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Clinical Psychology

Prevalence of behavioral and mental disorders in Manizales, Colombia

Daniel Landínez Martínez^{1,2*}, Anyerson Gómez Tabares¹, Daniel Rincón Cuartas³

Abstract

Background: Mental and behavioral disorders are responsible for the largest proportion of the global burden of disease; yet, there is sound evidence that the prevalence of these disorders is variable worldwide. Indeed, such disorders are highly inconsistent in Manizales, Colombia when compared to national data.

Objective: This study aims at describing the prevalence of behavioral and mental disorders in Manizales, Colombia. *Methods:* This is an observational, descriptive and cross-sectional study.

Results: Findings suggest that a total of 30.3% of all participants displayed behavioral and emotional disorders with onset usually occurring in childhood and adolescence, 28% showed disorders of psychological development, followed by mood [affective] disorders (11%), organic, including symptomatic, mental disorders (9.3%), mental retardation (7.2%), symptoms and signs involving cognition, perception, emotional state and behavior (6.8%). An additional finding of this study was that disorders of psychological development are highly prevalent in females.

Conclusion: This article highlights the need for and importance of longitudinal studies focused on early-onset disorders. These studies need to begin during infancy to truly capture the prodromal period for early-onset disorders.

¹ Luis Amigó Catholic University, Manizales, Colombia

² University of Manizales Medical School, Manizales, Colombia

³ Clinical Director Rincón Cuartas IPS, Colombia

E-mail corresponding author: daniel.landinezma@amigo.edu.co

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1. Introduction

Mental health is defined by the World Health Organization (WHO) as a state of well-being in which every individual realizes his/her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to his or her community (Vigo et al., 2016). This state, however, is disrupted in one of every three individuals during their lifetimes

(Steel et al., 2014). Mental disorders were the second leading cause of disease burden in terms of years lived with disability (YLDs) and the sixth leading cause of disability-adjusted life-years (DALYs) in the world in 2017, posing a serious challenge to health systems, particularly in low-income and middle-income countries (India State-Level Disease Burden Initiative Mental Disorders Collaborators, 2020).

However, higher than normal levels of depression, anxiety, distress and insomnia have been reported since the outbreak of COVID-19 (Wu et al., 2021). Previous studies reported that 6.6% (95% CI: 5.9%-7.3%) of the general population of the USA were affected by major depression disorder (Kessler et al., 2003), while 10.8% (95% CI: 9.1%-12.5%) and 14.7% (95% CI: 12.7%-16.6%) of the 3,001 adults selected at random from the general population of Sweden underwent depression and anxiety in 2009, respectively (Johansson et al., 2013). Elsewhere, 6.2% (95% CI: 3.4%-10.4%) of the adult indigenous population of Panama reported serious psychological distress under normal circumstances (Walker et al., 2019). All of these rates were much lower than those of all of the populations included in another study (Wu et al., 2021). Similarly, before the outbreak of COVID-19, the prevalence of insomnia in the general population of Turkey was 12.2% (95% CI: 11.2%-13.1%) (Benbir et al., 2015), while a meta-analysis reported a prevalence of insomnia among the general population of China of 15% (95% CI: 12.1%- 18.5%) (Cao et al., 2017).

Mental health is being recognized as one of the priority areas in public health policies around the world and has also been included in the sustainable development goals (Kyu et al., 2018). In fact, research has indicated that effective self-care practices involve self-awareness, self-compassion, the practice of altruism and the implementation of a variety of strategies across physical, social and inner self-care domains (Adams et al., 2020; Callahan et al., 2018; Mills et al., 2020). In a national study of Australians nurses and doctors within palliative care units, 100% of those using a self-care plan reported it to be an effective strategy, while 70% of those not currently using a self-plan indicated they would consider developing a self-care plan if they were supported to do so (Adams et al., 2020).

Globally, rapid economic, demographic, and epidemiological transitions mean a growth in populations that are living longer, but with greater morbidity and disability (Atun, 2015). For example, one study reported that the incidence of cognitive impairment in Europe ranged from 30.70 to 76.50 per 1000 person-years (median = 56.5 per 1000 person-years (25th percentile = 51.45; 75th percentile = 76.5) (Etgen, 2010; Luck et al., 2010a, 2010b; Ravaglia et al., 2008; Veronese et al., 2016). In North America, this ranged from 41.8 to 215 per 1000 person-years

(median = 60.4 per 1000 person-years; 25th percentile = 47.19; 75th percentile = 65.42) (Alhurani et al., 2016; Boyle et al., 2010; Mejia-Arango & Gutierrez, 2011; Plassman et al., 2011; Potvin et al., 2011) and in Singapore the incidence was reported as 22 per 1000 person-years (Feng et al., 2016). Behavioral and mental disorders are a major driver of the growth of overall morbidity and disability globally (Prince et al., 2007). Five types of mental illness appear in the top 20 causes of global burden of disease: major depression (2nd), anxiety disorders (7th), schizophrenia (11th), dysthymia (16th), and bipolar disorders (17th) were leading causes of YLDs in 2013 (Global Burden of Disease Study 2013 Collaborators, 2015).

Depressive disorders affect more than 300 million people (4.4% of the global population), and its prevalence in the African continent is estimated at 9% (29.9 million cases) in the general population (Endomba et al., 2020). Others have found that lifetime prevalence ranged from 2% in China (Lu et al., 2008), 6.7% in South Korea (Cho et al., 2015), 20.5% in Chile (Markkula et al., 2017), to 21% in France (Bromet et al., 2011). The 12-month prevalence ranged between 1.1% in China (Lu et al., 2008) and 10.4% in Brazil (Bromet et al., 2011). By continent, the highest prevalence was in Europe (Goldney et al., 2010) and the lowest in Asia (Liu et al., 2015). In European countries, average lifetime prevalence was 11.32% and average 12-month prevalence 2.2% (Markkula et al., 2015).

In Latin America, there has been an increasing number of studies on the prevalence of mental illness in the community, with data on service utilization (Kohn et al., 2018). Alarming, 67% of Hispanic adults with any mental illness and 44% of those with a serious mental illness received no treatment (Hirai et al., 2021). On the other hand, studies on the rates of mental illness in children, adolescents, and indigenous population have been conducted. For instance, a systematic review found that the prevalence of dementia in Latin America in people older than 65 years old ranged from 0.2% to 39.4% (CI: 95%: 9% - 12%). According to sex, dementia is more common in Latin American females than males (Zurique Sánchez et al., 2019).

Another study reported that in Argentina, the 12-month prevalence of any mental disorder was 14.8%, with 10.7% having one disorder, 2.4% two disorders and 1.6% three or more disorders. The most common diagnostic category was anxiety disorders (9.4%), followed by mood disorders (5.7%) and substance use disorders (2.4%), and the least common was disruptive behavior disorders (0.5%) The most common individual disorder was specific phobia (4.8%), followed by major depressive disorder (3.8%), obsessive-compulsive disorder (2.5%) and bipolar disorder (2.0%). The 12-month prevalence of a severe disorder was 3.7% (Stagnaro et al., 2018).

Research initiatives such as the Global Burden of Disease study (Whiteford et al., 2015), the World Mental Health Surveys (Kessler et al., 2009), the WHO Assessment Instrument for Mental health Systems (Saxena et al., 2007) have provided a better understanding of the prevalence, burden and treatment gap in the region.

In particular, data from studies that were part of the World Mental Health Survey were obtained from published reports: Colombia (Posada Villa, 2018), n= 4 426, age 18-65 years, urban areas included; Argentina (Stagnaro et al., 2018), n= 3 927, age \geq 18 years, based on a nationally representative sample; Brazil (Andrade et al., 2012), n= 5 037, age \geq 18 years, data were collected in Sao Paulo; Mexico (Medina-Mora et al., 2005), n= 5 782, age 18-65 years, urban areas included; Peru (Piazza & Fiestas, 2014), n= 3930, age 18-56 years, based on five urban areas.

Mental and substance use disorders account for 10.5% of the DALYs in Latin America. Among children, 5.2% of all DALYs are due to mental and substance use disorders, whereas among those 15-59 years of age, the rate is 16.6%. Mental health and substance use disorders account for 22% of YLDs and 28.5% among those 15-59 years of age (Kohn et al., 2018). Recent research has even reported notable differences in DALYs and YLDs among those 15-59 years old between North America and Latin America: DALYs for schizophrenia were 1.3 versus 0.9; alcohol use disorders, 2.0 versus 2.1; drug use disorders, 7.7 versus 1.7; depressive disorders, 4.8 versus 3.0; bipolar disorders, 0.9 versus 1.2; and anxiety disorders, 3.0 versus 2.4. The YLDs for schizophrenia were 2.2 versus 1.8; alcohol use disorders, 2.2 versus 3.0; drug use disorders, 8.2 versus 2.5; depressive disorders, 8.5 versus 6.4; bipolar disorders, 1.6 versus 2.6; and anxiety disorders, 5.2 versus 5.1 (Rehm & Shield, 2019).

In regard to Colombia, the most recent mental health survey (MHS) used the Self-Reporting Questionnaire (SRQ-20) to assess mental health issues in adolescents and adults (Gómez Restrepo, 2016). The SRQ-20 is an instrument with twenty items to understand items which question respondents about symptoms and problems likely to be present in those with neurotic disorder. It includes binary (yes/no) questions only, with codes "1" which represents the presence of a symptom, and "0" if the symptom is absent. The SRQ-20 item questions reflect depression, anxiety and psychosomatic complaints (subscales), which are all together, grouped under the common mental disorder and have been found to detect probable cases of it with satisfactory accuracy (Netsereab et al., 2018). Eleven positive responses out of twenty suggest high probability of mental disorder. However, the MHS developed in Colombia considered eight positive responses which is compatible with at least one issue. It also called a positive SRQ

if any of the subscales (depression, anxiety, psychosomatic complaints and epilepsy) were positive (table 1).

This MHS also assessed children (7-11 years old) through the Diagnostic Interview Schedule for Children (DISC-P). Information was supplied by the primary carer (mother) and the prevalence was estimated according to the presence of the disorder in the last 12 months (table 2)

Table 1. Mental Health Disorders in Adolescents and adults

Mental Health Problem	Descript.	Adolescents*		Descript.	18-44 years*		Descript.	X> 45 years*	
		Male	Female		Male	Female		Male	Female
Anxiety	3-4 symptoms	13%	10.1%	≥ 5 symptoms	3.3%	9%	≥ 5 symptoms	5.3%	12.4%
Depression	4-6 symptoms	15%	16.6%	≥ 7 symptoms	3.2%	4.9%	≥ 7 symptoms	6.2%	10.6%
Eating Disorders	Binge eating disorder	9.5%	8.8%	Binge eating disorder	8.3%	9.7%	<i>Not reported</i>		
Substance Use	Alcohol	25.2%	15.6%	Alcohol	57.6%	37.3%	Alcohol	46.7%	24%
	Tobacco	7.7%	4.0%	Tobacco	25%	9.3%	Tobacco	29.6%	15.3%
	Cannabis	3.5%		Cannabis	10.9%	2.9%	Cannabis	2.6%	
T.E**	-	30.7%	27.9%	-	41%	39.7%	-	39.6%	42.5%

Note. * (CI 95%); **At least one Traumatic Event

Table 2. Mental Health Disorders in Children

Mental Health Problem	Children*	
	Male	Female
Major Depressive Disorder	0.2%	0.01%
Separation Anxiety Disorder	1.6%	2%
Generalized Anxiety Disorder	0.5%	0.3%
ADHD*, unspecified	2.6%	3.3%
ADHD, inattentive type	0.7%	1.4%
ADHD, hyperactive type	1.6%	1.8%
ADHD, combined type	0.3%	0.2%
Oppositional Defiant	0.6%	0.3%
Conduct Disorder	0.4%	-
Any mental Disorder	3.8%	2.8% - 5.3%

Note. *Attention Deficit Hyperactivity Disorder

Likewise, the MHS reported that the prevalence of behavioral and mental disorders in adolescents (12-17 years old) is around 4.4% in the last 12 months (males: 2.4%; females: 6.3%). Besides, the prevalence of any anxiety disorder was higher than any mood disorder (3.5% - 1.2%) and social anxiety was the most common disorder in adolescence (3.4%). The second most common disorder was major depressive disorder (0.8%). In regard to suicide behavior, it was reported that 6.6% of the adolescents showed suicide thoughts (males: 5.7%; females: 7.4%). Furthermore, the suicide plan was found in 1.8% of the sample (males: 1.0%; females: 2.5%). Finally, suicide attempt was described in 2.5% of the participants (males: 2.1%; females: 2.9%) (Gómez Restrepo, 2016).

On the other hand, mental health assessment and diagnosis in adults were carried out using the World Health Organization Composite International Diagnostic Interview (CIDI-CAPI) version 21.1.3 to generate diagnoses of mental health problems. The MHS in adults indicated that the prevalence of mental disorders is over 4% in the last 12 months (males: 3.2%; females: 4.8%). The prevalence of anxiety disorders and mood disorders were alike (2.1% - 2.4%) and the most common mental disorder was major depression (1.6%). Social anxiety (1.6%) was the most common disorder among anxiety disorders (males: 1.4%; females: 1.8%). Besides, suicide ideation was found in 7.4% of adults (males: 5.5%; females: 7.6%). Suicide plans were reported in 2.3% of the sample (males: 2.0%; females: 2.7%). Finally, suicide attempt was described in 2.6% of the participants (males: 1.9%; females: 3.3%).

This increasing prevalence of mental illness in Colombia has enlarged the gap in health that can be provided to people with this type of diagnosis. There are still difficulties in care processes managed from health systems, especially in a middle-income country (Fanelli et al., 2020). There have even been calls on the government to expand and strengthen community mental health care as an alternative to reduce the difficulties that occur in relation to health care services for all the population, specifically for people with mental and behavior disorders (Zaraza-Morales & Hernández-Holguín, 2016). Despite the MHS study in Colombia, mental health underreporting in several areas of the country is still common and the number of psychiatric beds kept decreasing over the past decade, leading to overcrowding. Ninety per cent of health professionals are gathered within Colombia's ten largest cities and gross disparities between the coverage and care provided within the health system is clear (Chaskel et al., 2015).

1.1 Study Hypothesis

Based on these elements and those reported by the MHS in Colombia, this study aims at describing the prevalence of behavioral and mental disorders in Manizales, Colombia. In 2015, the state of Caldas (Manizales is the acting territorial capital of Caldas) reported that 7.41% of the population were diagnosed with mental illnesses, the highest of the country and far from the national mean (3.94%). In addition, 6.5% of the population were admitted in a clinical facility due to mental illness, again the highest of the country (national mean: 2.42%) (Grupo de Gestión Integrada para la Salud Mental, Subdirección de Enfermedades no Transmisibles, 2018). In 2015, The State of Caldas had 987.991 people.

2. Methods

This is an observational, descriptive and cross-sectional study.

2.1 Participants

A convenience sampling method was performed in 1355 participants from the neuropsychology department of a clinical facility in Manizales, Colombia. 506 participants were females (37.3%) and 849 males (62.7%). Average age was 22.85 years old ($SD=22.47$). Age ranged from 2 to 89 years old and was ranked according to the major stages of the human lifecycle: preschoolers, from 0-5 years ($n=48$; 3.5%), middle childhood, from 6-11 years ($n=519$; 38.3%), teenagers, from 12-18 years ($n=423$; 31.2%), young adults, from 19-26 years ($n=35$; 2.6%), adulthood, from 27-59 years ($n=163$; 12%) and elderly, from 60 to 89 years ($n=167$; 12.3%). Most patients are referred from the psychiatry, psychology, neurology and child psychiatry departments (Table 3).

Table 3. Referral Department

Referrals	n	%
Psychiatry	659	48.6
Clinical Psychology	193	14.2
Child Psychiatry	145	10.7
Neurology	115	8.5
General medicine	77	5.7
Pediatrics	61	4.5
Pediatric Neurology	54	4.0
Phonoaudiology	18	1.3
Occupational Medicine	8	0.6
Internal Medicine	7	0.5

Occupational Therapy	5	0.4
Genetics	4	0.3
Endocrinology	2	0.1
Family Medicine	2	0.1
Clinical Sexology	2	0.1
Physiatry	1	0.1
Gynaecology	1	0.1
Neurosurgery	1	0.1

2.2 Data Collection

Data were collected from databases of the neuropsychology department of a clinical facility in Manizales, Colombia. Collected data were age, sex, referral department, diagnosis and major diagnostic category based on ICD-10.

2.3 Ethical Considerations

According to the 1090 Act from 1990 and resolution number 008430 from 1993 in Colombia, this research complies with fundamental ethical principles: respect, intimacy and dignity for persons. Likewise, confidentiality and anonymity rights are protected as specified in law articles 26 and 50. This research project was approved by both the Ethics Committee of Universidad Católica Luis Amigó and the clinical facility.

2.4 Data Analysis

The analyses were conducted on IBM SPSS Statistics 25 (IBM Corporation, 2017). Data coding was performed in excel.

3. Results

Table 4 shows major diagnostic categories according to ICD-10 for patients referred to the neuropsychology department. A total of 30.3% of all participants displayed behavioral and emotional disorders with onset usually occurring in childhood and adolescence (F90–F98), 28% showed disorders of psychological development (F80–F89), followed by mood [affective] disorders (F30–F39) (11%), organic, including symptomatic, mental disorders (F00–F09) (9.3%), mental retardation (F70–F79) (7.2%), symptoms and signs involving cognition, perception, emotional state and behavior (R40–R46) (6.8%). The remaining major diagnostic categories accounted for 5% or less.

Table 4. Major diagnostic categories (ICD-10) for patients referred to the neuropsychology department

Major diagnostic Category (ICD-10)	n	%
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	410	30.3
Disorders of psychological development	380	28.0
Mood [affective] disorders	149	11.0
Organic, including symptomatic, mental disorders	126	9.3
Mental retardation	97	7.2
Symptoms and signs involving cognition, perception, emotional state and behavior	92	6.8
Neurotic, stress-related and somatoform disorders	46	3.4
General symptoms and signs	16	1.2
Persons with potential health hazards related to socioeconomic and psychosocial circumstances	14	1.0
Mental and behavioral disorders due to psychoactive substance use	13	1.0
Schizophrenia, schizotypal and delusional disorders	7	0.5
Disorders of adult personality and behavior	3	0.2
Other and unspecified effects of external causes	2	0.1

Table 5 shows the most common diagnostic categories and disorders referred to the neuropsychology department.

Table 5. Diagnostic categories and disorders prevalence found in the sample

Diagnostic Category	Disorder	Código CIE 10	n	%
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence (n=410; 30.3%)	Disturbance of activity and attention	F900	203	15
	Conduct disorder, unspecified	F919	72	5.3
	Hyperkinetic conduct disorder	F901	67	4.9
	Other conduct disorders	F918	28	2.1
	Mixed disorder of conduct and emotions, unspecified	F929	12	0.9
	Other mixed disorders of conduct and emotions	F928	9	0.7
	Unspecified behavioral and emotional disorders with onset usually occurring in childhood and adolescence	F989	5	0.4
	Conduct disorder confined to the family context	F910	2	0.1
	Other childhood emotional disorders	F938	2	0.1
	Childhood emotional disorder, unspecified	F939	2	0.1
	Elective mutism	F940	2	0.1
	Childhood disorder of social functioning, unspecified	F949	2	0.1
	Oppositional defiant disorder	F913	1	0.1
	Separation anxiety disorder of childhood	F930	1	0.1

	Other childhood disorders of social functioning	F948	1	0.1
	Other specified behavioral and emotional disorders with onset usually occurring in childhood and adolescence	F988	1	0.1
Disorders of psychological development (n=380; 28%)	Developmental disorder of scholastic skills, unspecified	F819	194	14.3
	Other developmental disorders of scholastic skills	F818	67	4.9
	Mixed disorder of scholastic skills	F813	51	3.8
	Asperger syndrome	F845	21	1.5
	Other pervasive developmental disorders	F848	10	0.7
	Pervasive developmental disorders	F84	2	0.1
	Childhood autism	F840	5	0.4
	Expressive language disorder	F801	5	0.4
	Other developmental disorders of speech and language	F808	5	0.4
	Pervasive developmental disorder, unspecified	F849	5	0.4
	Specific developmental disorders of speech and language	F80	3	0.2
	Developmental disorder of speech and language, unspecified	F809	3	0.2
	Specific developmental disorders of scholastic skills	F81	1	0.1
	Specific disorder of arithmetical skills	F812	1	0.1
	Atypical autism	F841	1	0.1
Mood [affective] disorders (n=149; 11%)	Other bipolar affective disorders	F318	52	3.8
	Bipolar affective disorder, unspecified	F319	19	1.4
	Moderate depressive episode	F321	17	1.2
	Recurrent depressive disorder, current episode moderate	F331	17	1.3
	Bipolar affective disorder, current episode mild or moderate depression	F313	9	0.6
	Unspecified mood [affective] disorder	F39	6	0.4
	Severe depressive episode without psychotic symptoms	F322	5	0.4
	Bipolar affective disorder, currently in remission	F317	4	0.3
	Mild depressive episode	F320	4	0.3
	Recurrent depressive disorder, current episode mild	F330	3	0.2
	Recurrent depressive disorder, current episode mild	F323	2	0.1
	Other depressive episodes	F328	2	0.1
	Depressive episode, unspecified	F329	2	0.1
	Bipolar affective disorder, current episode severe depression without psychotic symptoms	F314	1	0.1
	Bipolar affective disorder, current episode mixed	F316	1	0.1
	Bipolar affective disorder, current episode manic without psychotic symptoms	F311	1	0.1
	Recurrent depressive disorder	F33	1	0.1

	Other recurrent depressive disorders	F338	1	0.1
	Recurrent depressive disorder, unspecified	F339	1	0.1
	Other specified mood [affective] disorders	F388	1	0.1
Organic, including symptomatic, mental disorders (n=126; 9.3%)	Mild cognitive disorder	F067	90	6.6
	Unspecified dementia	F03	15	1.1
	Unspecified mental disorder due to brain damage and dysfunction and to physical disease	F069	6	0.4
	Dementia in Alzheimer disease with late onset	F001	3	0.2
	Dementia in Alzheimer disease, unspecified	F009	3	0.2
	Mixed cortical and subcortical vascular dementia	F013	2	0.1
	Dementia in Pick disease	F020	2	0.1
	Dementia in Alzheimer disease, atypical or mixed type	F002	1	0.1
	Organic amnesic syndrome, not induced by alcohol and other psychoactive substances	F04	1	0.1
	Other specified mental disorders due to brain damage and dysfunction and to physical disease	F068	1	0.1
	Personality and behavioral disorders due to brain disease, damage and dysfunction	F07	1	0.1
	Postconcussional syndrome	F072	1	0.1

Table 6 shows the distribution of diagnostic categories according to sex. It was found that disorders of psychological development, behavioral and emotional disorders with onset usually occurring in childhood and adolescence and Mood [affective] disorders are highly prevalent in both males and females. A chi-Square test of independence was performed and it was noticed that diagnostic categories depend on sex variation (Pearson's chi-squared test=111,117; Verisimilitude= 117,401; $df=12$; $p<0.001$).

Table 6. Diagnostic categories according to sex

Female (n=506)			Male (n=849)		
Diagnostic Category ICD-10	n	%	Diagnostic Category ICD-10	n	%
Disorders of psychological development	123	24.3	Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	308	36.3
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	102	20.2	Disorders of psychological development	257	30.3
Mood [affective] disorders	75	14.8	Mood [affective] disorders	74	8.7
Organic, including symptomatic, mental disorders	68	13.4	Organic, including symptomatic, mental disorders	58	6.8
Symptoms and signs involving cognition, perception, emotional state and behavior	50	9.9	Mental retardation	54	6.4

Mental retardation	43	8.5	Symptoms and signs involving cognition, perception, emotional state and behavior	42	4.9
Neurotic, stress-related and somatoform disorders	34	6.7	Mental retardation	16	1.9
Persons with potential health hazards related to socioeconomic and psychosocial circumstances	6	1.2	Neurotic, stress-related and somatoform disorders	12	1.4
Schizophrenia, schizotypal and delusional disorders	2	0.4	Mental and behavioral disorders due to psychoactive substance use	11	1.3
Mental and behavioral disorders due to psychoactive substance use	2	0.4	Persons with potential health hazards related to socioeconomic and psychosocial circumstances	8	0.9
Other and unspecified effects of external causes	1	0.2	Schizophrenia, schizotypal and delusional disorders	5	0.6
			Disorders of adult personality and behavior	3	0.4
			Other and unspecified effects of external causes	1	0.1

Table 7 displays the distribution of diagnostic categories according to the major stages of the human lifecycle. It was found that disorders of psychological development and behavioral and emotional disorders with onset usually occurring in childhood and adolescence are highly prevalent in preschoolers, middle childhood and teenagers. Mental retardation and mood [affective] disorders were the most common diagnosis among young adults. Mood [affective] disorders and organic, including symptomatic, mental disorders were more likely to prevail during the adulthood. Furthermore, organic, including symptomatic, mental disorders and symptoms and signs involving cognition, perception, emotional state and behavior were more prevalent in the elderly. Finally, A Chi-Square test of independence was performed and it was noticed that diagnostic categories depend on the major stages of the human lifecycle variation (Pearson’s chi-squared test=1370,494; Verisimilitude= 1347,427; $df=60$; $p=<0.001$).

Table 7. Diagnostic categories according to major stages of the human lifecycle

Preschoolers (0-5 years) (n=48)		
Diagnostic Category ICD-10	n	%
Disorders of psychological development	19	39.6
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	16	33.3
General symptoms and signs	6	12.5
Persons with potential health hazards related to socioeconomic and psychosocial circumstances	5	10.4
Other and unspecified effects of external causes	1	2.1
Mood [affective] disorders	1	2.1
Middle childhood (6-11 years) (n=519)		

Diagnostic Category ICD-10	n	%
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	257	49.5
Disorders of psychological development	198	38.2
Mental Retardation	26	5.0
Mood [affective] disorders	19	3.7
General symptoms and signs	10	1.9
Persons with potential health hazards related to socioeconomic and psychosocial circumstances	6	1.2
Neurotic, stress-related and somatoform disorders	2	0.4
Organic, including symptomatic, mental disorders	1	0.2
Teenagers (12-18 years) (n=423)		
Diagnostic Category ICD-10	n	%
Disorders of psychological development	159	37.6
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	134	31.7
Mental Retardation	49	11.6
Mood [affective] disorders	47	11.1
Mental and behavioral disorders due to psychoactive substance use	10	2.4
Neurotic, stress-related and somatoform disorders	9	2.1
Symptoms and signs involving cognition, perception, emotional state and behavior	5	1.2
Persons with potential health hazards related to socioeconomic and psychosocial circumstances	3	0.7
Disorders of adult personality and behavior	3	0.7
Schizophrenia, schizotypal and delusional disorders	2	0.5
Other and unspecified effects of external causes	1	0.2
Organic, including symptomatic, mental disorders	1	0.2
Young adults (19 - 26 years) (n=35)		
Diagnostic Category ICD-10	n	%
Mental Retardation	11	31.4
Mood [affective] disorders	8	22.9
Neurotic, stress-related and somatoform disorders	6	17.1
Disorders of psychological development	4	11.4
Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	3	8.6
Symptoms and signs involving cognition, perception, emotional state and behavior	2	5.7
Mental and behavioral disorders due to psychoactive substance use	1	2.9
Adulthood (27 - 59 years) (n=163)		
Diagnostic Category ICD-10	n	%

Mood [affective] disorders	52	31.9
Organic, including symptomatic, mental disorders	40	24.5
Symptoms and signs involving cognition, perception, emotional state and behavior	35	21.5
Neurotic, stress-related and somatoform disorders	20	12.3
Mental Retardation	10	6.1
Schizophrenia, schizotypal and delusional disorders	4	2.5
Mental and behavioral disorders due to psychoactive substance use	2	1.2
<hr/>		
Elderly (60 years and older) (n=167)		
<hr/>		
Diagnostic Category ICD-10	n	%
Organic, including symptomatic, mental disorders	84	50.3
Symptoms and signs involving cognition, perception, emotional state and behavior	50	29.9
Mood [affective] disorders	22	13.2
Neurotic, stress-related and somatoform disorders	9	5.4
Schizophrenia, schizotypal and delusional disorders	1	0.6
Mental Retardation	1	0.6

4. Discussion

This study aimed at describing the prevalence of behavioral and mental disorders in the general population in Manizales, Colombia. To better understand the results and the discussion, it is critical to mention that the state of Caldas had 998.255 people in 2020 and the city of Manizales had 400.436 people. In order to determine the diagnostic categories that were referred to the neuropsychology department of a clinical facility, this study reports that 30.3% of all participants displayed Behavioral and emotional disorders with onset usually occurring in childhood and adolescence (F90–F98), 28% showed Disorders of psychological development (F80–F89), followed by Mood [affective] disorders (F30–F39) (11%), Organic, including symptomatic, mental disorders (F00–F09) (9.3%), Mental retardation (F70–F79) (7.2%), Symptoms and signs involving cognition, perception, emotional state and behavior (R40–R46) (6.8%).

These results are in line with previous research that have found that between 10% and 20% of children and young people are affected annually by mental health disorders, and the rates are very similar across different racial and ethnic groups after controlling for income, resident status, education, and neighborhood support (Ogundele, 2018). Others have also reported that behavioral and emotional disorders with onset usually occurring in childhood and adolescence are the most prevalent in the general population (Timonen et al., 2021).

However, poverty and low socioeconomic status are risk factors that appear to increase the rate of mental health disorders across populations (Bolhuis et al., 2017). Another report even

indicated the 6-month prevalence rate for any mental health disorder in children and young people, up to age 17 years, to be 20.9%, with disruptive behavior disorder at 10.3%, second only to anxiety disorders at 13% (Bakker et al., 2017).

One plausible explanation for this finding could be the role of environmental factors, which may either protect against or promote the development of these disorders (Beesdo et al., 2009). For instance, socially inactive leisure time has been related to increased occurrence of psychiatric disorders. These findings have remained significant even after controlling for commonly known family-related risk factors for psychiatric morbidity of young individuals such as parents' mental health disorders (Merikukka et al., 2020), parental educational level (Paananen et al., 2013), and living with a single parent (Amato, 2000).

Furthermore, epidemiological survey findings have also shown that anxiety disorders are the most prevalent disorders worldwide and are associated with significant comorbidity and morbidity (Stein et al., 2017). The development of depressive symptoms or anxious reactions to a diagnosed psychiatric disorder is usually a longer process. Commonly, it includes accumulations of various adverse experiences in everyday life of the adolescent.

One study reported that socially inactive leisure time increased the incidence of anxiety and behavioral psychiatric disorders. The explanation for an excess of anxiety disorders might relate to the individuals themselves; for example, they may have a sensitive and introvert personality and therefore seek out leisure time activities that can be done alone (Whisman et al., 2000). Because of hobbies that are not social, adolescents/young adults may also have missed out on the potential protective effect of communities. Also, on community level, it is possible that some neighbors/coworkers do not accept anxious or introverted persons as a group member. Accumulated experiences of being alone and left outside peers' groups can be a source of anxiety and other mental health problems (Cantor-Graae & Selten, 2005).

An important finding of this study was that disorders of psychological development are highly prevalent in females. However, research on pervasive developmental disorders more frequently involves affected boys exclusively, because approximately four males are affected for every affected female (Riecher- Rössler, 2017). The disparity in prevalence between males and females with autism and related conditions has provoked three overarching questions. First, is this disparity an accurate representation of a differential occurrence of the disability in males and females, or does this reflect insensitivity in the current diagnostic system, which fails to encompass differences in presentation between the sexes? Second, are girls with autism spectrum conditions more impaired in terms of intellectual functioning, social disability, or

adaptive functioning as a group than boys with these conditions? And third, if the disparity accurately reflects the true prevalence, what neuropathological mechanisms explain this differential? (Gustavson et al., 2018).

Since the existing definition of a disorder governs who is included for study, addressing the questions outlined above through a comparison of studies over time becomes problematic. One must make comparisons between epidemiological or phenomenological data, while also considering what criteria were used to determine eligibility for the study (Zhang et al., 2020).

Overall, these findings show that interventions should address multiple co-occurring problems to impact positively on youth mental health and to potentially interrupt the continuity between childhood internalizing and externalizing psychopathology that may also co-occur with psychosis-like experiences on one hand, and psychiatric disorders in adulthood on the other (Colizzi et al., 2020). The eradication of childhood adversities, especially those associated with maladaptive family functioning (e.g., parental mental illness, child abuse, neglect), would lead to a 29.8% reduction of any mental disorder lifetime, and an even higher reduction when considering exclusively adolescence (32.3%) and childhood-onset (38.2%) cases (Kessler et al., 2010). The possibility of preventing nearly one in two childhood-onset mental disorders is of crucial importance when considering that the experience of a mental disorder kindles a cascade of events which make recurrence later in life more likely (Rutter et al., 2006).

Thus, promoting selective preventive strategies supporting children's physiologic reactivity, cognitive control, and self-regulation through parenting and classroom-based interventions, may represent a massive preventive action and ensure the earliest possible access to intervention with a view of limiting the continuity of mental health problems from childhood through to adolescence and adulthood (Colizzi et al., 2020).

On the other hand, the current study showed that the most prevalent mental disorders in preschoolers, middle childhood and teenagers are not only Behavioral and emotional disorders with onset usually occurring in childhood and adolescence but also Disorders of psychological development. Difficulties in scholastic skills (reading, expression, writing, spelling and mathematics) associated with various neurodevelopmental disorders can be the result of a deficit in one or more processing of learning (Gowda et al., 2019). The acquisition of these skills requires the brain to process multimodal information in different parts of the brain that constitute the information processing model for mental development (Rowe et al., 2017). This theory attempts to describe how sensory input is perceived, transformed, reduced, elaborated, stored, retrieved, and used by the human mind. It includes attention mechanisms for bringing

in information, working memory for actively manipulating information, and long-term memory for passively holding information so that it can be used in the future (Czapka et al., 2019).

Likewise, and as others have mentioned the wide variation in emotional disorders reflects variation in assessment tools, geographical location, and demographic differences between study samples (Dougherty et al., 2015). Despite this variation, anxiety disorders are widely acknowledged as the most prevalent class of psychiatric illness during the preschool period and across the lifespan, and retrospective studies report the median age of onset for anxiety disorders around 6 years of age (Petresco et al., 2014). Altogether, these data suggest that anxiety disorders are the most common type of psychiatric illness for all age groups, and symptoms usually start during or near the preschool period. In contrast to older children and adults (Gune et al., 2016), most studies during the preschool period do not find that prevalence rates for anxiety disorders differ based on sex (Dougherty et al., 2015) or ethnicity (Hudson et al., 2011). Adolescents with anxiety disorders are more likely to have other anxiety disorders, depression (Bufferd et al., 2011), attention deficit hyperactivity disorder (Egger & Angold, 2006), and oppositional defiant disorder (Lavigne et al., 2009) relative to peers, with up to 30 to 50% of adolescents with anxiety disorder having some other non-anxious psychiatric disorder (Czapka et al., 2019).

However, research into the causes of these disorders remains comparatively limited. Understanding the factors that place an individual at risk of anxiety, early in life, can provide valuable information regarding the ultimate prevention of anxiety. Of particular interest are risks that occur during the preschool years, the period prior to the typical age of onset (Hudson et al., 2019). Others have extended the previous literature and even the scope of this study by uniquely assessing multiple family environment factors to predict early adolescent anxiety including maternal anxiety, maternal negativity, maternal overinvolvement and mother-child attachment. For instance, it has been found that preschool children are more likely to experience anxiety symptoms and disorders in early adolescence when the child is inhibited, when there is a history of maternal anxiety disorders and when mothers displayed high levels of overinvolvement (Asbrand et al., 2017).

Another main finding in regard to young adults was that the most prevalent diagnostic category was mental retardation. Although this was the smallest group (31.4%) of the sample, this rate aligns fairly well with previous studies (Cooper et al., 2007). Similarly, other authors have highlighted the variability of prevalence estimates across countries, age groups, and study design. Prevalence estimates are also highest in low-and middle- income countries, in young adult populations (McKenzie et al., 2016). Young people with mental retardation are more likely to

have experienced a range of social and material disadvantages (low family socio-economic position, living in a more deprived area, exposure to violence) than those without intellectual disabilities. This echoes previous research around socioeconomic position (Kavanagh et al., 2018). Peer victimization has also been significantly higher for young adults with mental retardation (Jansen et al., 2011). It is reported that they have experienced more episodes of violence (both threats and being attacked), theft, weekly theft, being called names and being socially excluded (Kavanagh et al., 2018).

Changes in exposure to risk factors associated with brain development can attenuate or increase the over-all risk of mental retardation in a population. These changes may be related to the application of risk reduction strategies such as education concerning consumption of alcohol during pregnancy, failure of preventive measures such as the recent lead contamination of drinking water in Flint, Michigan (Hanna-Attisha et al., 2016), or changes in the spread of infectious agents. The latter is exemplified by the recent spread of the Zika virus worldwide, which has raised concerns about the risk of microcephaly and other congenital malformations in infants born to infected mothers and the subsequent mental retardation associated with these malformations (Ferreira et al., 2018). Such concerns are reminiscent of epidemics of rubella throughout the twentieth century, where congenital rubella syndrome increased the risk of a diagnosis of mental retardation (Brosco et al., 2006). An understanding of such epidemics may explain some variation in the occurrence of intellectual disabilities prior to the introduction of rubella vaccines.

However, mental retardation is not the only leading cause of disability in adults worldwide. The public health burden of mood disorders is substantial, with negative effects including not only functional impairment but also reduced quality of life, disability, low work productivity, premature mortality, and increased health care utilization (Twenge et al., 2019). Our results support what others have found in regard to mood disorder indicators increasing among both men and women. Thus, the more pronounced increase in depression since 2011 among adolescents found in previous research (Twenge et al., 2018) extends to adults and to indicators of psychological distress and suicide-related outcomes (Gómez, 2020; Gómez Tabares et al., 2019). The increases have appeared across most racial and ethnic groups for most indicators, with the increases generally larger among white population. With the exception of major depressive episodes and suicide attempts, increases in mood disorder indicators have been found to be larger among population with the highest total family income. This profile is consistent with previous research finding an even higher prevalence of past-year major

depressive episodes (18.5%) (Alonso et al., 2016) and suicidal ideation in college populations (17.2%) (Mortier et al., 2018) than the overall rates for 27-to 59-years old found in other works (Weinberger et al., 2018).

Finally, in participants aged 60 years old or older, organic, including symptomatic, mental disorders were the most prevalent. These data are in line with a study that reported that the incidence rate of Alzheimer disease increases almost exponentially with increasing age until 85 years of age (Hachinski et al., 2010). However, it remains uncertain whether the incidence continues to increase, even at more advanced ages, or reaches a plateau at a certain age; this is relevant for projecting the burden of the disease as well as for understanding its etiology. For example, a consistently exponential increase with advancing age in Alzheimer incidence suggests that Alzheimer disease is an inevitable consequence of aging, whereas a convergence to or a decline at certain age may suggest that very old people may have reduced vulnerability, owing perhaps to genetic or environmental factors (Miech et al., 2002).

This study further found that the incidence of Alzheimer disease increased with age, peaked, and then started to decline at extreme old ages for both men and women (Miech et al., 2002). However, some meta-analyses and large-scale studies in Europe provided no evidence for the potential decline in the incidence of dementia and Alzheimer disease among the oldest-old age groups (Matthews et al., 2005). The apparent decline suggested in some studies may be an artifact of poor response rate and survival effect in these very old age groups. Several studies from Europe observed a higher incidence rate of Alzheimer disease among women than men, especially among the oldest-old age groups (Fratiglioni et al., 2000), whereas studies in North America generally found no significant gender difference (Kukull et al., 2002).

As others have mentioned, people living with Alzheimer and their informal caregivers are more likely to be diagnosed with comorbidities and subsequently experience poorer access to health and social care services when compared to their unaffected counterparts (Y.-T. Wu et al., 2018). Research also demonstrates that people living with Alzheimer are disproportionately more likely to report a poor quality of life (Farina et al., 2020). This reduced quality of life and other inequalities in outcomes are recognized to be driven by factors such as economic hardship and social isolation that are ultimately caused by the stigma associated with this condition (Wright & O'Connor, 2018). Thus, those affected represent a vulnerable population group that could be better served by changes within healthcare and social services systems.

The burden associated with Alzheimer's disease is now recognized as one of the most pressing issues in the field of public health. There is an urgent need for health care systems to identify

novel and innovative solutions to meet the needs. However, an effective response to the challenges arising from Alzheimer first requires an accurate understanding of the patterns of prevalence and burden of Alzheimer (Ienca et al., 2018).

5. Limitations and Strengths

This study has both strengths and limitations. First, this is one of the first studies conducted in Manizales concerning the prevalence of behavioral and mental disorders in the general population. Most studies have been developed in college students. This is of particular relevance since as mentioned before, Manizales has the highest prevalence of behavioral and mental disorders in Colombia. Another strength of the study could be the larger sample size. However, the smaller number of females in our sample could limit the generalizability of our findings. Thus, the authors of this study want to encourage other researchers to work on public health policies in order to promote wellness and ensure that specific mental health goals are met.

Closing Remarks

This article highlights the need for and importance of longitudinal studies focused on early-onset disorders. These studies need to begin during infancy to truly capture the prodromal period for early-onset disorders. Given the differences already seen in physiological, neurobiological, emotional, and social functioning among the population with pathologies, research is now needed to investigate these areas at younger ages, prior to the onset of several disorders. In addition, the results of this study are useful for public mental health policies, prevention and intervention strategies for mental disorders prevalent in each life cycle.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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