Lifetime prevalence and age-of-onset of mental disorders in adults from the Argentinean Study of Mental Health Epidemiology

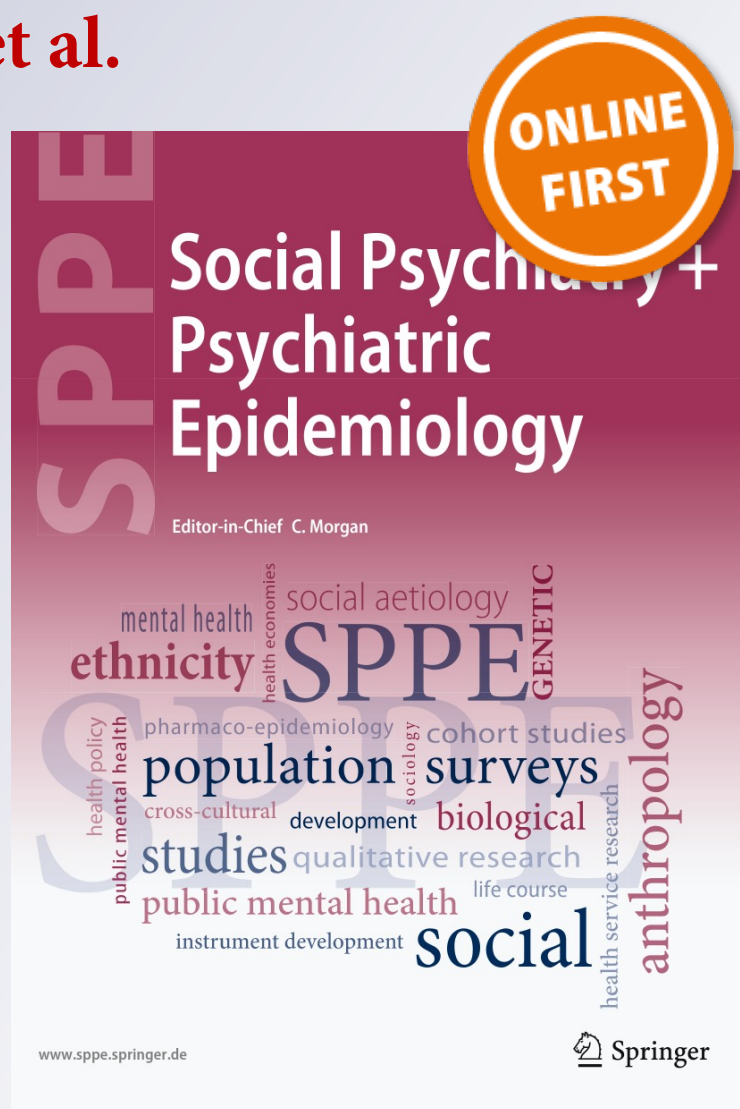**Alfredo H. Cía, Juan Carlos Stagnaro, Sergio Aguilar Gaxiola, Horacio Vommaro, Gustavo Loera, María Elena Medina-Mora, et al.**

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Lifetime prevalence and age-of-onset of mental disorders in adults from the Argentinean Study of Mental Health Epidemiology

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Abstract

Purpose Although the Global Burden of Disease Study estimated that depressive disorders and anxiety disorders are the second and fifth leading causes of disability in Argentina, these estimates were based on imputations rather than epidemiological data. The policy implications of these results for the necessary expansion of mental health services in Argentina are sufficiently great that more direct estimates of the population burdens of common mental disorders are needed. Therefore, the purpose is to present the first results regarding lifetime prevalence, projected lifetime risk up to age 75, age-of-onset, cohort effects and socio-demographic correlates of DSM-IV mental disorders among adults (18+) from the general population of urban areas of Argentina.

Method A multistage clustered area probability household survey was administered to 3927 individuals using the World Mental Health Composite International Diagnostic Interview.

Results Lifetime prevalence of any disorder was 29.1% and projected lifetime risk at age 75 was 37.1%. Median age-of-onset of any disorder was 20 years of age. Disorders with highest lifetime prevalence were major depressive disorder (8.7%), alcohol abuse (8.1%), and specific phobia (6.8%). Anxiety disorders were the most prevalent group of disorder (16.4%) followed by mood (12.3%), substance (10.4%), and disruptive behavior disorders (2.5%). Women had greater odds of anxiety and mood disorders; men had greater odds of substance disorders. Age-at-interview was inversely associated with lifetime risk of any disorder.

Discussion The results provide direct evidence for high lifetime societal burdens of common mental disorders in Argentina due to a combination of high prevalence and early age-of-onset.

Keywords Epidemiology · Argentina · Mental health · Psychiatric disorder · Lifetime prevalence

Introduction

Epidemiological data show clearly that mental disorders are highly prevalent and seriously impairing in all parts of the world [1]. Indeed, the Global burden of Disease (GBD) Study concluded that mental and substance disorders are the leading cause of years lived with disability worldwide [2]. The GBD also estimated disease burden for individual countries, although in many cases these estimates were based on imputations rather than direct epidemiological data. For

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Argentina, the focus of the current report, GBD estimated that depressive disorders and anxiety disorders are the second and fifth leading causes of disability (http://www.healthdata.org/argentina). Yet no large-scale epidemiological survey was ever carried out in Argentina to support these estimates. Given their major policy implications, it was felt that more direct data were needed to confirm these estimates.

The World Health Organization (WHO) World Mental Health (WMH) Surveys Initiative has fueled representative population surveys of common mental disorders since the year 2000 aimed to understand the distribution of mental disorders around the globe in countries from different regions with varying degrees of development to determine service needs and guide regional and global public health policy accordingly [3]. Until now, only four countries from Latin America (Brazil, Colombia, Mexico and Peru) have participated to provide lifetime prevalence estimates [4–7]. The lifetime prevalence estimates for any disorder reported from these four surveys range from 26.1% in Mexico (a nationally representative study of urban areas conducted in 2001–2002), 29% in Peru (a survey representative of metropolitan areas conducted in 2004–2005), 39.1% in Colombia (a nationally representative survey conducted in 2003) to 44.8% in Brazil (a survey representative of Sao Paulo conducted in 2005–2007). These Latin American surveys have reported early ages of onset (median age-of-onset of any disorder was age 18 in Brazil, 21 in Mexico and 22 in Peru) and overall cohort effects such that younger generations are more affected than older generations. This current study, the Argentinean Study of Mental Health Epidemiology, is the most recent survey from this initiative now providing data for Argentina.

Argentina has the highest Human Development Index (HDI) of Latin American countries, classified as very high, less human development inequality and gender inequality than the average for Latin America and the Caribbean, but greater than the average for very high HDI countries [8]. Whether the epidemiology of mental disorders in Argentina is similar or dissimilar to the other Latin American countries for which data are available is unknown. As of 2010, 40,117,096 people lived in Argentina, with 69.3% of the population aged 18 years and older and 14.3% over the age of 60 [9]. The vast majority (92%) of the population lives in urban areas and nearly 40% of the population resides in the Greater Buenos Aires area [9]. Healthcare is covered by three sectors, the public sector, the private sector, and a social security sector called *Obras Sociales*.

While the surveys in other Latin American countries have shown that mental disorders have a heavy societal burden due to high lifetime prevalence estimates coupled with largely unmet treatment needs [4–7], until now there have been no representative community studies of common mental disorders in Argentina. Having accurate and current information on the prevalence and distribution of common mental disorders is essential for developing effective policies for interventions aimed at prevention and timely treatment, especially since these disorders are likely to be under-treated due to lack of recognition on the part of the person with an illness, low rates of screening in the primary care system, and under-reporting as well as low help-seeking due to perceived stigma, barriers to treatment and insufficient treatment availability. Thus, the objective of the present study was to estimate lifetime prevalence rates, projected lifetime risk up to age 75, age-of-onset, cohort effects and basic socio-demographic correlates of mental disorders meeting Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) [10] criteria among adults from the general population of urban areas of Argentina.

Methods

Sample

The current study used a complex multistage probability sampling design that specifically targeted the population aged 18 and older with a stable residence living in the largest urban areas of the country which represents 13,913,577 individuals or 50.1% of the adult inhabitants in the country. The general geographic regions that made up the first-stage sampling units were the largest metropolitan areas including: (1) Buenos Aires, (2) Córdoba, (3) Corrientes-Resistencia, (4) Mendoza, (5) Neuquén, (6) Rosario, (7) Salta, and (8) Tucumán. Within each region, the second stage sampling units were randomly selected census areas and third stage sampling units were randomly selected households within each census area, approximately 5–7 households per sampling unit. Finally, in the fourth and last sampling stage, one individual per household was randomly selected. The response rate was 77% for a total sample of 3927 participants.

Instrument

Lifetime mental disorder and age-of-onset was evaluated with the World Mental Health Composite International Diagnostic Interview (WMH-CIDI) [11], a fully structured diagnostic interview previously used in the World Mental Health Surveys Initiative, including the Spanish Speaking Latin American countries. Pilot testing led to some minor modifications of local idiom. Diagnoses based on the CIDI have shown acceptable to good concordance with clinician diagnoses [12]. Disorders were assessed using the diagnostic criteria of the DSM-IV [10] and hierarchical rules to avoid duplication when counting disorders. Disorders were grouped as follows: mood disorders (i.e., major depressive

disorder, bipolar I and II disorder and dysthymia), anxiety disorders (i.e., panic disorder, agoraphobia without panic disorder, social phobia, specific phobia, separation anxiety disorder, obsessive–compulsive disorder, generalized anxiety disorder and post-traumatic stress disorder), substance use disorders (i.e., alcohol and drug abuse and dependence) and disruptive behavior disorders (i.e., those studied included three disorders typically manifested during childhood and adolescence, such as oppositional-defiant disorder, conduct disorder and attention deficit hyperactivity disorder as well as intermittent explosive disorder).

Retrospective age-of-onset reports were elicited using a series of questions that have been shown experimentally to yield more accurate reports than in standard questioning [13]. The sequence began with a question designed to emphasize the importance of accurate responses: "Can you remember your exact age the first time you had the symptoms?" Respondents who answered "No" were asked to bound their uncertainty by reporting the earliest age they could "clearly remember" an episode (e.g., "before you first started school?", "before you became a teenager?"). Age-of-onset was set at the upper end of the range of uncertainty.

Procedures

The research protocol and procedures were approved by the Ethics Committee of the University of Buenos Aires Medical School and have, therefore, been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Fieldwork was conducted by the Applied Statistics Research Center (CINEA) of the National University of Tres de Febrero (UNTREF). After reading the study objectives to the participants and informing them that their participation was voluntary and confidential, the interviewer answered all doubts before seeking written informed consent. All interviews were conducted face-to-face using Computer-Assisted Personal Interviewing (CAPI) methods by trained lay interviewers in respondents' homes.

As in earlier WMH surveys [14], the survey was administered in two parts. Part I, which was administered to all respondents, included assessments of core mental disorders, while Part II was administered to a probability subsample of 2116 Part I respondents consisting of all those with a Part I mental disorder, and a randomly selected subsample consisting of 23.6% of the other Part I respondents which was automatically selected by the computer. Part II focused on correlates of disorders of secondary interest and disorders that required extensive introductory questions that precluded the quick skip-out of non-cases that we wanted in Part I (i.e., disorders typically manifested during childhood or adolescence, substance use disorders, obsessive–compulsive disorder and post-traumatic stress disorder).

Data analysis

Lifetime prevalence was estimated as the weighted proportion of respondents who ever had a given disorder up to their age at interview. Age of onset and morbid risk (the projected proportion of respondents who would be estimated to meet criteria for the disorder as of age 75) were estimated using the two-part actuarial method implemented in SAS (Statistical Analysis Software) [15]. Using the actuarial method allowed us to more accurately estimate onset within a given year of life across cohorts than the more commonly used Kaplan–Meier method [16]. We also looked at socio-demographic predictors using discrete-time survival analysis with person-year as the unit of analysis using a logistic link function [17]. All analyses were based on weighted data that adjusted for differential probabilities of selection and non-response based on post-stratification to the total Argentinean population according to the 2010 Census across a range of Census socio-demographic and geographic variables assessed in the survey. A Part II weight was also applied to the Part II sample to adjust for the under-sampling of Part I non-cases and to make weighted prevalence estimates of Part I disorders identical in the Part II sample and total (Part I) samples. Because of the weighting and geographic clustering of the sample, estimates of standard errors of prevalence estimates were obtained using the Taylor Series Linearization Method with the SUDAAN software system [18] and standard errors of survival coefficients were obtained using the Jackknife Repeated Replication Method implemented in a SAS macro [19]. Logits and their standard errors were exponentiated and are reported here as odds ratios (ORs) and 95% confidence intervals (CIs). Analyses of Part I disorders were based on the total sample ($n = 3927$) and of Part II disorders using the Part II sample ($n = 2116$). Significance was evaluated consistently using two-sided 0.05-level tests.

Results

Prevalence

As shown in Table 1, lifetime prevalence of at least one DSM-IV mental disorder was 29.1%, while 12.6% of respondents had two or more disorders, and 5.7% had three or more. The most common class of disorders was anxiety disorders (16.4%), followed by mood disorders (12.3%), substance use disorders (10.4%), and least frequent disruptive behavior disorders (2.5%). In terms of individual disorders, the disorder with the highest lifetime prevalence was major depressive disorder (8.7%), followed by alcohol abuse (8.1%), and specific phobia (6.8%). Overall, prevalence was inversely related to age group. Among

Table 1 Lifetime prevalence of DSM-IV mental disorders in the total sample and by age group

Disorder group/disorder	N	Age groups										χ^2	df	p value
		Total		18–34		35–49		50–64		65+				
		%	SE	%	SE	%	SE	%	SE	%	SE			
Anxiety														
Panic disorder	68	1.5	0.4	1.3	0.6	2.1	0.7	1.7	0.4	0.7	0.3	7.4	3	0.059
GAD with hierarchy	160	3.9	0.5	3.0	0.6	3.9	0.9	5.1	1.2	4.6	1.1	3.6	3	0.313
Social phobia	111	2.6	0.3	3.1	0.5	3.7	0.7	1.8	0.5	0.5	0.1	48.0	3	0.000
Specific phobia	289	6.8	0.5	6.9	0.8	7.1	0.9	7.8	1.0	4.9	0.8	7.9	3	0.048
Agoraphobia w/o panic	24	0.5	0.1	0.5	0.3	0.7	0.2	0.4	0.2	0.2	0.2	3.4	3	0.334
PTSD	122	2.8	0.3	3.1	0.5	3.4	0.8	2.3	0.8	1.9	0.4	4.5	3	0.210
OCD	33	2.9	0.8	3.5	1.2	2.1	1.0	3.9	2.5	1.3	0.7	2.8	3	0.425
SAD/ASA	127	3.1	0.3	4.1	0.6	3.1	0.7	2.1	0.6	1.7	0.7	10.9	3	0.012
Any anxiety	618	16.4	1.1	17.2	1.6	16.4	1.6	18.8	3.9	11.3	1.9	6.3	3	0.098
Mood														
MDD with hierarchy	390	8.7	0.6	9.4	0.8	8.0	1.0	9.2	1.2	7.6	1.4	3.2	3	0.361
DYS with hierarchy	37	0.6	0.2	0.5	0.2	0.6	0.2	0.9	0.3	0.7	0.4	0.8	3	0.839
Bipolar-broad	144	3.5	0.4	4.8	0.7	4.3	0.8	2.1	0.7	0.9	0.4	30.6	3	0.000
Any mood	532	12.3	0.6	14.0	0.9	12.3	1.3	11.7	1.2	8.5	1.4	12.1	3	0.007
Disruptive behavior														
ODD with hierarchy	41	1.0	0.2	1.7	0.4	0.9	0.4	0.2	0.2	0.4	0.3	11.0	3	0.012
CD	25	0.8	0.2	1.4	0.4	0.7	0.2	0.1	0.1	0.3	0.2	17.0	3	0.001
ADHD	40	1.1	0.3	1.5	0.5	1.1	0.5	0.8	0.4	0.8	0.4	4.0	3	0.266
IED with hierarchy	1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3	0.792
Any disruptive	91	2.5	0.3	4.1	0.7	2.2	0.6	0.9	0.4	1.2	0.5	35.9	3	0.000
Substance														
ALC abuse with or without DEP	238	8.1	0.8	13.7	1.5	6.9	1.3	3.7	1.0	1.6	0.7	55.8	3	0.000
ALC abuse without DEP	205	7.0	0.7	11.9	1.2	6.4	1.3	2.5	0.7	1.2	0.5	61.2	3	0.000
ALC DEP with or without abuse	35	1.2	0.3	1.8	0.5	0.5	0.2	1.3	0.8	0.4	0.4	7.4	3	0.061
Drug abuse with or without DEP	129	4.0	0.5	6.5	1.2	4.1	0.8	1.8	0.4	0.3	0.3	30.4	3	0.000
Drug abuse without DEP	90	3.0	0.5	4.6	1.1	3.2	0.8	1.6	0.4	0.3	0.3	18.6	3	0.000
Drug DEP with or without abuse	44	1.2	0.3	1.9	0.5	1.4	0.4	0.3	0.2	0.0	0.0	17.3	3	0.001
Any substance	312	10.4	0.9	16.2	1.7	10.2	1.5	5.6	1.1	2.0	0.7	51.8	3	0.000
All Disorders														
Any disorder	1032	29.1	1.4	35.4	2.4	27.9	1.9	27.0	4.1	17.3	2.5	30.0	3	0.000
2+ disorders	499	12.6	0.8	15.8	1.4	12.6	1.4	10.5	1.2	7.0	1.4	24.7	3	0.000
3+ disorders	245	5.7	0.6	7.8	1.0	5.6	0.8	4.9	1.1	1.4	0.5	30.8	3	0.000

Part I, sample size = 3927; part II, sample size = 2116

ALC (alcohol); ADHD (attention deficit hyperactivity disorder); CD (conduct disorder);DEP (dependence); DyS(dysthymia); GAD (generalized anxiety disorder); IED (intermittent explosive disorder); LT (lifetime); MDD (major depressive disorder); OCD (obsessive-compulsive disorder); ODD (oppositional-defiant disorder); PTSD (post-traumatic stress disorder); SAD (Separation Anxiety Disorder)

younger age groups (18–34), the lifetime prevalence of any mental disorder was higher (i.e., 35.4%) compared to the 35–49, 50–64 and 65+ age groups (27.9%, 27.0% and 17.3%, respectively). Younger age groups also had a greater number of lifetime disorders. For example, 7.8% of those aged 18–34 had three or more disorders compared to 5.6% of those 35–49, 4.9% of those 50–64 and 1.4% of those 65 or older met criteria for three or more disorders.

However, there were some exceptions to this general tendency. Some disorders, such as obsessive–compulsive disorder or dysthymia, among others, did not have statistically significant age group differences and two others, namely, social phobia and specific phobia had the highest prevalence among the middle age groups (those aged 35–49 and 50–64, respectively).

Age-of-onset (AOO)

The age-of-onset (AOO) distributions are presented in Table 2. The median age-of-onset for any disorder (50th percentile of the AOO distribution) was 20. Disruptive behavior disorders had the earliest ages of onset (median AOO = 11), followed by anxiety disorders (median AOO = 19), substance use disorders (median AOO = 21 years old), and lastly, mood disorders (median AOO = 29). Interquartile ranges (the number of years between the 25th and 75th percentile of AOO distributions) were lower for disruptive behavior disorders

(4 years) and substance use disorders (11 years); in contrast, mood disorders (29) and anxiety disorders (34) present a higher variability of age-of-onset with lower AOO for phobias and separation anxiety and later for GAD and OCD.

Morbid risk

Morbid risk or projected lifetime risk (PLR) of any disorder as of age 75 from the AOO distributions (see Table 2) is 37.1%. This is 28% higher than the lifetime prevalence estimate for any disorder reported in Table 1.

Table 2 Projected lifetime risk at age 75 of DSM-IV mental disorders and percentiles of age at onset

Disorder group and disorder	Percentiles of age at onset								Projected LT risk age 75	
	5	10	25	50	75	90	95	99	%	SE
Anxiety										
Panic disorder	7	14	18	31	44	55	56	56	2.3	0.5
GAD with hierarchy	18	21	31	46	63	70	70	74	7.5	1.0
Social phobia	5	6	8	14	19	26	28	41	2.8	0.3
Specific phobia	5	5	6	11	19	38	58	62	7.9	0.6
Agoraphobia without panic[+]	–	–	–	–	–	–	–	–	–	–
PTSD	7	9	16	32	49	68	69	70	4.7	0.7
OCD	5	14	16	44	58	58	58	58	5.4	2.6
SAD/ASA	5	6	8	14	27	43	47	55	3.6	0.3
Any anxiety	5	5	10	19	44	62	69	70	21.9	1.8
Mood										
MDD with hierarchy	12	16	21	36	51	62	68	74	15.3	1.4
DYS with hierarchy	10	12	18	34	45	57	63	63	1.0	0.2
Bipolar broad	6	13	18	26	44	51	58	66	5.2	0.6
Any mood	9	14	19	29	48	59	66	74	19.8	1.3
Disruptive behavior										
ODD with hierarchy	7	8	9	11	11	14	15	22	1.0	0.2
CD[+]										
ADHD	6	7	8	9	11	14	15	15	1.1	0.3
IED with hierarchy[+]	–	–	–	–	–	–	–	–	–	–
Any disruptive	6	7	9	11	13	16	17	19	2.6	0.3
Substance										
ALC abuse with or without DEP	15	16	19	21	29	51	56	61	10.0	1.1
ALC abuse without DEP	16	16	19	21	27	51	53	61	8.4	0.9
ALC DEP with or without abuse	12	15	19	19	28	31	31	47	1.3	0.4
Drug abuse with or without DEP	5	13	17	19	31	44	46	63	5.0	0.7
Drug abuse without DEP	5	13	18	20	37	44	46	63	3.8	0.7
Drug DEP with or without abuse	14	16	17	21	27	36	60	60	1.4	0.3
Any substance	13	15	18	21	29	46	53	61	12.6	1.1
All disorders										
Any disorder	5	6	12	20	38	58	63	70	37.1	2.2

ALC (alcohol); ADHD (attention deficit hyperactivity disorder); CD (conduct disorder); DEP (dependence); DyS(dysthymia); GAD (generalized anxiety disorder); IED (intermittent explosive disorder); LT (lifetime); MDD (major depressive disorder); OCD (obsessive–compulsive disorder); ODD (oppositional-defiant disorder); PTSD (post-traumatic stress disorder); SAD (separation anxiety disorder)

[+]Cell size ≤ 30 cases, too small to estimate

Unsurprisingly, the disorders with the latest ages of onset have the highest increases between prevalence and PLR, namely generalized anxiety disorder, obsessive–compulsive disorder, and major depressive disorder. Consistent with the prevalence data, projected lifetime risk is highest for anxiety disorders (PLR = 21.9%), followed closely by mood disorders (PLR = 19.8%), substance use disorders (PLR = 12.6%) and with a very small increase, disruptive behavior disorders (PLR = 2.6%).

Cohort effects

Table 3 shows cohort effects such that age groups 18–34, 35–49, 50–64, and 65+ (corresponding roughly to cohorts born in 1980 or later, between 1979 and 1966, 1965 and 1950, and before 1950, respectively) were put into discrete-time survival analysis to predict lifetime disorders. For all but three disorders (obsessive compulsive disorder, dysthymia, and attention deficit/hyperactivity disorder) the odds ratios (ORs) showed a statistically significant positive

Table 3 Cohort as predictor of lifetime risk of DSM-IV mental disorders

Disorder	Age group												χ^2	df	p value
	18–34			35–49			50–64			65+					
	OR	LCL	UCL	OR	LCL	UCL	OR	LCL	UCL	OR	LCL	UCL			
Panic disorder	7.8*	2.0	30.7	6.7*	1.7	26.4	3.6*	1.0	12.2	1.0	1.0	1.0	10.3	3	0.016
GAD with hierarchy	6.5*	3.2	13.1	2.8*	1.7	4.7	2.0*	1.1	3.8	1.0	1.0	1.0	30.3	3	0.000
Social phobia	6.5*	3.2	13.1	7.2*	4.0	12.9	3.3*	1.6	6.8	1.0	1.0	1.0	51.6	3	0.000
Specific phobia	1.8*	1.1	2.8	1.7*	1.1	2.7	1.7*	1.1	2.5	1.0	1.0	1.0	9.1	3	0.028
Agoraphobia without panic	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PTSD	6.2*	2.6	14.9	4.0*	1.7	9.5	1.8	0.8	4.4	1.0	1.0	1.0	21.2	3	0.000
OCD	14.7*	1.0	209	7.1	0.4	121	5.3	0.4	67.9	1.0	1.0	1.0	6.6	3	0.086
SAD/ASA	3.8*	1.5	9.4	2.2	0.8	6.1	1.2	0.4	4.0	1.0	1.0	1.0	15.3	3	0.002
Any anxiety	3.5*	2.3	5.3	2.6*	1.7	4.1	2.4*	1.1	5.1	1.0	1.0	1.0	63.2	3	0.000
MDD with hierarchy	5.6*	3.2	9.7	2.3*	1.4	3.8	1.6*	1.1	2.5	1.0	1.0	1.0	55.8	3	0.000
DYS with hierarchy	2.1	0.4	10.8	1.2	0.3	4.9	1.3	0.4	3.9	1.0	1.0	1.0	1.8	3	0.618
Bipolar broad	23.9*	8.2	69.7	11.6*	3.5	38.5	2.9	0.7	12.6	1.0	1.0	1.0	65.3	3	0.000
Any mood	6.8*	4.2	10.9	3.1*	1.8	5.2	1.8*	1.2	2.8	1.0	1.0	1.0	90.0	3	0.000
ODD with hierarchy	4.5	0.9	21.6	2.4	0.4	14.1	0.6	0.1	3.5	1.0	1.0	1.0	13.7	3	0.003
CD	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ADHD	1.9	0.6	6.1	1.5	0.3	7.4	1.0	0.2	4.1	1.0	1.0	1.0	4.8	3	0.184
IED with hierarchy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Any disruptive behavior	3.4*	1.4	8.4	1.9	0.6	5.9	0.7	0.2	2.4	1.0	1.0	1.0	44.3	3	0.000
ALC abuse with or without DEP	23.2*	9.7	55.6	7.7*	3.1	19.6	2.8	0.9	8.2	1.0	1.0	1.0	206.5	3	0.000
ALC abuse without DEP	26.5*	12.9	54.5	10.0*	4.2	23.4	2.5*	1.1	5.9	1.0	1.0	1.0	153.7	3	0.000
ALC DEP with or without abuse	6.1*	1.0	36.2	1.1	0.2	7.4	3.1	0.4	25.5	1.0	1.0	1.0	13.7	3	0.003
Drug abuse with or without DEP[+]	8.1*	3.1	21.6	3.3*	1.5	7.1	1.0	1.0	1.0	–	–	–	20.6	2	0.000
Drug abuse without DEP[–]	6.9*	2.4	19.9	2.9*	1.2	7.2	1.0	1.0	1.0	–	–	–	14.5	2	0.001
Drug DEP with or without abuse[+]	14.0*	3.9	50.1	7.2*	2.1	25.2	1.0	1.0	1.0	–	–	–	18.4	2	0.000
Any substance	20.5*	8.6	48.9	8.3*	3.4	20.0	3.4*	1.3	8.5	1.0	1.0	1.0	86.0	3	0.000
Any disorder	5.5*	4.0	7.6	3.0*	2.1	4.3	2.2*	1.2	3.9	1.0	1.0	1.0	173.7	3	0.000

Based on discrete-time survival models with person-year as the unit of analysis

Controls are time intervals

ALC (alcohol); ADHD (attention deficit hyperactivity disorder); CD (conduct disorder);DEP (dependence); DyS(dysthymia); GAD (generalized anxiety disorder); IED (intermittent explosive disorder); LCL (lower confidence limit); LT (lifetime); MDD (major depressive disorder); OCD (obsessive–compulsive disorder); ODD (oppositional-defiant disorder); PTSD (post-traumatic stress disorder); SAD (separation anxiety disorder); UCL (upper confidence limit)

*Significant at the 0.05 level

[+]With the purpose to make the model more stable, the age categories 50–64 and 65+ were collapsed. In this outcome, the reference category is 50 and more

[–]Cell size ≤ 30 cases, too small to estimate

association between recency of cohort and odds of disorder. The largest cohort effects were associated with substance use disorders (ORs ranging from 3.4 for 50–64 years olds to 20.5 for the youngest cohort in comparison to the oldest cohort) and the smallest cohort effects were found for disruptive behavior disorders (OR of 3.4 for the youngest cohort and non-significant for all later cohorts).

To indirectly evaluate effects of differential recall or mortality, we further evaluated inter-cohort effects on age-of-onset of disorders (see Table 4). Inter-cohort differences with higher risks for younger groups were significant for most disorders, regardless of whether they were early, middle or late onset disorders suggesting that cohort effects are not due to inter-cohort differences.

Socio-demographic correlates

With regards to socio-demographic correlates (see Table 5), women had 90% greater odds of anxiety disorders and 28% greater odds of mood disorders than men, but lower odds of substance use disorders (OR = 0.30). No sex difference was found for disruptive behavior disorders. Students had lower odds of both mood and disruptive behavior disorders (ORs = 0.17 and 0.24, respectively) compared to those with

a medium to high level of education. Those with low education (less than secondary) had higher odds than those with higher education of anxiety, mood and substance use disorders (ORs from 1.31 to 2.05).

Discussion

An important proportion of the adult Argentinean population has experienced a mental disorder in their lifetime (29.1%) and even more are expected to experience a disorder by the time they reach the age of 75 (37.1%). A small group (5.7%) has experienced three or more comorbid disorders. These estimates are within the lower limits of the range reported for the other four Latin American countries (Brazil, Colombia, Mexico and Peru) [4–7] and well within the range reported overall across the globe [20] with very similar median ages of onset and cohort effects. These lifetime prevalence estimates, coupled with cohort effects that show a greater prevalence in more recent cohorts, and early ages of onset in the first three decades of life have important public health policy implications.

First, developing a mental disorder at a young age may have repercussions for educational attainment [21], labor

Table 4 Variation in the effects of cohort in predicting lifetime risk of DSM-IV mental disorders

Disorder	Age group	Age-of-onset								
		Early			Middle			Late		
		OR	LCL	UCL	OR	LCL	UCL	OR	LCL	UCL
Anxiety	18–34	2.449*	1.200	4.999	4.477*	2.147	9.336	5.154*	2.447	10.854
	35–49	3.079*	1.729	5.484	2.026	0.891	4.604	2.984*	1.674	5.321
	50–64	2.181	0.853	5.572	2.796	0.904	8.649	2.376*	1.000	5.645
	65+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	χ^2	17.038	3.000	0.001	30.189	3.000	0.000	29.236	3.000	0.000
Global χ^2 = 9.595 df = 6 p = 0.143/early 4–8, middle 9–18, late > 18										
Mood	18–34	5.978*	2.388	14.965	8.371*	3.037	23.079			
	35–49	3.968*	1.437	10.954	3.006*	1.059	8.534	2.953*	1.270	6.866
	50–64	1.940	0.694	5.424	1.750	0.731	4.187	1.868*	1.031	3.385
	65+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	χ^2	26.401	3.000	0.000	56.406	3.000	0.000	6.982	2.000	0.030
Global χ^2 = 9.171 df = 5 p = 0.102/early 4– 17, middle 18–27, late > 27										
Substance	18–34	4.927*	1.804	13.459	7.314*	2.595	20.614	7.134*	2.568	19.812
	35–49	1.729	0.616	4.855	4.578*	1.633	12.838	2.258	0.906	5.628
	50–64	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	χ^2	19.612	2.000	0.000	15.528	2.000	0.000	19.299	2.000	0.000
Global χ^2 = 4.094 df = 4 p = 0.393/early 4–17, middle 18–20, late over 27										

Model includes time intervals and gender as controls

Disruptive behavior disorders were not included because most of these disorders begin in a short period of time

OR (odds ratio); LCL (lower confidence limit); UCL (upper confidence limit)

*Significant at the 0.05 level

[+]There were no respondents in the 18–34 age group with late onset in mood disorders

Table 5 Socio-demographic correlates of lifetime DSM-IV mental disorders

Characteristics	Any anxiety disorder			Any mood disorder			Any behavior disorder			Any substance disorder		
	OR	LCL	UCL	OR	LCL	UCL	OR	LCL	UCL	OR	LCL	UCL
Sex												
Female	1.902*	1.343	2.694	1.284*	1.023	1.612	0.832	0.562	1.233	0.299*	0.191	0.470
Male	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sex χ^2(df, p)	14.276	1	0.001	5.041	1	0.041	0.913	1	0.339	29.848	1	0.001
Education												
Student	1.566	0.897	2.735	0.169*	0.124	0.230	0.241*	0.103	0.563	1.113	0.556	2.229
Low (< secondary)	1.663*	1.044	2.649	1.308*	1.003	1.705	1.000	1.000	1.000	2.050*	1.286	3.267
Med/high (secondary +)	1.000	1.000	1.000	1.000	1.000	1.000	–	–	–	1.000	1.000	1.000
Education χ^2(df, p)	5.094	2	0.078	289.820	2	0.001	11.782	1	0.001	10.086	2	0.006

Models include time intervals as controls

OR (odds ratio); LCL (lower confidence limit); UCL (upper confidence limit)

*Significant at the 0.05 level

force participation [22], interpersonal relations such as marriage and divorce [23], and even subsequent chronic physical conditions [24]. Second, the early ages of onset suggest the need for prevention, detection and timely treatment targeted to children and adolescents and the human resources to do so. National child and adolescent mental health policies and programs, information systems and human resources trained to deliver mental health care for children and adolescents are insufficient in most countries [25]. Third, the method used to estimate lifetime risk is based on the assumption of a constant conditional risk of a first onset, during a given year, among people with different ages at the moment of the interview. This assumption is difficult to defend in the light of the evidence for significant cohort differences in lifetime prevalence. Because the estimated prevalence was higher in more recent (younger) cohorts, lifetime risk in younger cohorts is likely underestimated in this model which is based on the assumption of constant inter-cohort conditional risk [19]. Thus, we can expect prevalence and service needs will increase in the future. Argentine public health policy makers should take these findings into account. The only three disorder for which we did not find a significant cohort effect (OCD, dysthymia and ADHD), all showed tendencies in the direction of greater prevalence among younger cohorts though not statistically significant. The lack of a cohort effect for ADHD in particular is interesting given the findings of an increased prevalence of diagnosed and treated ADHD in countries like the United States and the United Kingdom [26, 27], though this is likely related more to increased detection rather than a true increase in prevalence as Polanczyk et al. [28] in a systematic review and meta-regression analysis of 154 studies of the prevalence of ADHD across the globe found no evidence for increasing rates of ADHD over three decades. The greatest cohort effects for substance use disorders found in this study and

in a report of WMH surveys in 17 countries [20], are likely due to the increased availability of substances, decreased perceptions of risk, changes in substance production, routes and markets, among many possible reasons.

Our finding that women had greater odds of anxiety and mood disorders and lesser odds of substance use disorders is consistent with findings from other studies around the world [29], however, the magnitude of the association of female sex with mood disorders (OR = 1.28) is less than the two-fold risk often reported [30]. Seedat and colleagues found a narrowing of differences between the sexes for major depressive disorder in more recent cohorts which was related to changes in the traditionalism of female gender roles; in other words less gender inequality (as indicated by educational equality, labor force equality, later ages of marriage, and use of contraception) was associated to narrower sex differences in major depressive disorder [29]. Argentina's Gender Inequality Index, while higher than other countries with a high HDI, is lower than the average for Latin America [8] and might partially explain, along with the inclusion of bipolar in the mood disorders category, the smaller association of sex with mood disorders overall in Argentina. Being a current student was associated with lower odds of a mood and behavior disorder while low educational attainment compared to higher educational attainment was associated with higher odds of anxiety, mood and substance use disorders. This may be due to early onset disorders influencing school dropout [21] or as a result of greater life stress and ill health of those that have low levels of education [31].

This study is not without limitations. First, because of logistic constraints, this survey is representative only of the largest urban metropolitan areas and not nationally representative. Estimates may be biased in a number of ways. Because participants were limited to those with a permanent residence, prevalence may be underestimated by the

exclusion of homeless, hospitalized or institutionalized individuals. Likewise, prevalence may be underestimated by respondents' ability to recall symptoms experienced years before or by willingness to disclose potentially stigmatizing behaviors or symptoms. Greater recall bias by older participants might lead to an overestimation of cohort effects [32]. While our results shown in Table 3 suggest that younger cohorts have a greater prevalence overall of lifetime disorders, our results presented in Table 4 suggest that this was not influenced by inter-cohort effects, that is the age of onset of disorders did not differ by cohort. Continued prospective epidemiologic vigilance is necessary to determine if and how much cohort effects are overestimated. Additionally, diagnosis was based on a non-clinician fully structured diagnostic instrument. While clinician diagnoses would have been preferable, adequate agreement of the WMH–CIDI with clinician diagnoses has been reported [12], though not specifically for the Argentine population.

Despite these limitations, which are similar to the limitations faced by all cross sectional epidemiologic surveys of this type, this study contributes to an understanding of the distribution of mental disorders across the globe by filling a void of data in Latin America in general, and specifically for Argentina.

Compliance with ethical standards

Conflict of interest In the past 3 years, Dr. Kessler received support for his epidemiological studies from Sanofi Aventis; was a consultant for Johnson & Johnson Wellness and Prevention, Sage Pharmaceuticals, Shire, Takeda; and served on an advisory board for the Johnson & Johnson Services Inc. Lake Nona Life Project. Kessler is a co-owner of DataStat, Inc., a market research firm that carries out healthcare research. On behalf of all authors, the corresponding author states that none of the other authors have conflicts of interest.

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