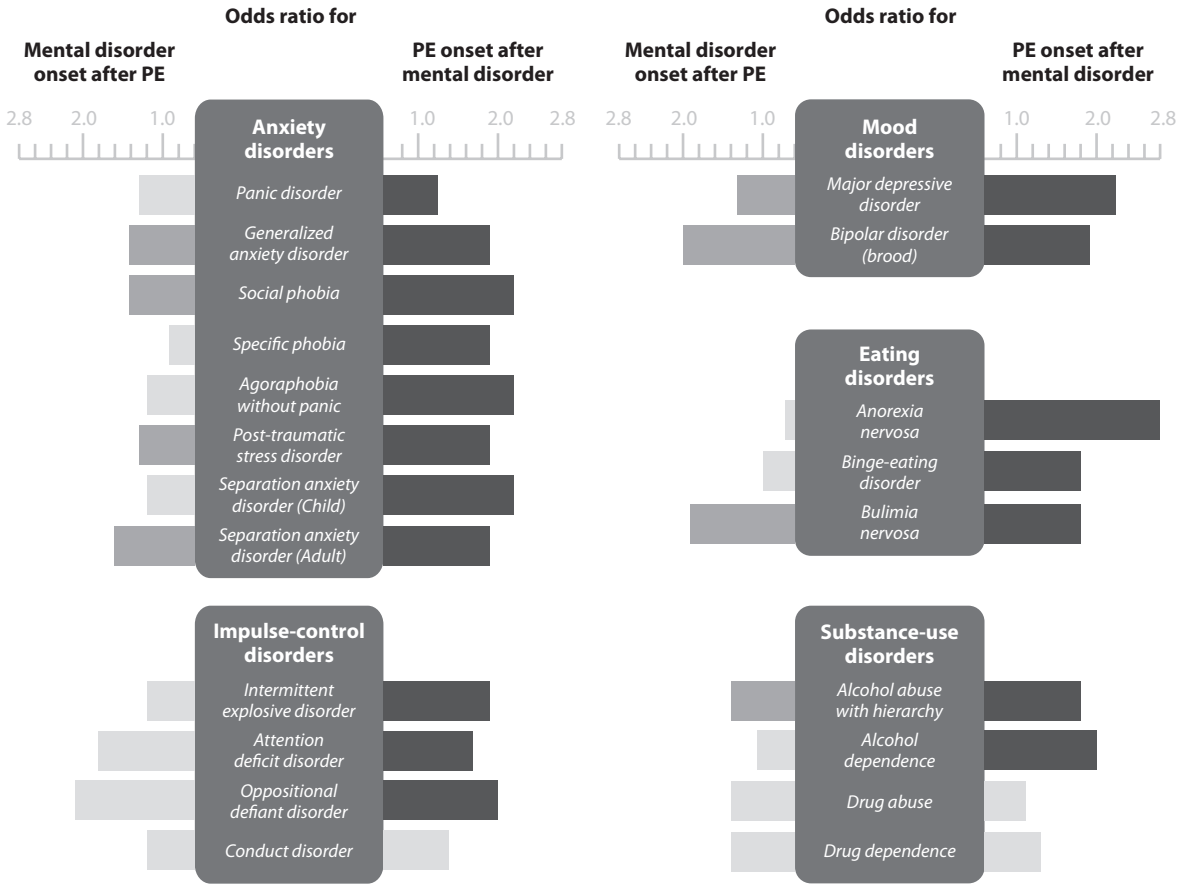

Figure 19.2 Summary of bi-directional associations between psychotic experiences (PEs) and mental disorders (odds ratios for insignificant associations are shown in the lightest grey bars).

only a small subgroup of individuals has multiple types of psychotic experiences and experiences these types of psychotic experiences more frequently. The CIDI only explores a subset of PEs (e.g. there are many types of DEs), and this needs to be taken into account when comparing prevalence estimates between studies that use difference scales to assess PEs.

The WMH data found that hallucinatory experiences are more common than delusional experiences (5.2% vs. 1.3%) and this general pattern was consistent across the three country income groups. Lifetime prevalence of psychotic experiences was lower in the low/lower-middle-income countries compared with the upper-middle- and high-income countries, reflecting a similar pattern observed in the prevalence of schizophrenia (Saha *et al.* 2005).

Based on projected AOO values, the median AOO for PEs was 26 years. Strikingly, approximately a quarter of individuals who will experience PEs during their life will have their first experience after age 40 years (McGrath *et al.* 2016a). In contrast to the AOO of schizophrenia (Thorup *et al.* 2007), we found no gender difference in the AOO of PEs (nor in HEs and DEs). The projected AOO for pure DEs was significantly right-shifted (encompassing older AOOs) compared to that for pure HEs while the AOO of PEs that contain any HEs show closely overlapping distributions. It will be of interest to explore if the risk factors associated with PEs in general differ according to AOO. For example, are respondents who have the onset of PEs later in life more likely to have a preceding mental disorder? The WMH surveys have provided us with many new research questions to guide future research.

The time-lagged associations between PEs and mental disorders provide new insights into the bi-directional relationship between psychotic experiences

https://doi.org/10.1017/9781316336168.019 Published online by Cambridge University Press

and mental disorders. The analysis demonstrates that individuals with PEs are at increased risk of experiencing a wide range of mental disorders at some stage in their life compared with other people in the population. On the other hand, we found a very consistent increased odds of psychotic experience onset after nearly all of the mental disorders we examined. That is, most mental disorders were associated with an increased likelihood of subsequent psychotic experiences, even in multivariate models. Of the 21 disorders examined in this study, only three externalizing disorders did not significantly predict subsequent psychotic experiences in the multivariate model (conduct disorder, drug abuse, and drug dependence). These findings call into the question the specificity of the association between psychotic experiences and psychotic disorders (Kelleher & Cannon 2010).

Our research has provided new insights into the fine-grained epidemiology of PEs, and also provided new insights into the bi-directional relationship between psychotic experiences and mental disorders. Epidemiologists have increasingly recognised the importance of considering psychotic experiences in the causal pathways of psychotic disorders. These new findings provide a heuristic framework for the generation of new hypotheses related to psychotic experiences.

Acknowledgements

Figure 19.2 appeared previously in: McGrath, J.J., Saha, S., Al-Hamzawi, A., Andrade, L., Benjet, C., Bromet, E.J., Browne, M.O., Caldas de Almeida, J.M., Chiu, W.T., Demyttenaere, K., Fayyad, J., Florescu, S., de Girolamo, G., Gureje, O., Haro, J.M., ten Have, M., Hu, C., Kovess-Masfety, V., Lim, C.C., Navarro-Mateu, F., Sampson, N., Posada-Villa, J., Kendler, K.S., Kessler, R.C. (2016). The bi-directional associations between psychotic experiences and DSM-IV mental disorders. *The American Journal of Psychiatry*, 173 (10), 997–1006, used with permission from The American Psychiatric Association (Journals).

References

David, A. S. (2010). Why we need more debate on whether psychotic symptoms lie on a continuum with normality. *Psychological Medicine*, 40, 1–8.

Freeman, D. & Fowler, D. (2009). Routes to psychotic symptoms: trauma, anxiety and psychosis-like experiences. *Psychiatry Research*, 169, 107–12.

Hanssen, M., Bak, M., Bijl, R., *et al.* (2005). The incidence and outcome of subclinical psychotic experiences in the general population. *British Journal of Clinical Psychology*, 44, 181–91.

Johns, L. C., Cannon, M., Singleton, N., *et al.* (2004). Prevalence and correlates of self-reported psychotic symptoms in the British population. *British Journal of Psychiatry*, 185, 298–305.

Kaymaz, N., Drukker, M., Lieb, R., *et al.* (2012). Do subthreshold psychotic experiences predict clinical outcomes in unselected non-help-seeking population-based samples? A systematic review and meta-analysis, enriched with new results. *Psychological Medicine*, 42, 2239–53.

Kaymaz, N. & van Os, J. (2010). Extended psychosis phenotype – yes: single continuum – unlikely. *Psychological Medicine*, 40, 1963–6.

Kelleher, I. and Cannon, M. (2010). Psychotic-like experiences in the general population: characterizing a high-risk group for psychosis. *Psychological Medicine*, 41, 1–6.

(2014). Whither the psychosis-neurosis borderline. *Schizophrenia Bulletin*, 40, 266–8.

Kelleher, I., Devlin, N., Wigman, J. T., *et al.* (2014). Psychotic experiences in a mental health clinic sample: implications for suicidality, multimorbidity and functioning. *Psychological Medicine*, 44, 1615–24.

Kessler, R. C. & Üstün, T. B. (2008). The World Health Organization Composite International Diagnostic Interview. *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders*. R. C. Kessler and T. B. Üstün, eds. New York: Cambridge University Press, 58–90.

Lawrie, S. M., Hall, J., McIntosh, A. M., *et al.* (2010). The 'continuum of psychosis': scientifically unproven and clinically impractical. *British Journal of Psychiatry*, 197, 423–5.

Linscott, R. J. & van Os, J. (2013). An updated and conservative systematic review and meta-analysis of epidemiological evidence on psychotic experiences in children and adults: on the pathway from proneness to persistence to dimensional expression across mental disorders. *Psychological Medicine*, 43, 1133–49.

McGrath, J. J., Saha, S., Al-Hamzawi, A., *et al.* (2015). Psychotic experiences in the general population: a cross-national analysis based on 31261 respondents from 18 countries. *JAMA Psychiatry*, 72, 697–705.

McGrath, J. J., Saha, S., Al-Hamzawi, A. O., *et al.* (2016a). Age of onset and lifetime projected risk of psychotic experiences: cross-national data from the World Mental Health Survey. *Schizophrenia Bulletin*, 42, 933–41.

McGrath, J. J., Saha, S., Al-Hamzawi, A., *et al.* (2016b). The bidirectional associations between psychotic experiences and DSM-IV mental disorders. *The American Journal of Psychiatry*, 173(10), 997–1006.

Nishida, A., Sasaki, T., Nishimura, Y., *et al.* (2010). Psychotic-like experiences are associated with suicidal feelings and deliberate self-harm behaviors

in adolescents aged 12–15 years. *Acta Psychiatrica Scandinavica*, 121, 301–7.
Saha, S., Chant, D., Welham, J., *et al.* (2005). A systematic review of the prevalence of schizophrenia. *PLoS Medicine*, 2, e141.
Saha, S., Scott, J., Varghese, D., *et al.* (2011a). The association between physical health and delusional-like experiences: a general population study. *PLoS ONE*, 6, e18566.
Saha, S., Scott, J., Varghese, D., *et al.* (2012). Anxiety and depressive disorders are associated with delusional-like experiences: a replication study based on a National Survey of Mental Health and Wellbeing. *BMJ Open*, 2, e001001.
Saha, S., Scott, J. G., Johnston, A. K., *et al.* (2011b). The association between delusional-like experiences and suicidal thoughts and behaviour. *Schizophrenia Research*, 132, 197–202.
Saha, S., Scott, J. G., Varghese, D., *et al.* (2011c). The association between delusional-like experiences, and tobacco, alcohol or cannabis use: a nationwide population-based survey. *BMC Psychiatry*, 11, 202–10.
Saha, S., Scott, J. G., Varghese, D., *et al.* (2011d). The association between general psychological distress and delusional-like experiences: a large population-based study. *Schizophrenia Research*, 127, 246–51.
Saha, S., Scott, J. G., Varghese, D., *et al.* (2013). Socio-economic disadvantage and delusional-like experiences: A nationwide population-based study. *European Psychiatry*, 28, 59–63.
Saha, S., Varghese, D., Slade, T., *et al.* (2011e). The association between trauma and delusional-like experiences. *Psychiatry Research*, 189, 259–64.
Scott, J., Chant, D., Andrews, G., *et al.* (2007). Association between trauma exposure and delusional experiences in a large community-based sample. *British Journal of Psychiatry*, 190, 339–43.
Singer, J. D. & Willett, J. B. (1993). It's about time: using discrete-time survival analysis to study duration and the timing of events. *Journal of Educational Statistics*, 18, 155–95.
Sommer, I. E. (2010). The continuum hypothesis of psychosis: David's criticisms are timely. *Psychological Medicine*, 40, 1959–61.
Thorup, A., Waltoft, B. L., Pedersen, C. B., *et al.* (2007). Young males have a higher risk of developing schizophrenia: a Danish register study. *Psychological Medicine*, 37, 479–84.
Varghese, D., Saha, S., Scott, J. D., *et al.* (2011a). The association between family history of mental disorder and delusional-like experiences: a general population study. *American Journal of Medical Genetics Part B-Neuropsychiatric Genetics*, 156B, 478–83.
Varghese, D., Scott, J., Welham, J., *et al.* (2011b). Psychotic-like experiences in major depression and anxiety disorders: a population-based survey in young adults. *Schizophrenia Bulletin*, 37, 389–93.
Werbeloff, N., Drukker, M., Dohrenwend, B. P., *et al.* (2012). Self-reported attenuated psychotic symptoms as forerunners of severe mental disorders later in life. *Archives of General Psychiatry*, 69, 467–75.
Yung, A. R., Phillips, L. J., Nelson, B., *et al.* (2011). Randomized controlled trial of interventions for young people at ultra high risk for psychosis: 6-month analysis. *Journal of Clinical Psychiatry*, 72, 430–40.

https://doi.org/10.1017/9781316336168.019 Published online by Cambridge University Press