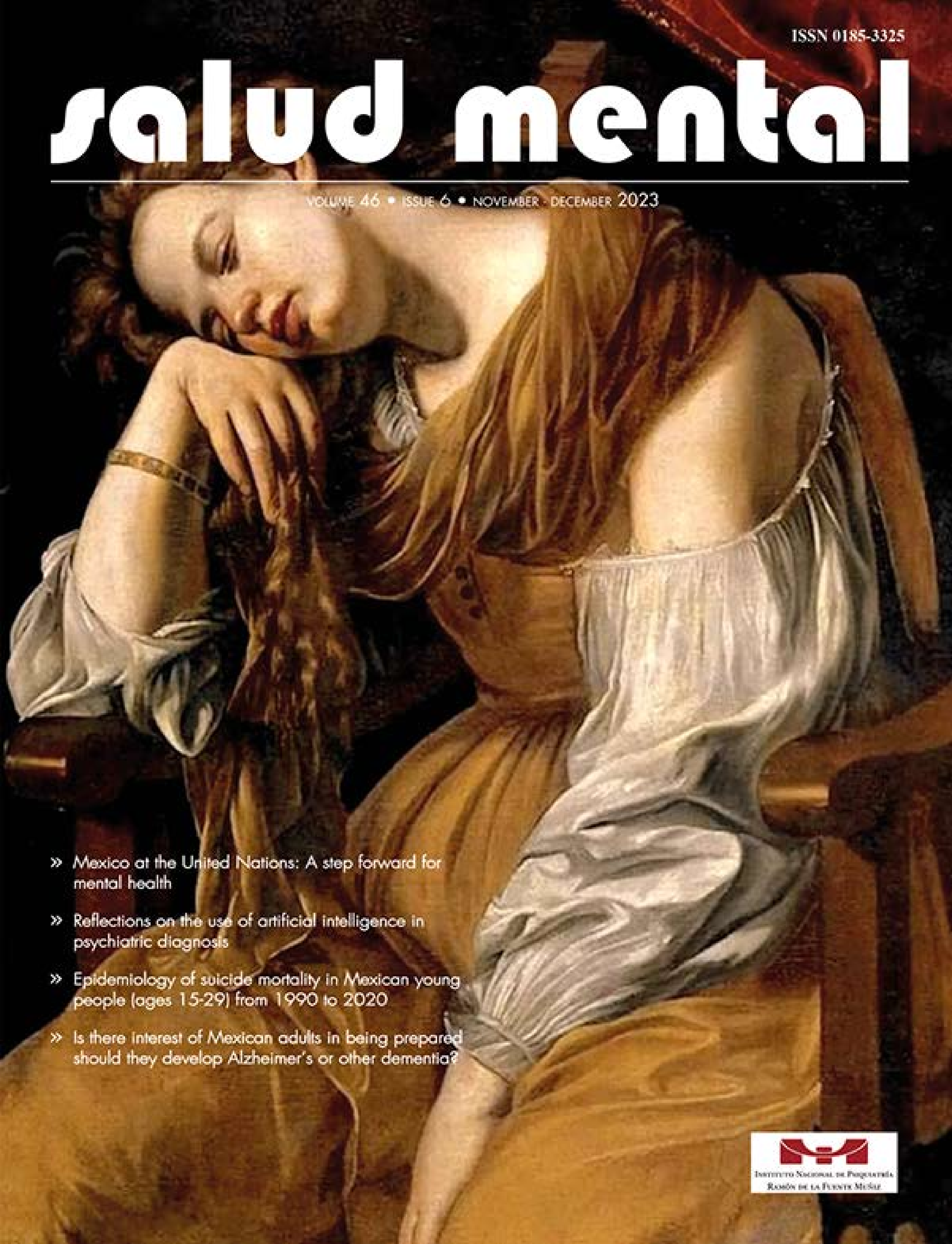
ISSN 0185-3325

salud mental

VOLUME 46 • ISSUE 6 • NOVEMBER - DECEMBER 2023



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Instituto Nacional de Psiquiatría
Ramón de la Fuente Muñiz

ISSN 0185-3325

salud mental

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On the cover
A Hospital Ward during the Chief Physician's Round
Oil on canvas, 290 x 445 cm

Luis Jiménez Aranda
(1845-1928)

Del Prado Museum, Madrid

INSTITUTO NACIONAL DE PSIQUIATRÍA
RAMÓN DE LA FUENTE MUÑIZ

Directorio

Salud Mental, Año 47, No. 3, Mayo-Junio 2024, es una publicación bimestral, editada por el Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz. Calzada México-Xochimilco No. 101, Col. San Lorenzo Huipulco, Alcaldía Tlalpan, C.P. 14370, Ciudad de México, Tel. 55 4160-5128. Página web: www.revistasaludmental.mx, correo electrónico: revistasaludmental@gmail.com. Editor responsable: Dr. Héctor Pérez-Rincón. Reservas de Derechos al Uso Exclusivo No. 04-1979-000000000-506-102 e ISSN: 0185-3325, otorgados por el Instituto Nacional del Derecho de Autor. Certificado de Licitud de Título y Contenido de la Comisión Calificadora de Publicaciones y Revistas Ilustradas de la Secretaria de Gobernación número 17472. Impresa y distribuida por BVS ediciones, Playa Regatas 501, Col. Militar Marte, Alcadía Iztacalco, C.P. 08830, Ciudad de México. Depósito en SEPOMEX, oficina expedidora M.D.M. Coyoacán, Higuera 27, La Concepción, Coyoacán, 04020 Ciudad de México, CDMX. Última actualización el 15 de junio de 2024.

Salud Mental

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salud mental

EDITORIAL
Volume 47, Issue 4, July-August 2024
doi: 10.17711/SM.0185-3325.2024.019

The Crucial Intersection: Understanding Obesity, Mental Health, and Weight Stigma in Mental Health Care

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Citation:
Ramos Salas, X., & Esquivias-Zavala, H. (2024). The Crucial Intersection: Understanding Obesity, Mental Health, and Weight Stigma in Mental Health Care. *Salud Mental*, *47*(4), 147-149.

DOI: 10.17711/SM.0185-3325.2020.019

The link between obesity and mental health is complex and often overlooked (Sharma, 2012). Although, there are many gaps in the literature, there is an understanding that a bi-directional relationship between obesity and mental health exists (Taylor et al., 2020). On the one hand, some individuals with obesity present with a wide range of mental health conditions, which can promote weight gain and act as significant barriers to obesity treatment (Taylor et al., 2012). On the other hand, studies indicate that some patients with mental illness have higher rates of obesity, hypertension, dyslipidemia, metabolic syndrome, and diabetes than the general population (Taylor et al., 2008).

Mental illness can increase the risk of obesity in many ways and heighten the risk of cardiometabolic diseases. For example, somatic symptoms of depression such as sleep and appetite alterations have been associated with diabetes, erectile dysfunction, and hypercholesterolemia (Ditmars et al., 2022). Some mental health conditions are also associated with unhealthy behaviours such as smoking, alcohol, and drug use. It is estimated that about 20% of people with a mental illness have a co-occurring substance use problem (Rush et al., 2008). There are also biological changes associated with mental illness, including inflammation, hypothalamic pituitary adrenal axis dysregulation and abnormal levels of circulating signaling proteins involved in weight regulation that can lead to weight gain (Taylor & Macqueen, 2010). In addition, psychiatric medications can have weight gain as a side effect (Taylor et al., 2020). Some patients with obesity who are prescribed psychiatric medications report stopping taking them to avoid weight gain. This can hinder the treatment of mental health conditions.

Both obesity and mental illness are highly stigmatized in society, and patients living with these conditions perceive and experience biased, stigmatizing, and discriminatory treatment in healthcare, education, and employment (Rössler, 2016; Rubino et al., 2020). Medical students and healthcare professionals, including mental health professionals, have biased beliefs and attitudes towards patients with mental illness and those living with obesity (McDaid, n.d.; Lawrence et al., 2021; Wington & McGaghie, 2001). Biased attitudes and believes among healthcare professionals are associated with stigmatizing treatment in healthcare settings and can include prejudicial, disrespectful, and discriminatory healthcare practices. Discriminatory healthcare practices can include unfair treatment because of one's weight or mental illness such as denial of healthcare services (e.g. cancer screening services) (Hawley et al., 2024; Murphy, 2021).

Health related bias, stigma and discrimination in healthcare, education, and employment can lead to poor health, education, and socio-economic individual and population level outcomes, which can contribute to health and social inequalities. Within the field of public health, stigma is considered a social determinant of health because it drives health and social inequalities, independent of any illness or condition a person may have (Hatzenbuehler et al., 2013). Weight-related discrimination translates into a 60% higher risk of mortality, exceeding that caused by other forms of discrimination (Sutin et al., 2015).

Weight bias, stigma and discrimination translates into inequities in employment settings, health-care facilities, and educational institutions, in part due to widespread negative stereotypes that people with obesity are lazy, unmotivated, lacking in self-discipline, less competent, noncompliant, and sloppy (Friedman et al., 2005). Some individuals with living with obesity may internalize weight biased beliefs and attitudes, affecting their health and wellbeing as well as their health behaviours (Ramos Salas et al., 2019). For example, some individuals with obesity may believe that the stigmatizing attitudes or unfair actions against them are deserved because they should be able to manage their own weight (Patton et al., 2023). Patients who believe that obesity is their own fault and responsibility may not seek evidence-based obesity treatment from qualified health professionals and may instead try to manage their weight using unsafe strategies that ultimately may lead to more weight gain (Sharma & Ramos Salas, 2018).

Weight stigma can also impact physical and mental health outcomes and increase risk for all-cause mortality independently of weight or BMI status (Sutin et al., 2015). For example, weight stigma is associated with mental health outcomes such as stress, mood, or anxiety disorders, eating disturbances, depression, and body image dissatisfaction (Levinson et al., 2024; Emmer et al., 2020). Moreover, weight-related stigmatization is a risk factor for low self-esteem and body dissatisfaction, and greater frequency of stigmatization is one of the five factors associated with depression and anxiety (Ma & Xiao, 2010).

More recent studies demonstrate that internalized weight bias may also mediate mental health outcomes (Pearl & Puhl, 2016). In other words, when people believe that the negative or unfair treatment they receive is deserved, mental health outcomes worsen. Patients with obesity who experience weight stigma in healthcare report that healthcare professionals do not listen to their health concerns and that they often blame every ailment they present with solely on their weight (Kirk et al., 2014). Individuals living with obesity who have experienced weight bias and stigma from healthcare professionals may delay or avoid healthcare services for fear of being blamed and shamed for their weight (Alberga et al., 2019; Phelan et al., 2022). Ultimately, a lack of trust between healthcare providers and patients living with obesity can impact communications and the therapeutic relationship, which may in turn impact health behaviours and health outcomes (Vallis et al., 2020).

Patients with mental illness also experience significant bias, stigma, and discrimination (Sutin et al., 2015). Stereotypes about people with mental illness include that people with mental illness are dangerous, incompetent, unpredictable, and to blame for their illness (American Psychiatric Association [APA], 2024; Centre for Addictions and Mental Health [CAMH], n.d.; Fresán et al., 2018). These stereotypes can lead to healthcare professionals and systems offering a lower standard of care for people with mental illness (APA, 2024). For example, healthcare professionals who hold biased beliefs and attitudes towards people with obesity or mental illness may assume that patients will not comply with healthcare recommendations and therefore will not offer necessary interventions to patients.

Stigma is a global problem and can be a barrier for public policy measures to address obesity and mental illness (Rössler, 2016; Nutter et al., 2024). Specifically, weight bias and mental health stigma can reduce the willingness of public policymakers to invest in mental health and obesity (McDaid, n.d.; Ramos Salas et al., 2017). Given the prevalence and impact of obesity, mental illness, and related stigma to healthcare systems and society, it is imperative that direct action is taken to recognize, identify and address the intersection between obesity and mental health, while also reducing bias, stigma and discrimination for people affected by these conditions. Possible actions to address obesity and mental illness stigma include: 1) prioritizing obesity and mental illness stigma within healthcare systems, education, and employment, all mental health professionals should encourage patients to share their experiences of stigmatization to prevent them from isolating themselves or foregoing health promoting and leisure activities due to these types of experiences; 2) Conducting timely and local research on obesity and mental illness stigma; 3) Developing collaborative, evidence-informed and patient-centred interventions to address obesity and mental illness stigma in healthcare, education, employment and public policy; 4) Challenging the social stigma associated with obesity and mental illness among healthcare professionals, educators, and policy makers through public awareness campaigns, highlighting the numerous causes of obesity and mental illness and supporting all evidence-based interventions, including cognitive behavioral therapy; 5) Creating and implementing stigma reduction training programs for healthcare professionals, employers, teachers, and policy makers; and 6) Creating public policies or legislations to protect patients against obesity and mental illness bias, stigma and discrimination. Ultimately, by becoming more aware of the intersection of obesity, mental illness and stigma, we can help challenge stereotypes, change clinical practices, improve healthcare services and systems, and impact patient health outcomes.

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salud mental

ORIGINAL ARTICLE
Volume 47, Issue 4, July-August 2024
doi: 10.17711/SM.0185-3325.2024.020

Validation and Adaptation of the Spanish Version of Cancer Survivors' Unmet Needs survey (CaSUN-MX) for Use in the Mexican Adult Oncology Population

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Received: 11 August 2023
Accepted: 10 October 2023

Citation:
Mazatán Orozco, R., Torres Alegre, C., Zayas-Villanueva, O. A., Reynoso González, O. U., Fraga-Sastrias, J.-M., & Sierra-Murguía, M. A. (2024). Validation and Adaptation of the Spanish Version of Cancer Survivors' Unmet Needs survey (CaSUN-MX) for Use in the Mexican Adult Oncology Population. *Salud Mental*, *47*(4), 151-160.

DOI: 10.17711/SM.0185-3325.2024.020

ABSTRACT

Introduction. Cancer survivorship in Mexico is a research topic that is still in its infancy. No specific studies have been found on the needs of this population, meaning that there are no validated scales in the Mexican population measuring the needs of cancer survivors. **Objective.** To validate and adapt the Cancer Survivors' Unmet Needs survey, Spanish version (CaSUN-Mx) for use in the Mexican adult oncology population. **Method.** One hundred and eighty participants answered the questionnaire (CaSUN-S). For the analysis, the study was divided into three phases: content validity, construct validity, and internal consistency analysis. **Results.** The final version of the adapted questionnaire (CaSUN-Mx) has 34 items and one open question. It was divided into five factors with a total Cronbach's Alpha of .95 and a value of over .85, in all the subscales (psychological care, comprehensive and collaborative care, practical and information needs, and those associated with effects. **Discussion and conclusion.** The CaSUN-Mx questionnaire has content validity because it has been adequately linguistically and culturally adapted, and construct validity because of its factorial structure, and reliability, making it suitable for use in the Mexican adult oncology population.

Keywords: Cancer, survival, needs, validity, reliability.

RESUMEN

Introducción. La supervivencia al cáncer en México es un tema aún que se encuentra en desarrollo, no se han identificado estudios específicos acerca de las necesidades que presenta esta población, por consecuencia, no se cuenta con escalas validadas en población mexicana que midan las necesidades en supervivientes al cáncer. **Objetivo.** validar y adaptar la escala Cancer Survivors' Unmet Needs versión en español (CaSUN-Mx) para su uso en población oncológica, mexicana, adulta. **Método.** 180 participantes respondieron el cuestionario (CaSUN-S); para el análisis, el estudio se dividió en tres fases: análisis de validez de contenido, análisis de validez de constructo y, análisis de consistencia interna. **Resultados.** La versión final del cuestionario adaptado (CaSUN-Mx), cuenta con 34 ítems y una pregunta abierta. Se dividió en cinco factores con un Alpha de Cronbach total de 0,95 y, mayor a 0,85 en todas las subescalas (Necesidades de atención psicológica, Necesidades de atención integral y colaborativa, Necesidades prácticas, Necesidades de información, Necesidades relacionadas con efectos secundarios. **Discusión y conclusión.** El cuestionario CaSUN-Mx cuenta con validez de contenido según la correcta adecuación en lenguaje y cultura, validez de constructo según su estructura factorial y, confiabilidad para su uso en población oncológica, mexicana, adulta.

Palabras clave: Cáncer, supervivencia, necesidades, validez, confiabilidad.

INTRODUCTION

In 2021, approximately 1.1 billion deaths were reported worldwide, of which nearly 100,000 (8%) were due to cancer. In Mexico, cancer is the third leading cause of death. In addition, cancer mortality increased from 6.09 per ten thousand population in 2010 to 7.06 in 2021 (National Institute of Statistics, Geography and Informatics; Spanish acronym INEGI, 2023).

Although the incidence of cancer cases has risen in recent years, survivorship has also risen due to early detection and medical advances. There are currently over 16.9 million survivors in the United States, as opposed to just three million in 1971 (American Society of Clinical Oncology [ASCO], 2021). A survivor is defined as a patient who had a cancer diagnosis and is currently in remission. Some of the literature describes survivorship from the moment of diagnosis without specifying the stage of the patient (American Cancer Society [ACS], 2021). Three survivorship phases are described: the acute phase, from diagnosis until completion of initial treatment, the extended phase. after initial treatment and in the subsequent months, and permanent survivorship, when years have passed after treatment. However, survivorship vaies depending on the type of cancer. Those with the highest survival rates are breast cancer, prostate cancer, and colorectal cancer (ASCO, 2021).

Receiving a cancer diagnosis can trigger emotional responses with a direct impact on people's lives, causing discomfort in the biopsychosocial-spiritual spheres. However, even when there is a diagnosis indicating that patients are free of disease, it has been observed that the psycho-emotional consequences do not disappear quickly. They often persist over time, negatively impacting the quality of life of patients who experienced it. At least 50% of survivors suffer physical and emotional consequences after completion of their treatment (Martínez Arroyo et al., 2019).

Instruments measuring the needs of surviving patients in various oncological populations include the following: The Spanish Questionnaire to Detect Unmet Needs of Cancer Survivors (CESC), comprising 25 items with three factors, physical, emotional and financial/work-related. It has a Cronbach's Alpha of .77 for the first, .71 for the second and .63 for the third component (Arrighi et al., 2014).

The Fear of Cancer Recurrence Inventory, developed by Sébastien Simard and Josée Savard, was designed to evaluate the fear of cancer recurrence in a multidimensional way. It consists of 42 items with seven dimensions: triggers, severity, distress, coping, functional alterations, perception and detection behaviors. It has a Cronbach's Alpha of .95 (Simard & Savard, 2009).

The Supportive Care Needs Survey has two versions, a long and a short one. The long one has 59 items, the short

Table 1
Different versions of CaSUN

Version	*Number of items*	*Factors*	*Cronbach's alpha*
CaSUN (original) (Hodgkinson et al., 2007)	42	Exploratory Factor Analysis yielded five factors: existential survival, quality of life, relationships, comprehensive care, information.	.96
CaSun-S (Spanish population) (Martínez et al., 2021)	35	Confirmatory Factor Analysis: 5-factor model the same as the original showed adequate goodness-of-fit properties.	.95
T-CaSUN (Thai cholangiocarcinoma population) (Summart et al., 2022)	20	Four factors: Intensive care, information, relationships, and medical care. Exploratory factor analysis was performed on one half of the sample and confirmatory factor analysis on the other.	.79
CaSUN-NL (Keeman et al., 2018)	37	Exploratory Factor Analysis yielded a total of seven factors. Five original ones: Existential survival, comprehensive oncological care, information, quality of life, personal relationships Two domains were added: lifestyle and return to work.	.94
Slovenian population (CaSUN-SL) (Miroševič et al., 2022)	40 items and one open question	Exploratory factor analysis was performed on one half of the sample and confirmatory factor analysis on the other. The quality-of-life factor was replaced by an emotional and psychological support one.	.94
Chinese population (CaSun-C) (Fang et al., 2018)	20 items	Exploratory factor analysis was performed on one half of the sample and confirmatory factor analysis on the other. Four factors: physical/psychological needs, information, medical care and communication needs.	.87
Japanese population (Casun-J) (Komatsu et al., 2020)	41 items and one open	Confirmatory factor analysis: Five factors, including existential survival, comprehensive cancer care, information, quality of life and relationships.	.96

one 34 and both cover five domains: psychological, health system, physical and daily activities, patient care and support, and sexuality. It has internal consistency, measured with Cronbach's Alpha, greater than .85 in all subscales (Boyes et al., 2012).

The Cancer Survivors' Unmet Needs (CaSUN) measure scale is the original version. It consists of 35 items measuring the needs of surviving patients, six items concerning positive changes that have arisen as a result of the disease (41 items in total), and an open question about experienced needs. It has five domains: existential survival, comprehensive care, information, quality of life and interpersonal relationships. The questionnaire shows internal consistency, with a Cronbach's Alpha value of .96. Three hundred and fifty-three surviving patients participated in the creation of the questionnaire (Hodgkinson et al., 2007). It has been adapted for the oncology population of several countries, described in Table 1.

Since the questionnaire has not been validated for use in the Mexican population, the objective of this study is to obtain the validity and reliability of the instrument so that it can be used in this population.

METHOD

Study design

The type of research conducted was an observational, prospective, cross-sectional, descriptive study with a non-experimental quantitative research design.

Participants

The sample size was determined by the proportion of the number of items presented in the questionnaire, with five responses for each item (Vallejo, 2011). An initial sample of 294 participants was obtained, of which 114 were ruled out for failing to meet the inclusion criteria. The eligible population comprised a total of 180 cancer survivors, who had received care at hospitals and institutions in both the public and private sector, and members of support groups for cancer survivors. The inclusion criteria were being of either sex, with a minimum age of 18, having Mexican nationality, having received a cancer diagnosis, being in the follow-up phase (survivorship) from the extended phase onwards, and participating, with a signed informed consent form. The exclusion criterion was having difficulty understanding the questionnaire. The elimination criterion was withdrawing their informed consent. The average age was 55.5 years (*SD* = 11.85). One hundred and fifty-seven participants were women (87.2%), 80 participants had completed a bachelor's degree (44.4%), the majority of the participants were married (60.6%) and the most frequent types of cancer were breast (56.7%), head and neck (7.2%), gastric (6.7%), gynecological (6.1%) and hematological cancer (6.1%). The average length of time since diagnosis was 51.63 months (*SD* = 50), and the average length of time since end of treatment was 30.86 (*SD* = 45.47). In regard to length of survivorship, 60 participants had survived for fewer than six months (33.5%), 90 had survived for between 6.1 and 60 months (50.3%) and 24 had survived for over 60.1 months (13.4). Table 2 shows the sociodemographic data of the eligible population.

Table 2
Sociodemographic data, related to cancer and survival

Variable	*n*	*%*
Age ($\bar{X}$ = 55.50; *SD* = 11.85)		
Time since diagnosis ($\bar{X}$ = 51.63; *SD* = 50)		
Time since end of treatment ($\bar{X}$ = 30.86; *SD* = 45.47)		
Survivorship ≤ 6 months	60	33.5
Survivorship ≤ 6 months	90	50.3
Survivorship ≥ 60.1	24	13.4
Sex (*n* = 180)		
Woman	157	87.2
Man	23	12.8
Education (*n* = 179)		
Elementary school	3	1.7
Junior high school	13	7.2
Senior high school	17	9.4
Technical degree	35	19.4
Degree	80	44.4
Postgraduate degree	31	17.2
Marital status (*n* = 180)		
Married	109	60.6
Single	31	17.2
Divorced	25	13.9
Living together	9	5.0
Widowed	6	3.3
Cancer diagnosis (*n* = 180)		
Breast	102	56.7
Head and neck	13	7.2
Lung	5	2.8
Gastric	12	6.7
Gynecological	11	6.1
Hematological	11	6.1
Kidney	4	2.2
Thyroid	8	4.4
Prostate	7	3.9
Testicular	2	1.1
Other	5	2.8

Procedure

Questionnaires were administered at centers, hospitals, and institutions and among support groups. An electronic version of the questionnaire was designed using Google Forms so that they could be shared by the participating centers. The study was explained to the oncologists and doctors responsible for monitoring patients. During the follow-up consultations, they invited patients to participate, by signing the informed consent form (included in the same form) and answering the questionnaire. A text message was sent to cancer survivors registered with the participating centers. They were invited to participate and if they agreed, the study was explained to them, and they subsequently signed the informed consent form and filled out the questionnaires.

The type of sampling used was non-probabilistic, with chain case study assignment. In other words, key participants were identified and asked to tell other participants with similar characteristics about the questionnaire (Hernández-Sampieri et al., 2014).

Instruments

The Spanish version of the Cancer Survivors' Unmet Needs (CaSUN-S) measure, validated for the Spanish population through its administration to 566 breast cancer survivors, was used as a basis. Five factors were identified: information and medical care needs, physical effects, psychological effects, interpersonal relationships and practical issues, yielding a total Cronbach's Alpha of .95 (Martínez Arroyo et al., 2019). Other instruments used to conduct the present study were an informed consent form and an expert review form, designed for this study.

Data analysis

The study analyzed three aspects: content validity through the Aiken index, construct validity through factor analysis, and reliability through an internal consistency analysis. The following statistical programs were used: SPSS for internal consistency analysis, SPSS Amos (IBM) for confirmatory factor analysis (Figure 1), and the Spanish version of JASP .14.1. (Robalino et al., 2021) for exploratory factor analysis.

Procedure

Phase 1. Content validity

After adapting the base format, the adapted instrument (CaSUN-Mx) was submitted to a panel of expert judges to obtain content validity. Five experts specializing in oncology and psycho-oncology were asked to fill in the review form. In this form, they were asked to rate the wording and relevance of each of the items from 0-5. After the experts had answered, the data were analyzed with the formula to

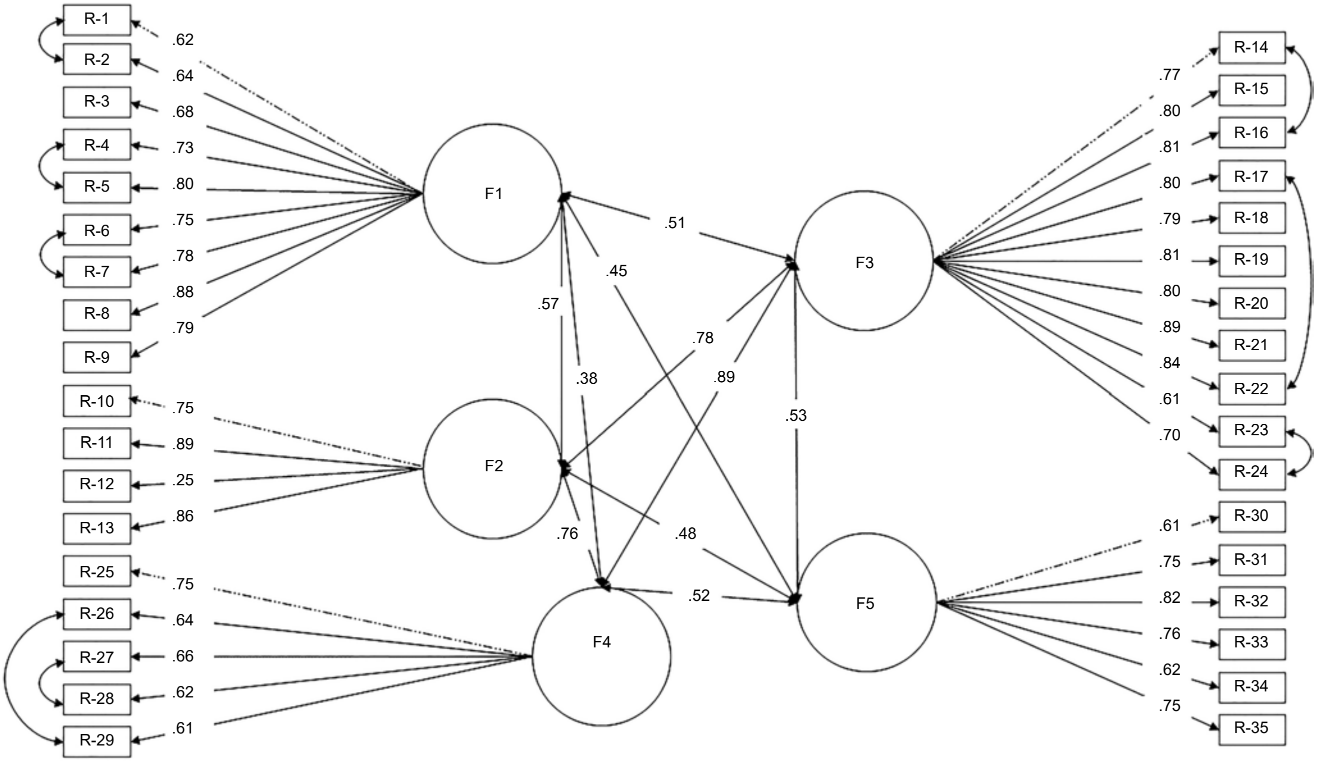

Figure 1. Confirmatory Factor Analysis.

Table 3
Aiken validation

Item		*Aiken language index*	*Aiken cultural index*
1.	I need updated information	1	1
2.	My partner and/or family needs relevant information	1	1
3.	I need you to provide me with information in such a way that I can understand it	1	1
4.	I need the best medical care	1	1
5.	I need health care services that are available whenever I need them	1	1
6.	I need to feel that I also participate, together with the medical team, in taking care of my health	1	1
7.	I need to know that all my doctors talk to each other to coordinate the care I receive	1	1
8.	I need any complaints I make about my medical care to be appropriately addressed	1	1
9.	I need to have access to complementary services (such as physiotherapists and nutritionists)	.8	1
10.	I need help with managing the side effects and/or complications of my illness	1	1
11.	I need help with adapting to the consequences of my illness on my quality of life	1	1
12.	I need help with my fertility problems	1	1
13.	I need help with adapting to the changes I have experienced in my physical appearance	1	1
14.	I need help with reducing the stress levels in my life	1	1
15.	I need help with coping with worry about my future because of my illness	1	1
16.	I need emotional support	1	1
17.	I need to talk to other people suffering from the same illness as me	.8	1
18.	I need help with moving forward with my life	1	1
19.	I need help with coping with the changes in my thinking that nothing bad will happen in my life	1	1
20.	I need help with knowing how to deal with people who don't understand the impact my illness has on my life	1	1
21.	I need help with managing both my own expectations and those of others regarding my illness	1	1
22.	I need help with trying to make decisions about my life despite the uncertainty	1	1
23.	I need help with exploring or analyzing my spiritual beliefs	1	1
24.	I need help with finding a purpose my life	1	1
25.	I need help with knowing how to support my partner and/or family	1	1
26.	I need help with managing the impact of my illness on my relationship	1	1
27.	I need help with establishing new social relationships due to my illness	1	1
28.	I need help with knowing how to deal with the issue of my illness in social and/or work situations	1	1
29.	I need help with addressing problems in my/our sex life	1	1
30.	I need help with getting and/or keeping a job	1	1
31.	I need help with finding out the possible financial benefits and/or subsidies to which I am entitled	1	.8
32.	I need help with arranging for life insurance and/or travel assistance due to my illness	1	1
33.	I need help with getting legal advice due to my illness	1	1
34.	I need more accessible parking at the hospital	1	1
35.	I need someone such as a social worker who I can contact whenever I need information about available services	1	1
36.	Please note any other needs you have experienced during the last month that you have not been previously asked about	1	1
Total		.98	.99

Note: Review format to obtain content validity. Source: compiled by the authors.

Table 4
Goodness-of-fit Indices of the CaSUN-S Survey in the Original Version

Statistical index	*Acceptable level of fit*	*Values obtained*	*Adjustment*
x2/gl	Values 2-3, up to 5[1]	1.741	Not acceptable
RMR	About 0[1]	.083	Acceptable
GFI	1 = Perfect fit > .95 Excellent fit	.776	Acceptable
CFI	Acceptable level of fit 0 = bad fit[2]	.909	Acceptable
PRATIO	0-1 perfect fit[3]	.911	Acceptable
PCFI		.828	Acceptable
NCP	< 2 = acceptable fit[1]	401.859	Unacceptable
RMSEA	< .05 = aceptable fit[1]	.064	Unacceptable
AIC	Nearly 0[1]	1119.859	Unacceptable
ECVI	Nearly 1[1]	6.256	Acceptable
HOELTER	Greater than sample size[4]	114/118	Acceptable

Note: [1] Escobedo-Portillo et al. (2016), p. 20; [2] Hooper et al. (2008); [3] Sánchez et al. (2020); [4] García, (2011), p. 86. Source: compiled by the authors.

obtain the Validity V coefficient (Aiken, 1980). The criterion was the modification of items obtaining an index of less than .80 in the Aiken index.

Phase 2. Internal Consistency

The JASP statistical program (Robalino et al., 2021) was used for internal consistency analysis and exploratory factor analysis.

An internal consistency analysis was conducted to obtain reliability and the Cronbach's Alpha coefficient. The Cronbach's Alpha coefficient of the base questionnaire (CaSUN-S) was obtained so that it could subsequently be compared with the coefficient resulting from the internal consistency analysis of the adapted questionnaire (CaSUN-Mx). The total coefficient of the questionnaire and the coefficients per factor were obtained.

Phase 3. Construct validity

To evaluate construct validity, confirmatory factor analysis (CFA) was conducted before exploratory factor analysis on the grounds that the instrument used as a base is an existing instrument that has been validated for use in a Spanish population. For this analysis, AMOS and maximum likelihood were used, an analysis of covariance was undertaken and the goodness-of-fit indices of the base questionnaire were searched to test it. The following statistical indices: Chi square (Doral-Fábregas et al., 2018); degrees of freedom x^2/df; values of the root mean square error rate (RMR) (Escobedo-Portillo et al., 2016); the goodness-of-fit index (GFI); the comparative fit index (CFI) (Hooper et al., 2008); the parsimony ratio index (PRATIO) and the parsimony comparative fit index (PCFI) (Sánchez et al., 2020); the noncentrality parameter (NCP); the root mean square error of approximation (RMSEA) value; the Akaike information criterion (AIC); the expected cross validation index (ECVI) (Escobedo-Portillo et al., 2016) and the HOELTER index to determine sample size adequacy (García Veiga, 2011) were used.

Since the indices failed to yield a good fit, the modifications suggested by the program were undertaken, such as conducting an analysis of covariances. Even though it had a better fit, it was decided to conduct an exploratory factor analysis to explore latent constructs.

In regard to exploratory factor analysis (EFA), the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were obtained. Once the expected results had been obtained, it was possible to continue with the analysis. A principal axis analysis was performed as an extraction method to obtain communalities, in other words, the variance in each variable. The matrix of rotated components was analyzed, using the Oblimin rotation. Items correlating with more than one factor or with insufficient saturation in any factor were discriminated.

The adjustments suggested by the EFA were made, the final edition of the questionnaire was obtained and lastly internal consistency analysis was conducted again to obtain the Cronbach's Alpha coefficient of the five subscales of the CaSUN-Mx survey and the total coefficient.

Ethical considerations

The protocol was reviewed by the Research Committee with COFEPRIS registration number 22CI22014037 and approved with number 23-03 in the letter sent on May 22, 2023.

RESULTS

Phase 1. Content validity

The Aiken index yielded a coefficient of .98 for linguistic adaptation and a coefficient of .99 for cultural adaptation. Since all the coefficients were above the minimum threshold to be considered suitable (.80), so no modifications were made to the items (Table 3).

Phase 2. Internal consistency

According to the analysis of the internal consistency of the base questionnaire (CaSUN-S), a coefficient of .95 Cronbach's Alpha was obtained. After the item discrimination and exploratory factor analysis (EFA), the reliability coefficient was .87 for factor 1; .91 for factor 2; .87 for factor 3; .95 for factor 4 and .86 for factor 5.

Phase 3. Content validity

CFA yielded low values in CFI, TLI and RMSEA. The analysis of covariance undertaken by the modification indices shown indicated covariance between the errors of items 1 and 2, 4 and 5, 6 and 7, 14 and 16, 17 and 22, 23 and 24, 26 and 29, and 27 and 28 as well as a better fit.

After the adjustment of modification indices, the Chi-square value (x^2) was 943.859 with 542 df. Table 4 shows the result of the statistical values produced by the CFA. The first column shows the name of the statistical value, the second the acceptable fit levels proposed by various bibliographic sources, and the third and fourth columns the results of the CFA values of the questionnaire used.

In the exploratory factor analysis, a score of .916 was obtained on the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, indicating an adequate degree of relationship between the items. Bartlett's sphericity test yielded an x^2 (Chi-square) = 4642.195, *df* = 595 and significance = .001, showing that it was appropriate to conduct exploratory factor analysis.

A distribution of variance was obtained in five components, distributed percentagewise as follows. The first component, "Psychological care needs" (16 items), accounted for 22.5% of total variance, the second, "Comprehensive care needs" (six items), accounted for 11.6%, the third, "Practical needs" (six items), accounted for 10.4%, the fourth, "Information needs" (three items) accounted for 7.9% and the fifth, "Needs related to side effects" (3 items), accounted for 7.5%. Together, the five factors accounted for 59.9% of total variance.

Table 5 shows the distribution of total explained variance in the five factors.

A factorial division into five components was identified. Table 6 shows the saturations of the items in the version with the corresponding adaptations of the questionnaire; values greater than .40 were considered in a single factor. Item 26, "I need help with managing the impact of my illness on my relationship," was eliminated since it did not significantly correlate with any factor.

Table 5
Components, Percentage of Explained Variance and Percentage of Accumulated Variance

Component	*% Explained variance*	*% Cumulative variance*
01	22.5	22.5
02	11.6	34.0
03	10.4	44.4
04	7.9	52.4
05	7.5	59.9

Note: Explained and accumulated variance in components.

DISCUSSION AND CONCLUSION

The objective of the present study was to validate the CaSUN-Mx measure adapted for use in the Mexican population of adult cancer survivors.

Confirmatory factor analysis (CFA) was conducted to analyze how the base questionnaire performed in the eligible population. It was decided to undertake this procedure prior to exploratory factor analysis (EFA) on the grounds that the base questionnaire would have an adequate fit in our population because it already existed. The CFA results indicated that the questionnaire did not have a completely adequate fit. The modification indices indicated covariance between some of the items as a result of which a better overall adjustment was obtained. However, EFA was undertaken to test the questionnaire again and seek possible dimensions or latent constructs after it had been answered by our population (Martínez-Arias et al., 2014).

The results of the EFA pointed to the need to alter the structure of the questionnaire, after modifying the factors and items and having obtained adequate reliability of the final version of the questionnaire. In future research, another CFA should be conducted with a different population to test the fit of the final version of the questionnaire and the new structure obtained in EFA (Martínez-Arias et al., 2014).

In regard to the factors obtained in the final version, Factor 1 of the base questionnaire "Information needs and medical care" was divided into two factors called "Information needs" (three items) and "Comprehensive and collaborative care needs" (six items). The separation of this factor can be explained by the fact that, in our population, the two variables function both independently and significantly. The factor referring to the need for comprehensive, collaborative care was so-called because it refers to the need to have

Table 6
Factor loadings of the 34 items in the five factors

Item		*1*	*2*	*3*	*4*	*5*
1.	I need help with my fertility problems	.434				
2.	I need help with reducing the stress levels in my life	.550				
3.	I need help with coping with worry about my future because of my illness	.560				
4.	I need emotional support	.585				
5.	I need to talk to other people suffering from the same illness as me	.472				
6.	I need help with moving forward with my life	.716				
7.	I need help with coping with changes in my thinking that nothing bad will happen in my life	.673				
8.	I need help with knowing how to deal with people who don't understand the impact my illness has on my life	.687				
9.	I need help with managing both my own expectations and those of others regarding having my illness	.735				
10.	I need help with trying to make decisions about my life despite the uncertainty	.733				
11.	I need help with exploring or analyzing my spiritual beliefs	.799				
12.	I need help with finding a purpose in my life	.788				
13.	I need help with knowing how to support my partner and/or family	.512				
14.	I need help with establishing new social relationships due to my illness	.697				
15.	I need help with knowing how to deal with the issue of my illness in social and/or work situations	.664				
16.	I need help with addressing problems in my/our sex life	.443				
17.	I need the best medical care		.537			
18.	I need health care services that are available whenever I need them		.748			
19.	I need to feel that I also participate, together with the medical team, in taking care of my health		.820			
20.	I need to know that all my doctors talk to each other to coordinate the care I receive		.884			
21.	I need any complaints I make about my medical care to be appropriately addressed		.786			
22.	I need to have access to complementary services (such as physiotherapists and nutritionists)		.623			
23.	I need help with getting and/or keeping a job			.561		
24.	I need help with finding out about the possible financial benefits and/or subsidies to which I am entitled			.650		
25.	I need help with arranging for life insurance and/or travel assistance due to my illness			.836		
26.	I need help with getting legal advice due to my illness			.747		
27.	I need more accessible parking at the hospital			.635		
28.	I need someone such as a social worker who I can contact whenever I need information about available services			.700		
29.	I need updated information				.803	
30.	My partner and/or family needs relevant information				.802	
31.	I need you to provide me with information in such a way that I can understand it				.688	
32.	I need help with managing the side effects and/or complications of my illness					.552
33.	I need help with adapting to the consequences of my illness on my quality of life					.656
34.	I need help with adapting to the changes I have experienced in my physical appearance					.543

Note: Factor loadings on principal components.

access to complementary services and interprofessional or collaborative care, in other words, between professionals working towards a common goal and sharing a team identity (Körner et al., 2016). Collaborative practice in the field of health refers to the work undertaken by health professionals from different disciplines who provide comprehensive care by working directly with patients, their families, caregivers and communities to provide high-quality service. This is achieved through interprofessional or transdisciplinary education, which occurs when different professionals know what each one does, learn from them and learn together to promote effective collaboration (World Health Organization [WHO], 2010).

One of the limitations of the study was that it failed to include a question on whether respondents had been treated in the public or private sector. It is important to know this for future research and for the generation of intervention programs because answers from the two groups vary considerably. Another limitation was that since the study was conducted during the COVID-19 pandemic, the context and consequences of the latter could have affected results, as well as creating further needs, which were not reported. Hence the importance of analyzing the answers obtained in item 35 "Please write down any other needs you have experienced during the last month and have not been previously asked about." A qualitative analysis of the answers should also be conducted.

Financing

None.

Conflict of interests

None of the authors declare a conflict of interest.

Acknowledgements

The present study was conducted at the private cancer center Cancer Center Tec100 in the city of Querétaro, Mexico. The authors of this research are grateful to the centers, hospitals and institutions that collaborated: Hospital Universitario Dr. José Eleuterio González, Av. Dr. José Eleuterio González S/N, Mitras Centro, 64460 Monterrey, N.L; Nuevo Hospital de Querétaro. Adalberto Martínez 448, La Joya, 76180 Santiago de Querétaro, Qro; the Muccam support group Calle Isla de Montecristo No. 84, Col. Loma Linda, Querétaro, Qro. Mex; and the La Nogalera support group.

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salud mental

ORIGINAL ARTICLE
Volume 47, Issue 4, July-August 2024
doi: 10.17711/SM.0185-3325.2024.021

Stress, Depression, and Anxiety Symptoms in Older Adults: Temporal Trend and Relationship with COVID-19

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Received: 2 April 2023
Accepted: 17 October 2023

Citation:
Pereira, I. M., Almeida, T. V., Ribeiro, A. Q., de Mendonça, E. T., de Oliveira, D. M., Cotta, R. M. M., Cavalcante, R. B., & Moreira, T. R. (2024). Stress, Depression, and Anxiety Symptoms in Older Adults: temporal trend and relationship with COVID-19. *Salud Mental*, *47*(4), 161-170.

DOI: 10.17711/SM.0185-3325.2024.021

ABSTRACT

Introduction. Although studies have demonstrated the impact of the COVID-19 pandemic on mental health, those correlating COVID-19 statistics with the psychosocial repercussions in older adults are as yet incipient. **Objective.** Evaluate the screening of stress, depression, and anxiety symptoms in older adults throughout the pandemic and their relationship with the occurrence and severity metrics of COVID-19. **Method.** An ecological, time-series, web-based survey study was conducted in the population aged 60 and over who use digital media. Data collection was undertaken between July 2020 and January 2021 in eight Brazilian cities and included 2,712 older adults. **Results.** There was an upward trend in anxiety and depression symptoms in Brasília-DF, and a downward trend in these symptoms in Divinópolis-MG. It was also possible to identify correlations between mental disorder symptom scores and COVID-19 occurrence and severity metrics in two of the cities evaluated. **Discussion and conclusion.** This study is one of the first to explore the relationship between COVID-19 indicators and mental health variables in older adults, showing that changes in the occurrence and severity metrics of the Novel Coronavirus may be followed by changes in the frequency of mental health problems in this population.

Keywords: Anxiety, depression, epidemiology, older adults.

RESUMEN

Introducción. Los estudios demuestran el impacto de la pandemia de COVID-19 en la salud mental. Pero todavía son incipientes los estudios que correlacionan las estadísticas de COVID-19 con las repercusiones psicosociales en los adultos ancianos. **Objetivo.** Evaluar la detección de síntomas de estrés, depresión, y ansiedad en los adultos ancianos durante toda la pandemia y su relación con las métricas de ocurrencia y severidad de COVID-19. **Método.** Se realizó un estudio ecológico, de series temporales, basado en una encuesta web en la población mayor de 60 años que utiliza medios digitales. La colecta de datos se realizó entre julio de 2020 y enero de 2021 en ocho ciudades brasileñas e incluyó 2712 personas ancianas. **Resultados.** Se observó una tendencia de aumento de los síntomas de ansiedad y depresión en Brasília – DF, y una tendencia de disminución de estos síntomas en Divinópolis - MG. Además, fue posible identificar correlaciones entre las puntuaciones de los síntomas de trastornos mentales y la métrica COVID-19 de ocurrencia y gravedad en dos de las ciudades evaluadas. **Discusión y conclusión.** Este estudio es uno de los precursores en la exploración de la relación entre los indicadores de COVID-19 y las variables de salud mental en los adultos ancianos, y en él se ha podido destacar que los cambios en las métricas de incidencia y gravedad del nuevo coronavirus pueden ir seguidos de cambios en la frecuencia de los problemas de salud mental en esta población.

Palabras claves: Ansiedad, depresión, epidemiología, ancianos.

INTRODUCTION

The emergence of the new coronavirus (SARS-Cov-2) and the 2019 coronavirus disease (COVID-19) pandemic have highlighted the potential impact public health problems can have on people's well-being. In addition to the repercussions on physical health, the process of spreading the infection also resulted in psychosocial, economic, political, environmental and other social consequences (Hossain et al., 2020; Hosseinzadeh et al., 2022; Rasheed et al., 2021).

The population only had a short period of time to absorb and understand the scope of the problem, in addition to having to abruptly adapt and adjust their lifestyle (Balanzá-Martínez et al., 2021; Di Renzo et al., 2020). It was necessary to respond to several challenges, such as social distancing and isolation, mask wearing and hand hygiene, in a context of uncertainty about COVID-19, high infectivity, lack of vaccines and definitive treatment, overload of health systems, recession and unemployment (Dubey et al., 2020; Werneck & Carvalho, 2020; Xiong et al., 2020).

Given all the changes and repercussions, the mental health of the population was also expected to be affected, a phenomenon described as the "fourth wave of care," encompassing the mental and emotional changes resulting from the pandemic (Pedreira Massa, 2020). For 2020 alone, a study published in *The Lancet* estimated a 27.6% increase in major depressive disorder cases worldwide, and an additional 25.6% of anxiety disorder cases (COVID-19 Mental Disorders Collaborators, 2021). Another survey showed that stress was the most prevalent mental health consequence in China during the initial pandemic period, affecting approximately 48.1% of the population (Bareeqa et al., 2021).

Of all the age groups, the older adult population was regarded as one of the most susceptible to the psychosocial impacts resulting from the pandemic (Armitage & Nellums, 2020). This is thought to be due to several factors, including the fact that older adults are vulnerable to developing complications from COVID-19, leading to significant fear in this group (Dubey et al., 2020). In addition, this group is more susceptible to psychiatric disorders (Machado et al., 2016; Silva et al., 2018), regardless of other factors, and the pandemic may exacerbate existing mental health problems.

Despite the progress to date, studies correlating statistics on the occurrence of COVID-19 with anxiety, depression and stress levels in older adults are as yet incipient. A review of the literature on the subject showed that several studies were able to demonstrate the prevalence of an array of symptoms and mental disorders in the population aged 60 and over (Bohlken et al., 2021; Das et al., 2021; Jemal et al., 2021; Kurniawidjaja et al., 2022; Srifuengfung et al., 2021). However, no details were found on the behavior of mental health variables over time associated with epidemiological rates related to the pandemic.

In this respect, this study proposes to evaluate screening for stress, depression and anxiety symptoms during the months of the evolution of the COVID-19 pandemic and their relationship with measures of the occurrence and severity of the disease (incidence rates, lethality, mortality and/or occupation of ICU beds) in older adults from eight Brazilian cities.

METHOD

The present study is part of the research project entitled "The COVID-19 infodemic and its repercussions on the mental health of the elderly: a multicenter study Brazil/Portugal/Spain/Italy/Chile" (Aguiar et al., 2022; Bezerra Cavalcante et al., 2022; Fhon et al., 2022; Kitamura et al., 2022; Santos et al., 2022). This research consists of an ecological, time-series study analyzing data from eight Brazilian cities (Juiz de Fora-MG, Divinópolis-MG, Viçosa-MG, Rio de Janeiro-RJ, Ribeirão Preto-SP, São Paulo-SP, Porto Alegre-RS, Brasília-DF), collection from July 2020 to January 2021.

Subjects/sample description

The study population consisted of older adults (aged 60 years or over) with access to e-mail and/or social networks and/or a smart phone. Older adults who did not agree to participate in the study or were unable to answer the questions autonomously were excluded.

The sample size of the multicenter study was estimated by city, considering the older adult population with internet access, using the formula: $n = N.Z^2.p.(1-p)/Z^2.p.(1-p). + e^2.(N-1)$, where "$n$" is the calculated sample, "N" is the population, "Z" the standardized normal variable associated with the confidence level, "p" the true likelihood of the event (P = (1-P) = .5, assumption of maximum variation), and "e" the sampling error, using a sampling error of 5% and a confidence level of 95%. Thus, in Brazil, for each city mentioned above, the inclusion of 330 to 384 older adults (aged 60 years or over) was estimated. Although two municipalities failed to reach the indicated sample, they were maintained in the present study for the sake of representativeness (Ribeirão Preto and Brasília). In total, 2,712 older adults were interviewed. Sampling was non-probabilistic.

Procedure

Data collection was conducted between July 2020 and January 2021, using a web-based survey. It was sent (in three batches over a three-month period), initially to groups of older adults with access to e-mail and/or social networks already followed by researchers in other outreach and research activities unrelated to mental health in each collaborating center of the study (community and senior support groups). Telephone contact was also used as a complementary strategy for inviting people to participate and clarifying doubts regarding the answers to the web-based survey. Older adults who received the links were asked to forward them to potential participants in their circle of acquaintances. Data collection was therefore based on the technique known as a "virtual snowball," which has increasingly been used in quantitative studies, with large sample numbers and inaccessible populations (Costa, 2018). It should be noted that during the COVID-19 pandemic, social distancing was recommended as a protective measure for older adults, with emphasis being placed on importance of their staying at home.

Seeking a more representative sample, as a complementary measure, the link to access the web-based survey was also forwarded to scientific geriatrics and gerontology societies, institutions caring for older adults and retiree associations.

When accessing the link, older adults were initially directed to the digital Free and Informed Consent Form (TCLE), which they were asked to read before deciding whether or not to participate in the study. Their decision was automatically registered in the database generated by the web-based survey. Only older adults who had agreed to participate in the study had access to the web-based survey questions. The form had no spaces to register participants' names, thereby guaranteeing their anonymity. In addition, codenames were used for the interviewees to replace their e-mails and phone numbers.

Measurements

For the construction of the questionnaire and data collection, the Google Forms tool, a file storage and synchronization service, was chosen because it is free, in the public domain and easy to access and manage for both researchers and respondents. This data collection system did not permit the generation of duplicate responses by email and/or telephone, making it possible to manage data duplication.

Screening for stress, depression and anxiety symptoms was performed using the Perceived Stress Scale-PSS (Cohen et al., 1983), Geriatric Depression Scale-GDS (Yesavage et al., 1982) and Geriatric Anxiety Inventory-GAI (Pachana et al., 2007), respectively. In Brazil, the PSS was translated and validated by Luft et al. (2007). The GDS was validated by Paradela et al. (2005) and its reliability analyzed by Almeida & Almeida (1999). The GAI was translated and adapted into Brazilian Portuguese by Martiny et al., (2011) and the validation study was conducted by Massena

Table 1

Characterization of Study Municipalities, by Population Aspects, COVID-19 Rates and Mental Health Variables during the Period from July 2020 to January 2021

City	*Population*[a]	*Sample*	*Incidence*[b] *(mean ± SD)*	*Mortality*[b] *(mean ± SD)*	*Lethality*[c] *(mean ± SD)*
Brasília	3 055 149	165	1012.54 ± 532.67	17.39 ± 10.24	1.69 ± .40
Divinópolis	240 408	381	341.61 ± 237.73	7.85 ± 4.22	2.72 ± 1.12
Juiz de Fora	573 285	470	379.94 ± 221.10	16.55 ± 11.25	4.32 ± 1.26
Porto Alegre	1 488 252	397	739.37 ± 266.90	19.29 ± 3.10	3.04 ± 1.61
Rio de Janeiro	6 747 815	352	277.96 ± 72.09	22.81 ± 5.89	8.50 ± 2.32
São Paulo	12 325 232	411	403.38 ± 138.86	11.64 ± 4.24	2.94 ± .59
Viçosa	79 388	334	535.98 ± 527.85	4.09 ± 5.12	.73 ± .67
Ribeirão Preto	711 825	202	646.24 ± 229.05	18.90 ± 8.73	2.84 ± .82

City	*Bed occupancy rate - % (mean ± SD)*	*Stress*[d] *(mean ± SD)*	*Depression*[e] *(mean ± SD)*	*Anxiety*[f] *(mean ± SD)*
Brasília	70.32 ± 16.31	19.44 ± 8.49	5.79 ± 2.71	6.24 ± 5.71
Divinópolis	66.15 ± 5.21	20.50 ± 9.54	5.77 ± 3.04	6.76 ± 5.89
Juiz de Fora	66.15 ± 5.21	20.55 ± 9.03	5.22 ± 2.61	6.43 ± 6.26
Porto Alegre	73.64 ± 5.40	20.01 ± 9.64	5.16 ± 2.85	5.48 ± 5.54
Rio de Janeiro	64.29 ± 12.33	20.08 ± 9.27	5.49 ± 2.58	6.54 ± 6.39
São Paulo	56.96 ± 11.23	19.79 ± 9.99	5.28 ± 2.96	5.81 ± 5.97
Viçosa	66.15 ± 5.21	20.09 ± 9.40	6.26 ± 2.59	6.96 ± 5.82
Ribeirão Preto	56.96 ± 11.23	21.49 ± 10.61	5.57 ± 3.04	6.47 ± 6.08

Note: *SD* = standard deviation. [a] Estimated population for the year 2020. [b] Per 100,000 population. [c] Per 100 cases of COVID-19. [d] Based on the Perceived Stress Scale. [e] Based on the Geriatric Depression Scale. [f] Based on the Geriatric Anxiety Inventory.

(2014). The three scales demonstrated good psychometric properties with the population studied. The monthly mean scores for each scale and in each city were regarded as aggregated variables for data analysis.

Demographic data and variables regarding the occurrence and severity of COVID-19 were collected on the websites of the Ministry of Health (Ministério da Saúde, n.d.), the Oswaldo Cruz Foundation-Fiocruz (FIOCRUZ, 2020) and the Brazilian Institute of Geography and Statistics-IBGE (IBGE, 2020). The following data were collected for each municipality: population size, monthly number of COVID-19 cases and deaths, and ICU bed occupancy rate for COVID-19. From these data, the incidence, mortality and lethality rates of COVID-19 were calculated in each municipality studied.

Statistical analysis

Stress, depression and anxiety scale and temporal variation estimate scores were analyzed using descriptive statistics

Table 2

Temporal Variation of Mean Stress, Depression and Anxiety Symptom Scores in Eight Brazilian Municipalities between July 2020 and January 2021

City and Mental disorders	*Monthly average*							*Average monthly variation (%)*^{a}	*95% CI*
	July/2020	*Aug/2020*	*Sept/2020*	*Oct/2020*	*Nov/2020*	*Dec/2020*	*Jan/2021*		
Brasília									
Stress	16.45	17.16	19.79	23.45	20.23	19.97	19.00	.49	-.59, 1.57
Depression	4.82	5.24	4.89	6.80	5.20	6.55	7.00	.34	.01, .67
Anxiety	5.09	4.95	6.04	7.10	5.86	7.29	7.33	.40	.12, .68
Divinópolis									
Stress	22.60	23.07	18.79	20.28	20.11	18.77	19.87	-.55	-1.20, .10
Depression	7.15	6.07	5.48	5.64	5.43	5.15	5.45	-.25	-.46, -.38
Anxiety	9.25	8.01	7.10	6.08	5.50	5.67	5.71	-.60	-.91, -.30
Juiz de Fora									
Stress	20.03	20.57	21.89	21.09	20.69	19.00	ND	-.16	-.85, .53
Depression	5.66	5.10	5.98	5.58	5.64	3.33	ND	-.30	-.88, .29
Anxiety	6.15	4.71	6.81	6.23	7.01	7.67	ND	.40	-.11, .90
Porto Alegre									
Stress	21.44	18.13	21.67	20.81	17.76	18.91	21.34	-.10	-.98, .80
Depression	5.33	5.33	4.83	5.61	5.00	4.55	5.46	-.04	-.23, .16
Anxiety	6.32	5.27	4.75	6.87	4.04	4.82	6.28	-.06	-.61, .48
Rio de Janeiro									
Stress	18.13	19.96	21.35	19.25	23.47	17.92	20.50	.18	-.82, 1.19
Depression	5.02	5.92	5.91	5.04	6.47	4.56	5.50	-.03	-.38, .32
São Paulo									
Stress	20.86	18.12	20.32	20.23	21.79	20.11	17.08	-.21	-1.04, .62
Depression	5.40	5.25	5.14	5.53	5.30	5.68	4.69	-.04	-.20, .12
Anxiety	5.49	6.31	6.10	5.56	6.81	6.03	4.38	-.11	-.50, .28
Viçosa									
Stress	19.67	18.34	20.48	20.91	20.34	20.86	20.00	.21	-.20, .62
Depression	5.67	5.00	5.63	5.59	5.54	5.37	11.00	.59	-.29, 1.48
Anxiety	3.67	6.12	5.92	6.12	5.92	5.98	15.00	1.20	-.16, 2.57
Ribeirão Preto									
Stress	21.05	21.66	20.96	20.92	18.61	20.14	21.56	-.14	-.67, .40
Depression	5.42	5.62	5.50	5.33	5.27	6.00	5.39	.02	-.11, .15
Anxiety	7.26	6.79	5.62	6.33	5.65	4.14	7.56	-.16	-.75, .44

Note: 95% CI = Confidence interval 95%; ND: data unavailable. ^{a} Linear regression coefficient.

(mean and standard deviation) and a simple linear regression model, with scores being interpreted as the outcome and the month as the explanatory variable. Trends toward increase, decline, or stagnation were expressed as the β coefficient of monthly variation, with the respective 95% confidence interval (CI) to assess the accuracy and statistical significance of temporal variations. Trends with a regression coefficient not different from zero were considered stationary.

Correlation tests (Pearson or Spearman—according to data normality) were performed to explore the association between the variables of occurrence and severity of COVID-19 (incidence rates, mortality, lethality and occupancy of COVID-19 ICU beds) and variables related to the mental health of older adults (scores on the stress, depression and anxiety scales). All data were analyzed using the Statistical Package for Social Sciences 21.0 software, with a significance level of 5%.

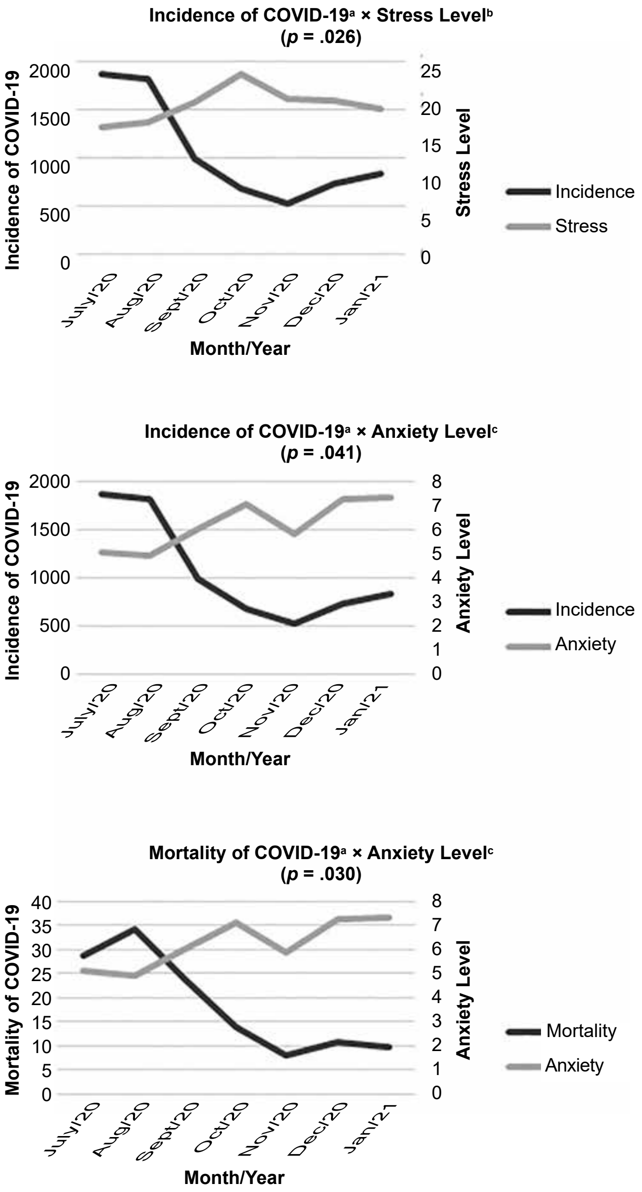

Figure 1. Evolution of COVID-19 epidemiological indicators (incidence and mortality) and average scores of mental disorders (stress and anxiety) in Brasília from Jul/2020 to Jan/2021.

Note: [a] Per 100,000 inhabitants. [b] Based on the Perceived Stress Scale. [c] Based on the Geriatric Anxiety Inventory.

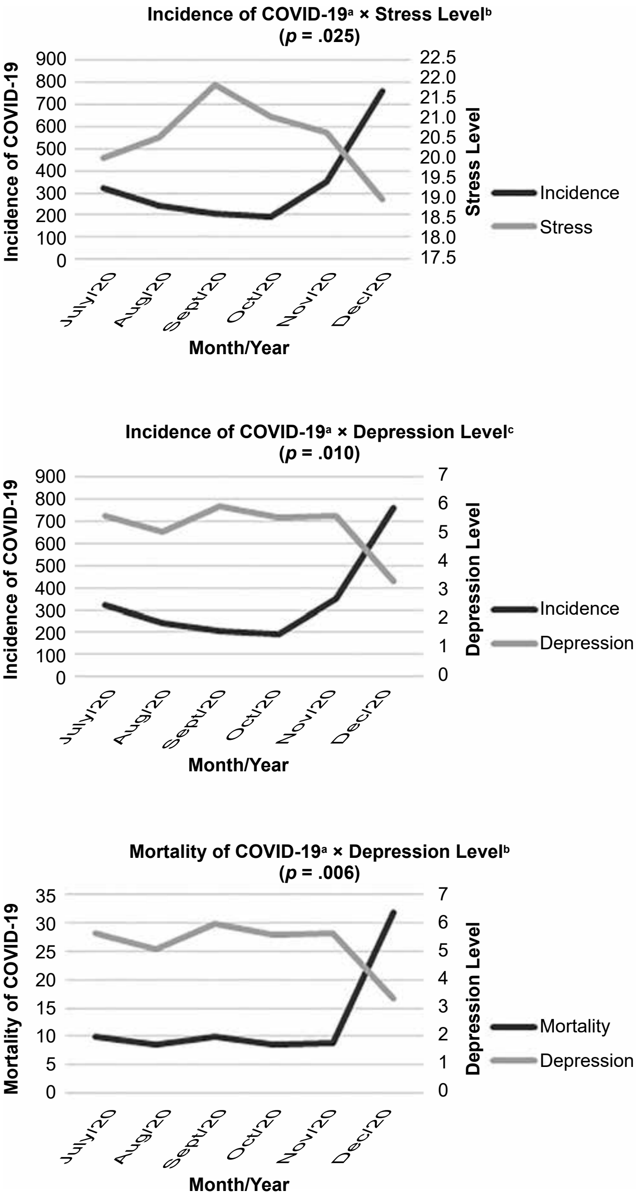

Figure 2. Evolution of COVID-19 epidemiological indicators (incidence and mortality) and average scores of mental disorders (stress and depression) in Brasília from Jul/2020-Dec/2020.

Note: [a] Per 100,000 population. [b] Based on the Perceived Stress Scale. [c] Based on the Geriatric Depression Scale.

Ethical considerations

In accordance with Resolution 466/2012 of the National Health Council, which provides for research with human beings, the project was submitted for consideration by the National Research Ethics Committee (CONEP) and approved in July 2020 (Opinion No. 4.134. 050). Subjects who agreed to participate in the research were asked to sign the TCLE. Thus, all participants were respected in terms of their dignity and autonomy, recognizing their vulnerability, making sure of their willingness to contribute and ability to decide whether or not to remain in the research project in a free and informed manner.

RESULTS

Population data, measures of the occurrence and severity of COVID-19 and the mental health variables of the municipalities are shown in Table 1. High incidence rates of COVID-19 were observed in all municipalities (over 250 cases per 100,000 population) during the study period. Higher mortality rates were observed in Rio de Janeiro and Porto Alegre, followed by Ribeirão Preto, Brasília and Juiz de Fora; the other municipalities had fewer than 12 deaths per 100,000 population. The highest fatality rate was found in Rio de Janeiro, while Viçosa had the lowest incidence of deaths per 100 confirmed cases of COVID-19. In regard to the bed occupancy rate, all municipalities were classified as having a medium alert level (between 50 and 80% occupancy) during most of the period analyzed.

Mean scores on the stress, depression, and anxiety scales are relatively homogeneous. The highest stress index was observed in Ribeirão Preto, and the lowest in Brasília. In regard to the depression and anxiety scales, Viçosa had the highest and Porto Alegre the lowest values (Table 1).

Table 2 shows the mean scores of the stress, depression and anxiety scales for each municipality between July 2020 and January 2021, in addition to the mean monthly variation and the respective confidence interval. All municipalities displayed occurrence data throughout the study period, except for Juiz de Fora, where there was no data collection in January 2021.

In regard to the depression and anxiety scales, only Brasília showed a significant upward trend over time, while Divinópolis was the only municipality with a significant

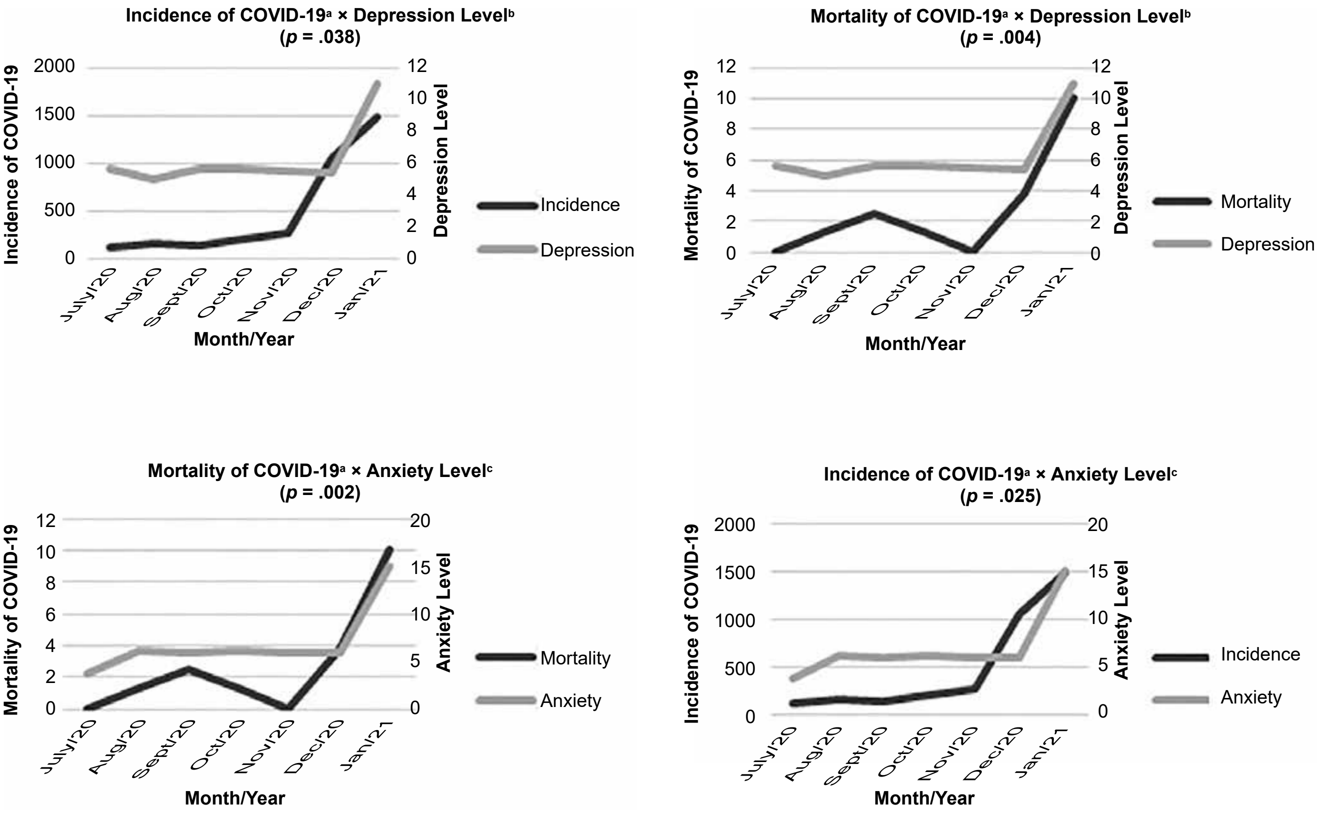

Figure 3. Evolution of COVID-19 epidemiological indicators (incidence and mortality) and average scores of mental disorders (depression and anxiety) in Brasília from Jul/2020 to Jan/2021.

Note: a Per 100,000 population. b Based on the Geriatric Depression Scale. c Based on the Geriatric Anxiety Inventory.

downward trend. No trend was observed in the stress scale during this period in any municipality (Table 2).

Figures 1, 2 and 3 show the rates of occurrence and severity of COVID-19 and the average scores of mental disorders in some of the municipalities evaluated during the study period. In the city of Brasília (Figure 1), there was a negative correlation between the incidence of COVID-19 and stress (p = .026) and anxiety (p = .041), and between mortality and anxiety (p = .30). In Juiz de Fora (Figure 2), negative correlations were also observed between the incidence of COVID-19 and stress (p = .025) and depression (p = .010), in addition to a correlation between mortality and depression (p = .006).

In Viçosa (Figure 3), positive correlations were observed between the incidence of COVID-19 and depression (p = .038) and anxiety (p = .025), and between mortality and depression (p = .004) and anxiety (p = .002). In the other municipalities, there was no statistically significant correlation between the variables studied.

DISCUSSION AND CONCLUSION

The results observed allow a partial understanding of the epidemiological patterns of COVID-19 in the population and of mental disorders in older adults during the pandemic. Throughout the period studied, a scenario of high rates of infection by the new coronavirus was observed, in addition to fluctuations in stress, depression and anxiety levels. An upward trend in anxiety and depression was observed in the city of Brasília, whereas in Divinópolis, a downward trend was observed in the mental health variables mentioned above.

The study also allowed the analysis of correlations between levels of mental disorders and measures of occurrence and severity of COVID-19. Negative correlations were found in Brasília and Juiz de Fora, since stress, depression and anxiety levels behaved in the opposite direction to incidence and mortality rates for the new coronavirus. At the same time, positive correlations were observed in the municipality of Viçosa, where anxiety and depression levels followed the same pattern as incidence and mortality rates.

In Brasilia, it was found that, despite the drop in incidence and mortality rates, stress and anxiety levels increased over the period studied. One of the hypotheses for this scenario is the fact that the municipality implemented an early easing of quarantine restrictions compared to other cities, with the reopening of bars, gyms and other businesses as early as July 2020 (Valente, 2020), which may have created fear and disquiet among older adults as a result of these changes.

In Juiz de Fora, it is interesting to note that, from November to December 2020, a clear increase in incidence and mortality rates was observed, whereas stress and depression levels in older adults experienced a significant decline. At the municipal level, no possible justifications for this situation were found. However, at the federal level, it is important to recall that it was during this period, from November to December 2020, that the Brazilian government presented the preproposal for the vaccination plan for the population (Sanar, 2020). This news may have produced greater peace of mind and impacted the stress and depression levels in the older adult population of Juiz de Fora.

In the case of Viçosa, anxiety and depression levels in older adults were positively correlated with variations in the incidence and mortality rates due to COVID-19. The fact that Viçosa is a relatively small municipality in the interior of the state, with the lowest number of inhabitants of all the cities studied, may account for this situation, since news in small or medium-sized cities spreads more quickly (Santos & Castro, 2013). News of an increase or decrease in the number of cases and deaths has a greater impact on the daily life of this type of municipality, and may explain the variations in the scope of mental health problems found in the older adult population of Viçosa.

It is worth mentioning that the results found in the study centers did not follow the same pattern, despite their being inserted in the same general context of high infectivity rates and a rising number of COVID-19 deaths. At the same time, it is also important to recall that the pandemic is a dynamic phenomenon, and that each municipality has particularities influencing the way each of them behaves in response to this phenomenon. The dynamic of the pandemic in various regions could help explain the differences in behavior found in the centers evaluated by the research.

Another striking aspect is the low number of trends observed throughout the study, which can be partly explained by the short evaluation period, since data collection began in July 2020 and ended in January 2021. In Brazil, the first confirmed case of COVID-19 was recorded in February 2020, meaning that a reasonable period—more than four months—elapsed before the start of data collection for the study. It can therefore be assumed that the time lapse between the onset of COVID-19 cases in Brazil and the beginning of the study could have prevented the achievement of better results—not to mention the fact that worldwide, the pandemic began even earlier. Furthermore, one aspect that must be considered for the analysis of results is the fact that there are no comparable data on the stress, anxiety and depression levels in older adults in the period prior to the pandemic in the municipalities studied. There is also a possibility that mental disorder levels were already high even before the start of the study, which could partly explain the negative correlations obtained.

Regardless of the trends found, it is essential to note that COVID-19 directly and indirectly impacts the mental health of the population. It has already been observed that those who contract the disease have an increased incidence of psychiatric sequelae, such as anxiety and depressed mood (Rogers et al., 2020). In addition, during the COVID-19 epidemic, several manifestations of psychological stress were reported, such as panic, fear and insomnia (Morin et al., 2021; Quadros et al., 2021). All these repercussions also affect the older adult population, who often experience feelings of loneliness, anxiety and sadness (Romero et al., 2021).

Among the factors contributing to the mental confusion of people over the age of 60, it is important to highlight the COVID-19 infodemic. The term "infodemic" refers to an abundance of possibly misleading information hindering or preventing the proper understanding of a given issue (Organização Pan-americana da Saúde [OPAS], 2020). In the case of the pandemic, there was an exorbitant amount of information on the new disease, which included false theories, misinformation, and unreliable content and guidelines (Rathore & Farooq, 2020; Ross et al., 2021). Studies indicate that this excess of information regarding the new coronavirus was associated with psychopathological changes in older adults, particularly fear, anxiety and stress, the most frequent manifestations (Kitamura et al., 2022).

Finally, it is worth mentioning some limitations of the study. One of them, already described above, is the time of the start of data collection, since ideally, work would have begun at the onset of the pandemic to allow the integral, longitudinal follow-up of the older adult population. Another factor is the limitation of the study population, since only a specific group of older adults were able to participate in the research, as older adults who did not have access to e-mail, social networks or smart phones and older adults with cognitive impairment or who were unable to answer questions independently were excluded. Moreover, although the study sample was relatively large, when the number of participants is subdivided by municipality and the months studied, it became relatively small, with a particular emphasis on Ribeirão Preto and Brasília, meaning that it failed to reach the recommended sample size.

Despite these limitations, the results obtained contribute to the knowledge of the relationship between the mental health of the older adult population and the evolution of COVID-19 in Brazil, enhancing understanding of the impact of COVID-19 on the health of this population.

This study is one of the first to attempt to link epidemiological data on COVID-19 to variations in the stress, depression and anxiety levels of older adults. The existence of positive and negative correlations was demonstrated in some of the cities studied, indicating that changes in measures of occurrence and severity of the new coronavirus (particularly incidence and mortality rates) may be accompanied by changes in the frequency of symptoms related to mental disorders. From this perspective, it is important to delve deeper into the factors that can influence the type of correlation found in each municipality, to be able to fully understand the behavior of the stress, depression and anxiety variables in older adults and to develop strategies that will make it possible to reduce the repercussions of COVID-19 on the mental health of this population.

Funding

This work was developed as part of the Institutional Program of Scientific Initiation Scholarships of the Federal University of Viçosa, in which the first author received a research grant from the National Council for Scientific and Technological Development (CNPq).

Conflict of interest

The authors declare they have no conflicts of interest.

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salud mental

ORIGINAL ARTICLE
Volume 47, Issue 4, July-August 2024
doi: 10.17711/SM.0185-3325.2024.022

Patients' Mental Health and Length of Stay in Emergency Departments in Mexico

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Received: 1 June 2023
Accepted: 20 October 2023

Citation:
Landa-Ramírez, E., Díaz-Vásquez, L. P., Hernández-Nuñez, M. E., Castillo-Cruz, J., Ortega-Ramírez, G. X., Guerrero-Martínez, A. H., Domínguez-Vieyra, N. A., & López-Gómez, A. (2024). Patients' Mental Health and Length of Stay in Emergency Departments in Mexico. *Salud Mental*, *47*(4), 171-177.

DOI: 10.17711/SM.0185-3325.2024.022

ABSTRACT

Introduction. International studies on emergency medical patients have identified an association between mental health problems and the number of patients' readmissions and their length of stay. **Objective.** We evaluated the relationship between patients' mental health (including anxiety and depression levels and suicide risk) and the number of readmissions and length of stay at the emergency department (ED) of a Mexico City hospital emergency department (ED). **Method.** This cross-sectional study was conducted between 2017 and 2020 at a general hospital in Mexico City. The sample comprised 236 patients in the ED. The study administered three instruments with psychometric properties to evaluate the sample. In addition, patient records were reviewed to identify the number of readmissions and length of stay in the emergency department. **Results.** The mean length of stay was 69.6 hours (standard deviation [*SD*] = 65.68) and the mean number of readmissions was .4 (*SD* = .88). In regard to mental health variables, it was found that 50% of the study population displayed anxiety symptoms, 54% showed depression symptoms and 8.30% of the patients presented a moderate/high risk of suicide according to the International Neuropsychiatric Interview (MINI). No statistically significant associations were found between study variables. **Discussion and conclusion.** There appears to be no relationship between mental health and length of stay. The percentages and implications of the data obtained are discussed.

Keywords: Mental health, length of stay, emergency department, mood disorder, Mexico.

RESUMEN

Introducción. Varios estudios internacionales han señalado la relación entre diversos problemas de salud mental con el número de reingresos y tiempo de estancia hospitalaria en pacientes de urgencias médicas. **Objetivo.** Se evaluó la relación entre la salud mental y el tiempo de estancia hospitalaria en pacientes hospitalizados en un departamento de urgencias médicas de la Ciudad de México. De igual manera, se evaluaron los niveles de ansiedad, depresión, riesgo suicida, número de reingresos y tiempo de estancia hospitalaria en urgencias médicas. **Método.** Se trató de un estudio transversal que se desarrolló entre el 2017 y 2020; participaron 236 pacientes hospitalizados en un hospital general de la Ciudad de México. Se aplicaron tres instrumentos con propiedades psicométricas a la población a evaluar. De igual forma, se revisaron los expedientes de los pacientes para identificar el número de reingresos, así como el tiempo de estancia en urgencias. **Resultados.** El tiempo promedio de hospitalización fue de 69.6 horas (Desviación Estándar [*SD*] = 65.68) y el promedio de reingresos fue de .4 (*SD* = .88). En relación con las variables emocionales, se obtuvo que el 50% de la población hospitalizada presentaba sintomatología ansiosa, 54% presentó sintomatología depresiva y el 8.3% de los pacientes presentó un riesgo suicida moderado/alto acorde con el instrumento MINI. No se encontraron asociaciones estadísticamente significativas entre las variables de estudios. **Discusión y conclusión.** Parece no haber una relación entre la salud mental y el tiempo de estancia hospitalaria. Se discuten los porcentajes y las implicaciones de los datos obtenidos.

Palabras clave: Salud mental, estancia hospitalaria, departamento de emergencias, trastornos de ánimo, México.

INTRODUCTION

Emergency medicine is a specialty concerning the evaluation, diagnosis, treatment and coordination of any patient requiring immediate medical, surgical or psychiatric care (Definition of Emergency Medicine, 2016). Efforts have been made in high-income countries to decrease the time spent by patients in Emergency Departments (ED), either by resolving the patient's problem or by transferring them to another department (Obermeyer et al., 2015). According to international recommendations, a patient's needs should be addressed within a maximum of eight hours; in the case of the United Kingdom, the maximum is just four hours (National Health Services, 2020). In Mexico, national health regulations state that a patient can be in an ED for a maximum of twelve hours (Secretaría de Salud, 2013).

In the case of low- and middle-income countries, ED stays tend to be longer. It has been reported that patients admitted to an ED experience average stays of 17 hours in Africa and 7.7 hours in Latin America. However, prolonged stays have also been described in Latin America, in some cases totaling 72 to 120 hours. These lengthy stays can result in higher care costs, saturation of ED areas, poor prognosis for patients, patients leaving the ED without being treated and higher mortality rates (Carter et al., 2014; Pearlmutter et al., 2017; Obermeyer et al., 2015).

Several factors influence the saturation of services, such as a shortage of emergency units, limited support and resources, few trained personnel, patient acuity and admission requirements, and inappropriate ED utilization by patients (Andersson et al., 2020; Carter et al., 2014; Obermeyer et al., 2015; Pryce et al., 2021). In addition to the aforementioned factors, several international studies have shown that problems such as anxiety, depression, suicidal ideation and substance abuse can contribute to overcrowding and length of stay within the ED, as these issues are reported to be among the most frequent reasons why patients go to emergency rooms (Hooker et al., 2019; Theriault et al., 2020). These problems may occur concomitantly with a chronic or acute condition, or may be the primary reason why patients decide to visit an ED (Holland et al., 2021).

ED utilization by patients with mental health and substance abuse problems has major consequences, including higher patient care costs (Yap et al., 2020), work overload, and a greater likelihood of dissatisfaction among health providers (Pearlmutter et al., 2017), and could impact the number of patient readmissions, since these patients have up to twice the number of ED visits compared to non-psychiatric patients, (Abar et al., 2017; Baia Medeiros et al., 2019; Blakemore et al., 2019). In addition, it has been observed that patients with mental health problems, previous suicide attempts, substance use and/or mood disorders (usually anxiety or depression), are 2.5 times more likely to be hospitalized and tend to have a longer length of stay (Coates et al., 2019; Santillanes et al., 2020; Smith et al., 2016).

Most of the literature on the interconnected problem of mental health and length of stay in the ED is produced by high-income countries, which usually have health systems with greater resources and a shorter average length of stay than developing countries. This could mean that existing data do not reliably describe what happens in countries such as Mexico, where it has been reported that the emergency system is characterized by a large number of patients, a shortage of beds, few people hired full-time or specializing in emergency medicine, and limited training in assessing mental health problems (Castilla-Puentes et al., 2008; Julián-Jiménez et al., 2019; Obermeyer et al., 2015). There is therefore a need for research on EDs in the context described above, to improve their preparedness for the situations that arise there. To this end, this study sought to evaluate the relationship between mental health and length of stay in patients hospitalized in a Mexico City emergency department. The association between mental health and the number of readmissions of ED patients was also evaluated. Based on previous evidence (Abar et al., 2017; Baia Medeiros et al., 2019; Blakemore et al., 2019; Coates et al., 2019; Holland et al., 2021; Santillanes et al., 2020; Smith et al., 2016; Yap et al., 2020), anxiety and depression symptoms, substance use, and suicide risk were considered the primary mental health variables for these analyses.

METHOD

Study design

A cross-sectional study was undertaken between 2017 and 2020.

Subjects / description of the sample

Sample size was calculated for a significant correlation equal to .45 (Aguilar-Barojas, 2005), considered the minimum clinically important value. Calculations considered a statistical power of 80%, a confidence level of 95% and potential patient losses of up to 20% (Hazra & Gogtay, 2016), resulting in the inclusion of a sample of 225 subjects. At the end of the study, 236 patients were recruited by convenience sampling. Severely ill patients, with cognitive impairment, unconscious, with delirium or who did not answer at least 80% of the psychological evaluation, were excluded from this study.

Measurements

The Hospital Anxiety and Depression Scale (HADS) was used to identify anxiety and depression symptoms in medical patients (Zigmond & Snaith, 1983). This scale comprises 14 items (seven for anxiety, seven for depression) with four Likert-type response options (ranging from zero to three). This research used a version of HADS adapted to the Mexican population with good reliability (Cronbach's alpha = .86) resulting in a depression cut-off point of seven and an anxiety cut-off point of eight (López-Alvarenga et al., 2002).

This study used the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), designed to evaluate and identify the level of risk in the use of psychoactive substances such as alcohol, tobacco and illegal drugs (WHO ASSIST Working Group, 2002). It comprises eight questions identifying the types of use (lifetime use, current use, dependence problems and risk) of ten substances (alcohol, tobacco, cannabis, cocaine, amphetamine-type stimulants, inhalants, sedatives, hallucinogens, opioids, and other drugs). The scale considered the cultural aspects of the countries where it was evaluated and has been shown to have adequate levels of reliability in Spanish-speaking countries (Cronbach's alpha = .93; Rubio Valldolid et al., 2014).

Section C of the International Neuropsychiatric Interview (MINI) was used to assess the presence of suicide risk. The MINI is a brief diagnostic interview developed to assess neuropsychiatric disorders based on the criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and the International Classification of Diseases, 10th edition (ICD-10; Sheehan et al., 1998) Despite its extensive clinical use, its psychometric qualities have not been validated in the Mexican population. However, the following cut-off points are recommended for the interpretation of results: mild suicide risk (score 1-5), moderate suicide risk (score 6-9), high suicide risk (score over 10; Ferrando et al., 2000).

The sociodemographic data and length of stay were obtained from hospital records. Length of stay was taken as the number of hours from the patient's admission to the emergency room to their discharge either because their health issue was resolved or because the patient was transferred to another department in the hospital. Although it was originally planned to obtain the number of hospital readmissions from hospital records, that information was unavailable. As a result, the number of hospital readmissions to the ED was obtained from the patient or their relatives self-reporting for the last year prior to the current stay.

Procedure

Patients hospitalized in the ED were invited to participate in the study. Due to the severity of the illness of the patients, only those who were conscious with adequate self-reported clinical conditions were assessed. Evaluations were performed by the psychology staff in the ED of the hospital where the research was conducted. Patients were informed of the research and signed an informed consent form. The scales were subsequently administered. Evaluation time ranged from 30 to 60 minutes. Finally, immediate psychological support was provided for patients in whom the presence of depression or anxiety symptoms, harmful substance use and/or suicide risk was identified.

Statistical analyses

The socio-demographic information obtained from patients was analyzed with descriptive statistics. Numerical variables were described by measuring the mode and standard deviation at 95%; categorical variables were described in terms of frequencies and percentages. For mental health and hospital stay variables, Kolmogorov-Smirnov normality tests were performed to determine the normality of the data distribution. In addition, Spearman-ordered rank correlations were performed to identify the association between these variables and length of stay, considering correlation coefficient intervals of ± .96 to ± 1.0 (perfect correlation), ± .85 to ± .95 (strong correlation), ± .70 to ± .84 (significant correlation), ± .50 to ± .69 (moderate correlation), ± .20 to ± .49 (weak correlation), ± .10 to ± .19 (very weak correlation) and ± .09 to ± .00 (null or nonexistent correlation), and a statistical significance level of $p < .0527$. Statistical analyses were performed using the R program version 4.0.1 with the psych, tidy verse, ggplot2 and lmtest packages (Hothorn et al., 2022; Revelle, 2020; Wickham, 2016; Wickham et al., 2019).

Ethical considerations

This research was approved by the Ethics and Research Committee of Hospital General Dr. Manuel Gea González (Registration number 27-152-2017).

RESULTS

Of the 236 patients originally considered, five were omitted from the analysis because they failed to complete their evaluations, meaning that information was provided for 231 patients. Of these 231 patients, 61% (n = 141) were men, with an average age of 46 (standard deviation [*SD*] = 15 years). Seventy-two per cent of participants reported residing in Mexico City and the Metropolitan Area, 69% (n = 160) reported having completed high school, 61% (n = 143) reported professing Catholicism, and 59% (n = 138) of participants reported not being engaged in any type of work. In regard to substance use, 51% (119) reported frequent substance use, 21.6% of whom (n = 50) reported alcohol use and 16% of whom (n = 37) reported alcohol and tobacco use. Twenty-four percent (n = 56) reported taking medication to regulate their glucose levels, and 33.30% (n =

Table 1
Sociodemographic Characteristics of Patients Utilizing Emergency Departments

Variable	*N*	*(%)*
Age (x̄ = 46.19) years (*SD* 15.64)		
Sex		
Male	141	61
Female	90	39
Diagnosis		
Diabetic ketoacidosis	30	13
Diverse metabolic diagnoses	28	12
Gastrointestinal tract bleeding	20	9
Other	153	66
Place of residence		
Mexico City and Metropolitan Area	210	91
Education		
Elementary education	109	47
Employment		
Currently engaged paid employment	142	61
Religion		
Catholic	143	62
Physical activity		
No	138	60
Death of a loved one (last year)		
No	148	64
Divorce or separation (last year)		
No	204	88
Serious Illness/Self-Report (last year)		
No	185	80

Note: x̄ = Mean; *SD* = Standard Deviation.

77) reported not having taken any medication prior to their hospitalization. In regard to mental health care, 26% (*n* = 60) reported having received psychological support or therapy at some point in their lives. Thirty-four per cent of patients reported having experienced the death of a family member, 10% had been separated or divorced from their partners, 18% received a new diagnosis of illness and 18.30% had experienced family fights during the previous year (Table 1).

Data indicate that the average length of stay in an ED was 69.6 hours (*SD* = 65.68) and that the average number of readmissions was .4 (*SD* = .88). In regard to the emotional variables, it was found that 50% of the study population had anxiety symptoms (HADS-A > 8), 54% had depression symptoms (HADS-D > 7) while 1.3% had a moderate risk and 8% a high risk of suicide according to MINI. According to ASSIST, alcohol, tobacco, marijuana and cocaine were the most common substances used by patients in their lifetime. However, in the evaluation of substance use through ASSIST, the authors experienced problems administering the instrument, as a result of which no more data will be presented. This point will be taken up in the study limitations (Table 2).

Table 2
Patients' Main Emotional Characteristics

	Results	
Variables	*N*	*(%)*
Anxiety (HADS-A > 8)	116	50
Depression (HADS-D > 7)	124	54
Suicide risk according to MINI		
Mild risk (MINI > 5)	50	22
Moderate risk (MINI: 6-9 score)	18	8
High risk (MINI > 10)	3	1
Lifetime Substance Use (ASSIST)*		
Alcohol	162	74
Tobacco	116	53
Marijuana	38	17
Cocaine	26	11

Note: * The total number of patients assessed was 220.

In the correlation analysis, a very weak, statistically significant negative correlation was identified between length of stay and anxiety variables (rho = -.15, p = .02) and a very weak, statistically significant positive correlation was identified between length of stay and age (rho = .13, p = .05). No statistically significant correlation was established between the number of readmissions and other variables: suicide (rho = -.01, p = .87), age (rho = -.03, p = .07, anxiety (rho = .03, p = .72) and depression (rho = .09, p = .22). Regarding the suicide risk variable, a very weak but statistically significant negative correlation was identified with the age variable (rho = -.19, $p < .001$), and a weak, statistically significant positive correlation was identified with the depression (rho = .38, $p < .001$) and anxiety variables (rho = .44, $p < .001$).

DISCUSSION AND CONCLUSION

This study sought to evaluate the relationship between mental health, length of stay and the number of readmissions in patients hospitalized at a medical emergency department in Mexico City. From the data obtained, there does not appear to be any association between the mental health variables included and length of stay and number of hospital readmissions. Although a statistically significant association was found between anxiety and length of hospitalization, it was very weak. This finding differs from those reported in previous international studies, identifying an association between mood variables (Abar et al., 2017; Baia Medeiros et al., 2019; Blakemore et al., 2019) and psychiatric problems (Coates et al., 2019; Santillanes et al., 2020; Smith et al., 2016) and length of stay and number of readmissions to the ED.

Several factors could explain why the data differ from those reported in the international literature, such as the characteristics of the patients studied. As can be seen from the data on Mexican patients, the latter have a much greater length of stay than those reported worldwide. Some papers have found that on the first day of hospital admission, patients have higher levels of anxiety, which significantly increase after five days of hospitalization and decrease when the patient is discharged (Alzahrani, 2021). Most patients evaluated in the ED were admitted and discharged within 7.7 hours after hospitalization (Smith et al., 2016) whereas in this study, most patients were hospitalized for two to three days before being transferred to other medical specialties or being discharged from the ED.

Furthermore, several previous studies that have observed an association between the aforementioned variables have used retrospective, multicenter designs of large samples (ranging from 4,000 to over 100,000 patients; Baia Medeiros et al., 2019; Coates et al., 2019) from which information is retrieved by reviewing electronic records. Using electronic records to collect large samples from which to analyze variables would seem to be an effective strategy. However, to the authors' knowledge, there is as yet insufficient coordination and infrastructure in Mexican ED that would enable access to such a large amount of information and data. In the future, it could be useful to create the necessary infrastructure to implement a national registration system. The importance of this research is that it is an incipient means of exploring the variables of interest.

Another explanation for the differences found may lie in the original reason why patients came to the ED. In most studies, patients were divided between those who went to the ED for mental health reasons (Holland et al., 2021; Theriault et al., 2020) and those with a health problem (Baia Medeiros et al., 2019). In our case, the hospitalized patients had both metabolic complications and mental health problems. It is highly likely that this condition is a particular characteristic of patients seen in EDs in developing countries and may be affecting waiting times and resolutions in EDs (Obermeyer et al., 2015; Polanco-González et al., 2013).

The length of stay observed in this study (an average of 69.6 hours) is striking, as it far exceeds the time suggested in international policy recommendations (four to eight hours; National Health Service, 2020) and Mexican policy (12 hours; Secretaría de Salud, 2013) to meet and resolve patients' needs in medical emergencies. However, the average length of stay is similar to the average length of stay reported in developing countries, particularly in Latin America (ranging from 72 to 120 hours; Obermeyer et al., 2015). The conditions of emergency services in Mexico, as well as the nature of the emergencies attended (such as critical illnesses, armed conflict, and natural disasters), may well contribute to the long length of stay reported in this study and the region (Obermeyer et al., 2015; Polanco-González et al., 2013).

The number of readmissions observed in this study (.4) is significantly lower than what has been reported in other studies of patients with mood problems or psychiatric diagnoses, who use emergency departments up to twice as many times as those who do not suffer from mental health problems (Sims et al., 2021). Unfortunately, due to the way the hospital keeps its medical records, it proved impossible to obtain objective information on the number of readmissions of each patient, a common problem in EDs (Kaji et al., 2014). Although self-reporting by the patient was the most practical means of obtaining information, since there is a significant risk that this information may be inaccurate, results should be interpreted with caution. Finally, based on clinical experience, it was observed that several of these patients were in fact readmitted to an ED at a different hospital, and were therefore not recorded as readmissions in this study. Readmissions in this study are therefore likely to have been under-reported.

It is important to note that the percentages of anxiety (50%) and depression (54%) symptoms obtained are similar to those reported in a retrospective study (anxiety = 42%; depression = 46%) evaluating and reviewing the records of patients admitted to the same hospital (Murillo et al., 2022). These data are similar to those described in other international studies and the Latin American context, where a range of anxiety oscillating between 30% and 40% of the patients evaluated has been observed (Castilla-Puentes et al., 2008; Webster et al., 2014). In regard to depression, figures obtained in this study are higher than those reported in the international literature and in the Latin American context, where the prevalence of depression is approximately 30% (Castilla-Puentes et al., 2008). In both cases, the increase in the frequency of presentation could be attributed to the time that has elapsed since the publication of earlier studies and the fact that in recent years, an increase of up to 26% has been reported in cases of people with depression seeking care in emergency services (Ballou et al., 2019).

A total of 8.3% of the population showed a moderate to high suicide risk according to the MINI instrument. These data are very similar to those reported in evaluations previously described in emergency medical patients in the United States (approximately 5-8%) (Boudreaux et al., 2016; Ilgen et al., 2009; Miller et al., 2017). This underscores the high number of emergency patients who display suicidal ideation or behavior when hospitalized. Recent studies have therefore pointed to the importance of screening to determine suicide risk in emergency medical patients and to implement actions to address this situation (Boudreaux et al., 2016; Ilgen et al., 2009).

A major problem of this study was the impossibility of obtaining data on substance use measured by the ASSIST instrument. The problem was due to the inadequate administration of the instrument by the evaluation team, resulting in incomplete information on items six and seven of the instrument (leading to losses of over 30%). Although this inadequate administration constitutes a major barrier to obtaining information, the authors of this paper believe it is only ethical to point out the failure, thereby promoting transparency in the information presented and perhaps encouraging greater replicability of psychological research (Open Science Collaboration, 2015).

Likewise, it is important to share the lessons learned to attempt to avoid making the same mistakes in the future. In this regard, the team of researchers identified 1) the need to design or use specialized training programs for evaluators (currently, and due to the COVID-19 pandemic, a large number of online courses have been offered, which could help achieve these goals); 2) the need to constantly supervise the evaluators' procedure in order to detect any deviation from the process to be followed in a timely fashion (the use of work diaries has been recommended for this purpose); and 3) the importance of regularly recording data to identify any anomalies that may arise with the data (Antes & Maggi, 2021).

Finally, since this is a cross-sectional study, the data show what the participants were like at the time of evaluation, yet fail to provide complementary information on the evolution of symptoms (Wang & Cheng, 2020). Similarly, a social desirability bias could be present. Previous research with relatives of hospitalized patients in Mexico has shown that Mexican cultural beliefs encourage people to maintain a positive view of daily problems that arise, which could lead patients to minimize the expression of their mental health symptoms to health personnel even though the latter could affect their perception of their hospital stay (Toledano-Toledano & Domínguez-Guedea, 2019).

Despite the limitations described above, in the authors' view, this study presents valuable, novel data. This is the first study in Mexico to assess the association between mental health variables and hospital stays/utilization. From the data presented it is possible to identify a high presence of mental health problems in patients hospitalized in medical emergencies. The data could undoubtedly support the replication of evaluations and interventions at other hospitals. Likewise, the data show the number of hours required to attend patients in emergency departments. This number is far higher than the international and national recommendations for attending patients. It would also be worthwhile to replicate these data at other facilities to identify the source of this delay.

Finally, the authors conclude that there is little or no relationship between the mental health, length of stay and number of readmissions of patients hospitalized in an emergency department. Further studies are recommended to corroborate the data presented.

Funding

None.

Conflicts of interest

The authors declare they have no conflicts of interest.

Acknowledgements

None.

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salud mental

ORIGINAL ARTICLE
Volume 47, Issue 4, July-August 2024
doi: 10.17711/SM.0185-3325.2024.023

The Mental Health Provider Shortage in the Mexican Public Sector: 2023 estimates of psychiatrists and psychologists

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Received: 12 September 2023
Accepted: 13 February 2024

Citation:
Barrón-Velázquez, E., Mendoza-Velásquez, J. J., Mercado-Lara, A., Quijada-Gaytán, J. M., & Flores-Vázquez, J. F. (2024). The Mental Health Provider Shortage in the Mexican Public Sector: 2023 estimates of psychiatrists and psychologists. *Salud Mental*, *47*(4), 179-187.

DOI: 10.17711/SM.0185-3325.2024.023

ABSTRACT

Introduction. Mental health has historically been overlooked in public policies in Mexico, with up to 80% of people with mental health and substance-related disorders in Mexico lacking adequate care. **Objective.** To characterize the mental health provider (psychiatrists and psychologists) shortage in the Mexican public sector. **Method.** Descriptive study. Data from SINERHIAS (Ministry of Health of Mexico) up to the first half of 2023 were analyzed. **Results.** A total of 1,504 psychiatrists worked in the public sector (1.1 per 100,000 population). The Health Ministry (Secretaría de Salud; Spanish acronym SS) employed 55.9%, IMSS 25.9%, ISSSTE 7.2%, while 1.0% were affiliated to other public institutions. There were 8,668 psychologists in the public sector (6.9 per 100,000 population), of which the SS employed 78.9%, IMSS 6.3%, ISSSTE 2.4%, while 12.3% worked at other public institutions. Thirty-four per cent of psychiatrists were in Mexico City, while 21 states, accounting for 70% of the population, had one psychiatrist or fewer per 100,000 population. Hospital units employed 83.3% of psychiatrists. **Discussion.** Mexico has an insufficient number of mental health providers at public institutions, with disparities between states and most providers affiliated to hospital units. **Conclusion.** There is an acute mental health provider shortage in the Mexican public sector, together with limited resources for community mental health care, affecting the treatment of mental health and substance use disorders.

Keywords: Health service administration, psychiatry, psychology, healthcare disparities, health service accessibility, Mexico.

RESUMEN

Introducción. Históricamente se ha subestimado la salud mental en las políticas públicas en México. Se calcula que hasta 80% de las personas con trastornos de salud mental y relacionados con sustancias en México carece de atención adecuada. **Objetivo.** Caracterizar la brecha de personal en salud mental (psiquiatría y psicología) en el sector público de México. **Método.** Estudio descriptivo. Se analizaron datos de SINERHIAS (Secretaría de Salud) hasta el primer semestre de 2023. **Resultados.** Se encontraron 1,504 psiquiatras laborando en el sector público (1.1 por cada 100,000 habitantes). La Secretaría de Salud (SS) empleaba al 55.9%, el IMSS al 25.9%, el ISSSTE al 7.2% y el 11.0% laboraba en otras instituciones públicas. Se encontraron 8,668 psicólogos(as) en el sector público (6.6 por cada 100,000 habitantes). La SS contaba con el 78.9%, el IMSS con el 6.3%, el ISSSTE con el 2.4% y el 12.3% laboraba en otras instituciones públicos. El 34% de psiquiatras se localizaban en la Ciudad de México, mientras que 21 estados, con el 70% de la población, tenían una tasa de un psiquiatra o menos por cada 100,000 habitantes. El 83.3% de psiquiatras se empleaba en unidades de hospitalización. **Discusión.** México cuenta una tasa insuficiente de personal de salud mental en instituciones públicas, con disparidades estatales y una prevalencia en unidades hospitalarias. **Conclusión.** Hay una profunda escasez de profesionales de salud mental en el sector público mexicano y pocos recursos para la atención comunitaria a la salud mental, afectando el abordaje de trastornos de salud mental y por consumo de sustancias.

Palabras claves: Administración de servicios de salud, psiquiatría, psicología, disparidades en servicios de salud, accesibilidad a servicios de salud, México.

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INTRODUCTION

The World Health Organization (WHO) Constitution establishes health as a fundamental human right, urging countries to provide accessible, affordable healthcare (WHO, 2022). The right to mental health has therefore steadily gained global recognition, playing a crucial role in the well-being of individuals and populations (United Nations, 2020). Depression ranks as a leading contributor to disability, while suicide is a major cause of death across the lifespan (Institute for Health Metrics and Evaluation, 2019; WHO, 2023). The impact of severe mental health conditions on overall health is significant, resulting in a potential reduction of up to two decades of life expectancy (Liu et al., 2017). Paradoxically, despite its impact and association with heightened violence, poverty, and social exclusion, mental health remains insufficiently addressed within public health discourse (WHO, 2023).

In keeping with the WHO call for countries to allocate sufficient resources for universal healthcare, the Mexican Constitution establishes the right to health protection for all individuals, including those lacking social security (Secretaría de Salud de México, 2015). However, Mexico's healthcare system shows substantial disparities, distinguishing between uninsured individuals and those with public insurance coverage (72% of the population).

Most of the Mexican population is insured by two public institutions: the Instituto Mexicano del Seguro Social (Mexican Institute of Social Security; Spanish acronym IMSS) and the Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (the Mexican Institute for Social Security and Services for State Workers; Spanish acronym ISSSTE). IMSS, covering 47.8% of the population, primarily serves the formal private sector, including employees, their families, retirees, pensioners, and voluntary members. ISSSTE, insuring 16.7% of the population,[1] focuses on federal, state, and municipal government employees, together with their families and retired public sector workers. The demographic composition of the populations insured by IMSS and ISSSTE varies. In IMSS, 25.1% are under 20, 56.8% are between 20 and 59, and 18.1% are 60 and over.[1] Conversely, 25.7% of ISSSTE's insured population are under 20, 41.9% are between 20 and 59, while a higher proportion, 32.4%, are 60 and over.[1] Both of these institutions are funded through employee and employer contributions, government subsidies and fees for certain services (Secretaría de Hacienda y Crédito Público, 2021). The remaining percentage (approximately 7.5%) of Mexicans insured by the public sector receive coverage through public institutions such as SEDENA (Secretaría de la Defensa Nacional/Secretariat of National Defense), SEMAR (Secretaría de Marina/Secretariat of the Navy), and Pemex (Petróleos Mexicanos/Mexican Petroleum). This diversification reflects the segmented nature of Mexico's healthcare system, providing specific coverage by employment sector. The complexity of Mexico's healthcare system is further borne out by the inclusion of other public institutions: Centros de Integración Juvenil (Youth Integration Center; Spanish acronym CIJ), which focus on addiction treatment for youth, and the Sistema Nacional para el Desarrollo Integral de la Familia (System for Integral Family Development; Spanish acronym DIF), a public institution for family welfare. The system also distinguishes between IMSS, providing formal sector employees with health and social security benefits, and IMSS Bienestar, serving informal sector workers and rural populations. These distinctions reflects the diverse healthcare needs and sector-specific services within Mexico.

The uninsured Mexican population, primarily comprising informal job sector workers, the unemployed, and their dependents, has limited access to healthcare, mostly provided by the Secretaría de Salud (Ministry of Health, Mexico; Spanish acronym SS). Although private medical services, encompassing physician care, pharmacies, and hospitals, are available, their accessibility is limited to a small proportion of the population due to their elevated costs (Espinola-Nadurille et al., 2010; Secretaría de Hacienda y Crédito Público, 2021; WHO et al., 2020). Further barriers to healthcare access in Mexico include a lack of services in rural areas, home to 21% of the population (Instituto Nacional de Estadística y Geografía [INEGI], 2021). Recent changes in insurance systems and public policies (such as the transition from the Seguro Popular [Popular Insurance Scheme] to INSABI [Instituto de Salud para el Bienestar]) have led to a significant increase in healthcare access issues, with a noticeable rise in the population lacking healthcare access. This issue disproportionately affected rural areas, where public health services not tied to employment benefits are more common, highlighting the vulnerability of these communities to policy changes in the healthcare system (Consejo Nacional de Evaluación de la Política de Desarrollo Social [CONEVAL], 2021).

Historically, Mexican health policies have tended to overlook mental health, leading to significant diagnostic and therapeutic gaps, as well as uneven service availability across the country (Secretaría de Salud de México, 2023a). Recent data indicate that up to 80% of individuals with mental and substance use disorders in Mexico fail to receive adequate care (Secretaría de Salud de México, 2022). This figure reflects the gap between those suffering from a disorder and those who obtain proper treatment in healthcare services. Barriers to mental healthcare are complex and persist in most regions globally, including a range of personal,

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[1] Author's calculation based on data from Consejo Nacional de Población (National Population Council; Spanish acronym CONAPO), https://datos.gob.mx/busca/dataset/proyecciones-de-la-poblacion-de-mexico-y-de-las-entidades-federativas-2020-2070; IMSS, https://www.imss.gob.mx/conoce-al-imss/memoria-estadistica-2022; and ISSSTE, https://www.issste.gob.mx/datosabiertos/anuarios/anuarios2022.html#cap1

cultural, and structural factors, such as stigma and social attitudes, lack of awareness and education, and inadequate healthcare infrastructure (Carbonell et al., 2020). A critical aspect of this issue, and the focus of the current study, is the inadequate distribution of mental health providers, such as psychiatrists and psychologists, which significantly impacts the accessibility and effectiveness of mental healthcare services.

The insufficient allocation of mental health providers in Mexico has raised concerns, as documented in national and international reports (Pan American Health Organization [PAHO], 2023; PAHO, WHO & Secretaría de Salud de México, 2011; Secretaría de Salud de México, 2022). According to WHO, in 2016, there were .2 psychiatrists, 2.2 nurses, .5 social workers, and 3.5 psychologists per 100,000 population working in the mental health sector in Mexico (WHO, 2019). In 2018, a census found 4,999 psychiatrists working across the country, yielding a ratio of 3.7 psychiatrists per 100,000 population (Heinze et al., 2019), below the minimum ratio of five psychiatrists per 100,000 population recommended by WHO (2014). Moreover, about 60% of all psychiatrists are concentrated in Mexico's three largest cities, exacerbating regional disparities in mental health care access (Heinze et al., 2019). At the same time, according to the Ministry of Economy, approximately 67,700 psychologists currently work in clinical settings in Mexico, yielding a ratio of 53.7 per 100,000 population (Secretaría de Economía, 2023). However, it should be noted that since these ratios encompass both public and private sector practitioners, the accessibility of mental healthcare for a sizable portion of the population is probably overestimated.

A sectoral plan for mental health and substance use disorders has therefore been developed (Secretaría de Salud de México, 2023b), including institutions such as the SS, IMSS and ISSSTE. This strategic plan seeks to unify and synergize fragmented efforts across sectors into a cohesive, collaborative initiative. It encompasses institution-specific initiatives and the establishment of integrated mental health service networks. The goal is to enhance equity, effectiveness, efficiency, and quality in mental healthcare, thereby contributing to both individual and community well-being. However, an updated, detailed assessment of mental health personnel within Mexico's public sector is lacking, despite being essential to accurately evaluating the mental health provision gap.

In this study, we sought to characterize the shortage of mental healthcare providers, specifically psychiatrists and psychologists, within the Mexican public sector. To this end, we described and analyzed the geographical distribution of public health facilities employing these professionals, the healthcare provider ratio per 100,000 population, the proportion working in inpatient and outpatient settings, and their employment in public insurance systems.

METHOD

1. Study design

This study is a secondary data analysis focused on mental health providers at public healthcare centers (clinical facilities operating within public institutions) in Mexico.

2. Sample description

The totality of public healthcare centers in Mexico employing at least one psychiatrist or one psychologist, across all levels of care, were included in the study. Healthcare centers from the following public institutions were considered for analysis: SS, IMSS, ISSSTE, SEDENA, SEMAR, Pemex, CIJ, DIF, IMSS Bienestar, State Medical Services, Municipal Medical Services, and University Hospitals.

3. Measurements

Data are drawn from the Subsistema de Información de Equipamiento, Recursos Humanos e Infraestructura para la Atención de la Salud (SINERHIAS, Healthcare Information on Equipment, Human Resources, and Infrastructure Subsystem,[2] https://datos.gob.mx/busca/dataset?tags=sinerhias), database, including data from the latest version available at the time of analysis (updated at the end of June 2023). The following data were collected, considering each center in the sample: number of psychiatrists and psychologists employed, localization (using the Cartesian coordinate system), public insurance system, and type of facility (inpatient or outpatient).[3]

4. Statistical analysis

We reported the total number and percentages of mental health providers employed at public health centers, their affiliation to various public institutions, and their distribution across inpatient and outpatient clinics. The population ratio of psychiatrists and psychologists per 100,000 population was calculated using the 2023 population projections of the National Population Council (CONAPO, 2023). Our analyses include a nationwide perspective and a breakdown of the data by state.

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[2] SINERHIAS consolidates data on the medical resources of operating health units in Mexico. It is the main country-wide information system gathering data from public and private health institutions. It seeks to provide accurate, real-time information on the distribution and utilization of these resources, enhancing investment effectiveness, equity, and efficiency in the healthcare sector. The system undergoes semiannual updates to ensure continuous relevance and is managed by designated SINERHIAS coordinators in the SS who oversee data collection and validation.

[3] Inpatient clinics are medical facilities with hospital beds, treating patients for various conditions, not specifically mental health and substance abuse disorders. Conversely, outpatient clinics are characterized by the absence of these hospitalization facilities.

5. Ethical considerations

This study employs an updated version of a publicly available database. This updated version, which also includes the location of the healthcare facilities, was requested by the authors from the General Directorate of Health information (DGIS) within the SS. No personal information on mental health providers was obtained at any point in the study.

Table 1
Psychiatrists at Mexican public institutions

			Institution				*Unit type*	
States	*N*	*Ratio*[a]	*SS*	*IMSS*	*ISSSTE*	*Other*[b]	*Outpatient*	*Inpatient*
All (Mexico)	1,504	1.1	840	390	109	165	251	1,253
			55.9%	25.9%	7.2%	11.0%	16.7%	83.3%
Aguascalientes	20	1.3	12	6	2	0	3	17
Baja California	29	.7	4	4	12	9	2	27
Baja California Sur	6	.7	3	3	0	0	1	5
Campeche	20	2.1	15	3	1	1	2	18
Chiapas	17	.3	9	4	1	3	2	15
Chihuahua	37	.9	14	14	2	7	8	29
Ciudad de México	510	5.5	318	122	41	29	101	409
Coahuila	32	1.0	17	10	3	2	2	30
Colima	10	1.3	6	3	1	0	0	10
Durango	32	1.7	23	6	3	0	2	30
Guanajuato	57	.9	41	13	2	1	11	46
Guerrero	11	.3	4	3	1	3	1	10
Hidalgo	23	.7	15	4	2	2	2	21
Jalisco	110	1.3	64	35	5	6	29	81
Estado de México	99	.6	41	31	1	26	14	85
Michoacán	31	.6	23	6	2	0	0	31
Morelos	15	.7	10	3	2	0	4	11
Nayarit	9	.7	4	4	1	0	2	7
Nuevo León	92	1.5	20	34	2	36	13	79
Oaxaca	21	.5	15	3	2	1	1	20
Puebla	42	.6	27	4	3	8	7	35
Querétaro	29	1.1	21	7	1	0	17	12
Quintana Roo	8	.4	2	5	1	0	0	8
San Luis Potosí	26	.9	13	6	2	5	10	16
Sinaloa	31	1.0	18	8	2	3	4	27
Sonora	36	1.2	18	13	1	4	5	31
Tabasco	28	1.1	18	2	2	6	0	28
Tamaulipas	33	.9	16	9	4	4	2	31
Tlaxcala	5	.4	3	2	0	0	1	4
Veracruz	35	.4	10	13	4	8	2	33
Yucatán	42	1.7	32	7	2	1	2	40
Zacatecas	8	.5	4	3	1	0	1	7

Note: Psychiatrists at public institutions, based on the Healthcare Information on Equipment, Human Resources, and Infrastructure Subsystem (SINERHIAS), June 2023 cut-off. SS: Secretaría de Salud (Ministry of Health); IMSS: Instituto Mexicano del Seguro Social (Mexican Institute of Social Security); ISSSTE: Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (Mexican Institute for Social Security and Services for State Workers). [a] Ratio per 100,000 population in 2023, according to population projections of the National Population Council (CONAPO); [b] Includes: Centros de Integración Juvenil (CIJ, Youth Integration Centers), Sistema Nacional para el Desarrollo Integral de la Familia (DIF, System for Integral Family Development), university hospitals, IMSS Bienestar, Pemex (Mexican Petroleum), Secretaría de Defensa Nacional (SEDENA, Secretariat of National Defense), Secretaría de la Marina (SEMAR, Secretariat of the Navy), State Medical Services, Municipal Medical Services.

RESULTS

1. Psychiatrists at public institutions

As of the first half of 2023, Mexico had 1,504 psychiatrists working at public institutions, resulting in a ratio of 1.1 per 100,000 population. In terms of public institutions, the SS employed the largest share, with 55.9%, followed by IMSS with 25.9%, and ISSSTE with 7.2%. The remaining 11.0% worked at other public institutions (Table 1). Regarding their practice settings, 16.7% of psychiatrists operated in outpatient clinics, while the majority, 83.3%, worked at inpatient units (Table 1). This prevalence of inpatient clinics for psychiatrists was consistent across all insurance systems, with 79.2% in the SS, 95.5% in IMSS, 86.1% in ISSSTE, and 73.3% in other public institutions (Table 1).

The distribution of public sector psychiatrists across states showed significant disparities (Table 1, Figure 1). Mexico City recorded the highest concentration, with a ratio of 5.5 psychiatrists per 100,000 population, followed by Campeche with 2.1, and Durango with 1.7. Conversely, states with the fewest public sector psychiatrists included Chiapas and Guerrero, both registering a ratio of .3 psychiatrists per 100,000 population, as well as Quintana Roo, Tlaxcala, and Veracruz, all with a ratio of .4.

Table 1 and Figure 1 provide detailed information on the number and ratio of public sector psychiatrists per state, their institutional affiliation, setting, and the geographic location of the centers where they are employed.

2. Psychologists at public institutions

As of the first half of 2023, there were 8,668 psychologists in Mexico practicing at public institutions, yielding a ratio of 6.6 psychologists per 100,000 population. The SS employed the majority, 78.9%, followed by IMSS with 6.3%, and ISSSTE with 2.4% (Table 2). The remaining 12.3% worked at other public institutions.1 In regard to practice settings, 55.8% of public sector psychologists worked at outpatient clinics and 44.2% at inpatient facilities (Table 2).

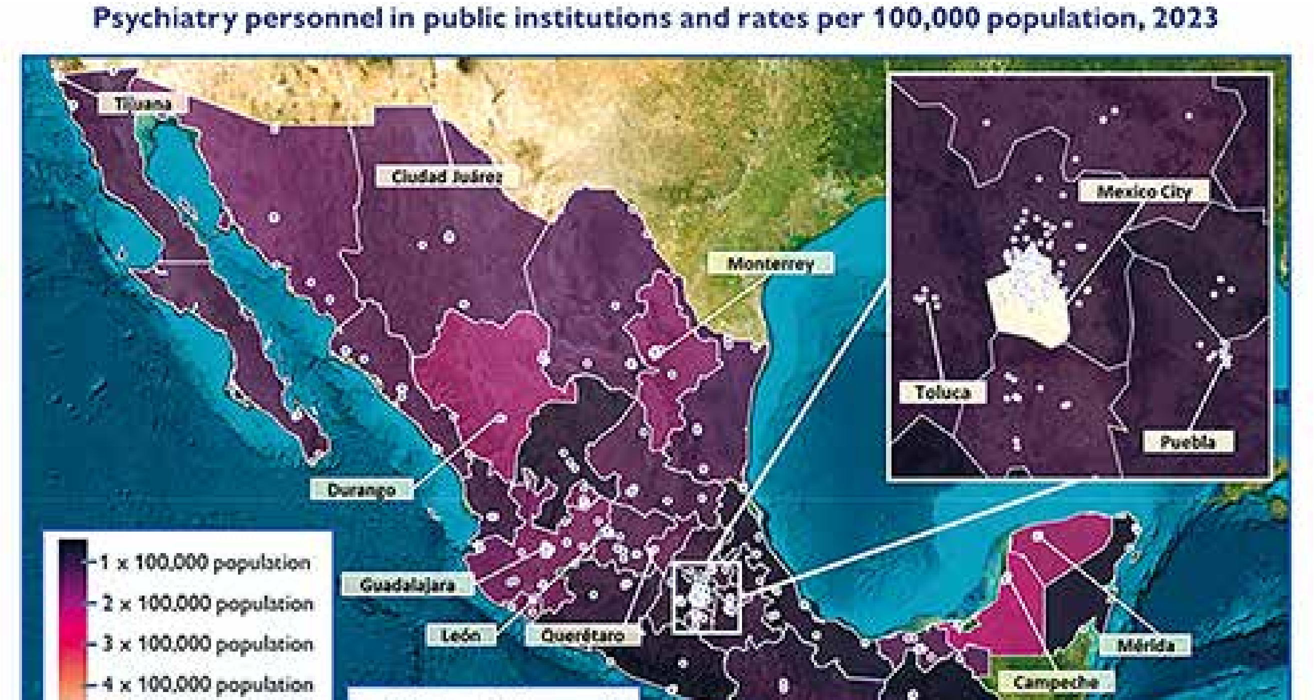

Figure 1. Psychiatrists in public institutions in Mexico. State color maps represent the rate of public institution psychiatrists per 100,000 inhabitants in 2023, according to the population projections of the National Population Council (CONAPO). Blue dots represent public establishments with at least one psychiatrist. Public institutions include: Secretaría de Salud (Ministry of Health), Instituto Mexicano del Seguro Social (IMSS, Mexican Institute of Social Security), Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE, Mexican Institute for Social Security and Services for State Workers), Centros de Integración Juvenil (CIJ, Juvenile Integration Centers), Sistema Nacional para el Desarrollo Integral de la Familia (DIF, System for the Integral Development of the Family), University Hospitals, IMSS Bienestar, Pemex (Mexican Petroleum), Secretaría de Defensa Nacional (SEDENA, Secretariat of National Defense), Secretaría de la Marina (SEMAR, Secretariat of the Navy), State Medical Services, Municipal Medical Services. Tags for the largest metropolitan areas, as well as cities with higher concentrations of psychiatrists, are included.

An uneven distribution of public sector psychologists among Mexican states was observed (Table 2, Figure 2). Mexico City had the highest concentration, with a ratio of 14.4 per 100,000 population, followed by Tabasco with 11.9, and Aguascalientes and Guerrero, both with 11.5. In contrast, states with the fewest public sector psychologists

Table 2
Psychologists at Mexican public institutions

			Institution				*Unit type*	
States	*N*	*Ratio*[a]	*SS*	*IMSS*	*ISSSTE*	*Others*[b]	*Outpatient*	*Inpatient*
All (Mexico)	8,668	6.6	6,841	548	211	1,068	4,839	3,829
			78.9%	6.3%	2.4%	12.3%	55.8%	44.2%
Aguascalientes	174	11.5	167	5	2	0	131	43
Baja California	122	3.0	68	15	4	35	86	36
Baja California Sur	58	6.7	46	3	1	8	40	18
Campeche	74	7.8	60	2	0	12	47	27
Chiapas	323	5.4	291	6	2	24	179	144
Chihuahua	271	6.9	205	25	5	36	194	77
Ciudad de México	1,324	14.4	938	138	81	167	564	760
Coahuila	153	4.6	94	18	4	37	71	82
Colima	68	9.0	52	6	5	5	43	25
Durango	160	8.4	143	3	3	11	79	81
Guanajuato	496	7.7	462	12	4	18	357	139
Guerrero	415	11.5	389	9	1	16	212	203
Hidalgo	163	5.0	144	2	3	14	104	59
Jalisco	398	4.6	286	40	14	58	212	186
Estado de México	1,003	5.7	775	43	12	173	559	444
Michoacán	258	5.2	220	7	6	25	102	156
Morelos	125	6.2	88	7	4	26	89	36
Nayarit	130	10.0	109	4	0	17	80	50
Nuevo León	285	4.6	144	77	12	52	178	107
Oaxaca	288	6.7	246	4	6	32	208	80
Puebla	195	2.8	129	13	6	47	116	79
Querétaro	123	4.8	111	9	3	0	77	46
Quintana Roo	72	3.6	51	6	3	12	49	23
San Luis Potosí	108	3.7	55	6	2	45	71	37
Sinaloa	226	7.2	182	11	5	28	133	93
Sonora	218	7.1	180	20	1	17	127	91
Tabasco	293	11.9	260	2	2	29	144	149
Tamaulipas	311	8.4	261	15	4	31	192	119
Tlaxcala	83	5.9	76	4	1	2	43	40
Veracruz	437	5.4	351	18	10	58	206	231
Yucatán	216	8.8	177	16	5	18	100	116
Zacatecas	98	5.8	81	2	0	15	46	52

Note: Psychologists at public institutions, based on the Healthcare Information on Equipment, Human Resources, and Infrastructure Subsystem (SINERHIAS), June 2023 cut-off. SS: Secretaría de Salud (Ministry of Health); IMSS: Instituto Mexicano del Seguro Social (Mexican Institute of Social Security); ISSSTE: Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (Mexican Institute for Social Security and Services for State Workers); [a] Ratio per100,000 population in 2023, according to the population projections of the National Population Council (CONAPO). [b] Includes Centros de Integración Juvenil (CIJ, Juvenile Integration Centers), Sistema Nacional para el Desarrollo Integral de la Familia (DIF, System for Integral Family Development), University Hospitals, IMSS Bienestar, Pemex (Mexican Petroleum), Secretaría de Defensa Nacional (SEDENA, Secretariat of National Defense), Secretaría de la Marina (SEMAR, Secretariat of the Navy), State Medical Services, Municipal Medical Services.

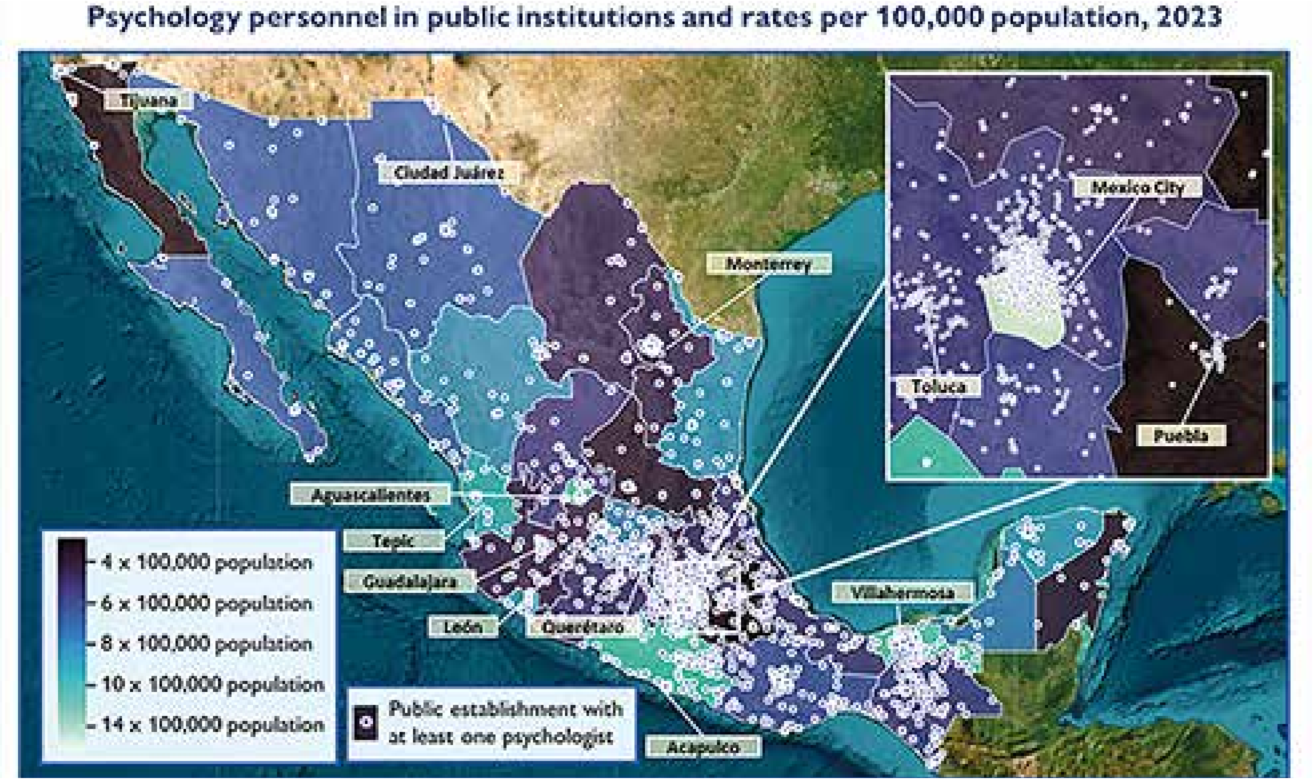

Figure 2. Psychologists in public institutions in Mexico. State color maps represent the rate of public institution psychologists per 100,000 inhabitants in 2023, according to the population projections of the National Population Council (CONAPO). Blue dots represent public establishments with at least one psychiatrist. Public institutions include: Secretaría de Salud (Ministry of Health), Instituto Mexicano del Seguro Social (IMSS, Mexican Institute of Social Security), Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE, Mexican Institute for Social Security and Services for State Workers), Centros de Integración Juvenil (CIJ, Juvenile Integration Centers), Sistema Nacional para el Desarrollo Integral de la Familia (DIF, System for the Integral Development of the Family), University Hospitals, IMSS Bienestar, Pemex (Mexican Petroleum), Secretaría de Defensa Nacional (SEDENA, Secretariat of National Defense), Secretaría de la Marina (SEMAR, Secretariat of the Navy), State Medical Services, Municipal Medical Services. Tags for the largest metropolitan areas, as well as cities with higher concentrations of psychologists, are included.

included Puebla and Baja California, both with a ratio of 3.0 psychologists per 100,000 population, Quintana Roo with 3.6, and San Luis Potosí with 3.7.

Table 2 and Figure 2 show detailed information on the number and ratio of psychologists in the public sector by state, their institutional affiliation, setting, and the geographic location of the centers where they are employed.

DISCUSSION AND CONCLUSION

This study presents an updated analysis of the distribution of mental health providers, specifically psychiatrists and psychologists, working at Mexican public institutions. This information is crucial for understanding Mexico's mental health treatment gap, reflected in the discrepancies in healthcare access in society (Riley, 2012). In the following section, we compare our results with those of previous studies and international recommendations, assess the availability of public mental healthcare services across the country, discuss the limitations of the study, and conclude with final remarks.

The ratio of Mexican mental health providers at public institutions falls significantly short of international recommendations. With only 1.1 psychiatrists per 100,000 population (Table 1), it fails to meet even the recommended minimum of five to ten psychiatrists per 100,000 population, widely criticized as insufficient (Burvill, 1992; FCRS, 1962; Heinze et al., 2019; WHO, 2014). Although there are limited data available on the minimum ratio of clinical psychologists required to meet population needs, a study in Ireland recommended a minimum ratio of 17.3 per 100,000 population (Byrne & Branley, 2012), more than twice the 6.6 ratio of psychologists in the public sector found in our study (Table 2).

Moreover, a considerable disparity between states was identified, which can be seen in Figure 1. Approximately 34% of psychiatrists at public institutions work in Mexico City, which is only home to 7% of the total population, while 21 out of 32 states (comprising 70% of the total population) have a ratio of one public sector psychiatrist per 100,000 population or less (Table 1). Furthermore, most public sector psychiatrists are concentrated in urban areas (Figure 1), underscoring the barriers to mental healthcare in rural areas. Although the regional disparity in public institution psychologists appears less pronounced, we found a wide range of state ratios, from 3.0 to 14.4 per 100,000 population (Table 2), as well as a concentration in urban areas (Figure 2). The disparity in the distribution of mental health providers across states and regions is a complex issue influenced by healthcare system infrastructure and social determinants (Mohammadi-aghdam et al., 2020). Key factors include state-level funding disparities, a higher concentration of secondary and tertiary health care facilities in large metropolitan areas, financial constraints, career opportunities, working conditions, personal choices, cultural norms, and regional living conditions, which affect service availability and raise safety concerns. To redress the balance, a comprehensive strategy addressing these factors is essential for equitable, effective mental healthcare resource allocation across Mexico.

Our findings regarding mental health provider ratios contrast with previous reports, such as the one by the Global Health Observatory of the WHO (2019) reporting ratios of .2 psychiatrists and 3.4 psychologists per 100,000 population in 2016. Given the relative stability of the public health workforce in Mexico over the past decade (Secretaría de Hacienda y Crédito Público, 2021), it is conceivable that the 2016 calculation omitted certain institutions within the complex Mexican public healthcare system. Alternative reports, including both private and public sector professionals, have estimated ratios of 3.7 psychiatrists (Heinze et al., 2019) and 53.7 psychologists (Secretaría de Economía, 2023) per 100,000 population in Mexico. Nevertheless, we suggest that our estimates reflect mental healthcare accessibility more accurately, as only a small proportion of the Mexican population can routinely access private healthcare services due to financial constraints (Secretaría de Hacienda y Crédito Público, 2021; WHO et al., 2020). Interestingly, comparing our study with those previously mentioned shows that in Mexico, approximately 30% of all psychiatrists and 13% of all psychologists work at public institutions.

Public institutions in Mexico vary considerably in their use of mental health providers. Specifically, 55.9% of all public sector psychiatrists and 78.9% of public sector psychologists work within the SS, which is primarily responsible for providing healthcare to the uninsured. Conversely, IMSS employs 25.9% of all psychiatrists at public institutions and 6.3% of psychologists at public institutions despite offering insurance coverage to nearly half the Mexican population. Additionally, ISSSTE employs 7.2% of all psychiatrists at public institutions and 2.4% of psychologists at public institutions while providing insurance to a sixth of the population. Age-related disparities in mental health provision in Mexico may arise due to the different demographics covered by IMSS and ISSSTE. IMSS insures a younger adult population, whereas ISSSTE covers a higher proportion of older adults. This variation in coverage could imply specific mental health care needs and a variety of approaches required for the various age groups across the country.

While national and international reports have highlighted the cost-effectiveness and improvements in accessibility and quality associated with the shift from hospital-based to community mental healthcare services (Díaz-Castro et al., 2020; PAHO, 2017; Secretaría de Salud de México, 2023a; Wong et al., 2022), our findings show a high concentration (83.3%) of state psychiatrists at inpatient facilities. It is worth mentioning that although inpatient clinics in Mexico tend to include outpatient services (such as a psychiatric hospital with an outpatient consultation department) (Díaz-Castro et al., 2020), and the hospital units included in our analysis are not necessarily designed for patients suffering from mental health or substance use disorders, this unbalanced prevalence of specialists in hospital settings reflects poor resource allocation for community care. This tallies with the findings of a 2013 study, reporting that 80% of the public mental health provision budget in Mexico is earmarked for psychiatric hospitals (Berenzon Gorn et al., 2013). Appropriately, current Mexican policies have focused on enhancing community mental healthcare services and the training of non-specialized personnel to reduce the diagnostic and treatment gap in mental health and substance-related disorders (PAHO, 2017; Secretaría de Salud de México, 2023b).

In terms of limitations, although our study maps the distribution of mental health providers in Mexico, it is important to note that merely quantifying the number of these providers does not fully reflect the mental healthcare gap. This gap is compounded by multifaceted barriers, including deep-rooted stigma, societal misconceptions, and a general lack of mental health awareness, which can deter individuals from seeking help. Additionally, structural issues such as inadequate healthcare infrastructure, especially in remote or underprivileged areas, as well as the lack of coordination between institutions and levels of care, hinder accessibility, and may lead insured individuals to seek help outside their designated institutions. These barriers, at both a personal and systemic level, require a broader, more integrated approach to mental healthcare that goes beyond merely increasing the number of healthcare providers.

In short, our study describes the acute mental health provider shortage in Mexico's public health sector. This deficit significantly hinders access to mental health services, resulting in the underdiagnosis and undertreatment of severe, prevalent mental health and substance-related disorders. These consequences, in turn, contribute to diminished quality of life among affected individuals and their loved ones, and higher rates of disability, violence and social exclusion. A considerable regional disparity between Mexican states was also highlighted, contributing to the inequity of mental health services across the country. Our study highlights the urgent need to strengthen Mexico's public mental healthcare provision. This includes increasing funding for mental health programs, improving coordination across healthcare institutions, and integrating efforts from various sectors to reduce stigma and boost mental health awareness. The development of community-based services and continuous training for non-specialist primary care providers is also crucial. These initiatives could potentially mitigate the disparities and barriers identified in mental healthcare, contributing to a more equitable and effective system, although their success will depend on effective implementation and continuous evaluation.

Funding

No financial support was received for the undertaking of this study.

Conflict of interest

The authors declare that they have no conflicts of interest.

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salud mental

ORIGINAL ARTICLE
Volume 47, Issue 4, July-August 2024
doi: 10.17711/SM.0185-3325.2024.024

Physical Comorbidity and Healthcare Utilization in People with Schizophrenia: a systematic review

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Received: 18 September 2023
Accepted: 21 May 2024

Citation:
Salvador, M., Porras-Segovia, A., Lopez-Fernandez, O., & Baca-Garcia, E. (2024). Physical Comorbidity and Healthcare Utilization in People with Schizophrenia: a systematic review. *Salud Mental*, *47*(4), 189-204.

DOI: 10.17711/SM.0185-3325.2024.024

ABSTRACT

Introduction. Schizophrenia is a mental health condition that can lead to significant disability and have a major impact on social and occupational functioning. It tends to decrease life expectancy, which could be attributed to a variety of factors, including poor health habits, barriers to healthcare access, and the stigmatization of mental illness. **Objective.** The main aim of this systematic review is to examine the physical comorbidity of these patients, and their health service utilization. **Method.** The protocol has been registered with the PROSPERO database (CRD42020139972) and follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A search of PubMed/MEDLINE, EMBASE, Scopus, Web of Science, PsycINFO, Cochrane Library, and ProQuest Health Research Premium Collection yielded 317 articles, 57 of which were selected. **Results.** The mortality rate of people with schizophrenia is often at least twice that of the general population. In addition, these individuals may be susceptible to other physical health conditions that can significantly shorten their lifespan: cardiovascular and respiratory diseases, diabetes mellitus, oncologic diseases, and chronic infections. Complications during hospitalization and prolonged length of stay due to comorbidities may impede their access to essential healthcare. **Discussion and conclusion.** Enhancing the healthcare system is crucial to providing adequate care for these patients. Adopting positive lifestyle choices, reducing substance dependence, and abstaining from unconventional antipsychotics can bolster their life expectancy. It is therefore crucial to implement intervention strategies while training professionals to detect and manage physical comorbidities associated with this disorder.

Keywords: Schizophrenia, physical comorbidity, health services, mortality, morbidity, systematic review.

RESUMEN

Introducción. La esquizofrenia puede provocar una discapacidad significativa y tener un impacto notable en el funcionamiento social y ocupacional. Este trastorno tiende a disminuir la esperanza de vida debido a una variedad de factores, incluidos malos hábitos de salud, obstáculos para acceder a la atención médica y el estigma a las enfermedades mentales. **Objetivo.** La presente revisión sistemática pretende examinar la comorbilidad física de estos pacientes y su uso de los servicios de salud. **Método.** El protocolo registrado en la base de datos PROSPERO (CRD42020139972) sigue las directrices *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA). A través de PubMed/MEDLINE, EMBASE, Scopus, Web of Science, PsycINFO, Cochrane Library y ProQuest Health Research Premium Collection se identificaron 317 artículos y se seleccionaron 57. **Resultados.** Las personas que padecen esquizofrenia se enfrentan a una tasa de mortalidad que supera al menos el doble de la población general, y son susceptibles a enfermedades cardiovasculares, respiratorias, diabetes mellitus, oncológicas e infecciones crónicas, que pueden disminuir su esperanza de vida. Las complicaciones durante la hospitalización y las estancias prolongadas dificultan su atención sanitaria. **Discusión y conclusión.** Los sistemas de salud requieren mejoras para brindar una atención adecuada a los pacientes con esquizofrenia y ayudar a incrementar su esperanza de vida. Además, estos pacientes se benefician de adoptar estilos de vida saludables, tratar la dependencia de sustancias y adaptar el tratamiento antipsicótico. Parece crucial ejecutar estrategias de intervención y capacitar a los profesionales clínicos para poder detectar y manejar las comorbilidades físicas asociadas a este trastorno mental.

Palabras clave: Esquizofrenia, comorbilidad física, servicios de salud, mortalidad, morbilidad, revisión sistemática.

INTRODUCTION

Schizophrenia is one of the most disabling medical disorder. Considered a severe mental illness (SMI), it is usually associated with impaired social and occupational functioning. Approximately seven people per 1,000 will experience it in their lifetime (McGrath et al., 2008). The economic burden of schizophrenia diagnosis and treatment was estimated at $155.7 billion USD in 2013 in the United States (US) (Cloutier et al., 2016), including health costs and those associated with productivity loss. Indeed, the mortality rate of people with schizophrenia more than doubles that of the general population, largely due to the high prevalence of comorbid physical conditions (McGrath et al., 2008), which may be associated with their limited healthcare access.

Patients with schizophrenia have a shorter life expectancy (Laursen et al., 2014) due to poor physical health, which may be associated with worse health habits (such as substance use). There may also be barriers to the adequate physical care of this population, associated with both the patient and their illness, and compounded by the attitudes of physicians and the healthcare organizational structure (McGinty et al., 2015). A fragmented healthcare system, limited healthcare access, the inability of these patients to identify their medical problems or reluctance to be treated may contribute to their poor physical healthcare (Lambert et al., 2003). The frequent stigmatization of psychiatric patients (even among physicians) may exacerbate the problem (Copeland et al., 2006; Leucht et al., 2007).

In the initial reviews of this research issue, Goldman (1999) found that 50% of patients with schizophrenia had a comorbid or undiagnosed medical pathology. These patients were often excluded from research studies (Jeste et al., 1996), making it difficult to determine the extent and consequences of this healthcare deficit. Lambert et al. (2003) noted that patients with schizophrenia had a life expectancy ten to 25 years lower than that of the general population, while other authors have observed that this difference can increase over time (Hjorthøj et al., 2017; Laursen et al., 2014; Leucht et al., 2007). Lee et al. (2018) reviewed eight longitudinal studies of mortality in schizophrenia, finding that the standardized mortality rate (SMR) of these patients compared to that of the general population increased by 37% from 2.2 in pre-1970s studies to 3.0 in post-1970s reports.

Salokangas (2007) reviewed studies of patients with schizophrenia living in community residences, observing that most had undetected physical illnesses, despite seeking medical care more frequently than the general population. The literature review by Leucht et al. (2007) found a higher prevalence of human immunodeficiency virus (HIV) infection and hepatitis, osteoporosis, altered pain sensitivity, sexual dysfunction, obstetric complications, cardiovascular diseases, overweight, diabetes, dental problems, and polydipsia than among the general population. Likewise, Oud and Meyboom-de Jong (2009) systematically reviewed the prevalence and treatment of somatic comorbidity in primary care, finding that patients with serious mental illness (SMI) were at risk of developing diabetes mellitus, metabolic syndrome, hypertension, cardiovascular or pulmonary diseases, hypothyroidism, and visual problems. A number of reviews conducted in this century have identified a group of physical health issues commonly found in individuals with SMI. These comorbidities include, but are not limited to, diabetes, and cardiovascular, infectious, metabolic, and hormonal diseases. Most of these health concerns are associated with genetic and lifestyle factors, and are compounded by the inability of these patients to identify their medical problems, reluctance to be treated or their inadequate medical assessment. Consequently, these characteristics have become a typical pattern in the lives of most individuals with schizophrenia, negatively impacting their quality of life, life expectancy, and healthcare. To the authors' knowledge, there is a dearth of systematic medical literature reviews exploring the impact of somatic comorbidity on patients with schizophrenia. In addition, according to the most recent reviews, the severity of this mental disorder is due to its increasing mortality, pointing to a possible relationship between this psychiatric diagnosis and severe physical diseases such as cancer, diabetes mellitus, and certain chronic cardiovascular diseases (Laursen et al., 2014; Nordentoft et al., 2021; Rodrigues et al., 2021). For instance, Nordentoft et al. (2021) found that patients with schizophrenia have a 50% higher risk of breast, lung, and colon cancer deaths than the general population, while Nordentoft et al. (2021) observed that those with psychotic disorders have a 69% higher risk of multimorbidity (the occurrence of multiple co-occurring, chronic conditions in which the chronic cardiovascular disease may be hypertension, coronary heart disease, myocardial infarction, ischemic stroke, or atrial fibrillation).

Kowalski and Misiak (2023) recently reviewed the multidimensional associations between schizophrenia and COVID-19 for common biological pathways, finding that environmental stress, common comorbidities of schizophrenia, and the adverse effects of antipsychotic treatment are associated with greater severity and mortality of the disease. The present systematic review aims to examine the physical comorbidity of patients diagnosed with schizophrenia, regardless of the level of severity, and the healthcare received. It also specifically seeks to determine how this relationship impacts the mortality of these SMI patients, identify the main physical conditions comorbid with a diagnosis of schizophrenia; and observe the healthcare service utilization of these patients with comorbid physical conditions to gauge the degree of access to and quality of the medical treatment they receive, and the hospital admissions rate.

METHOD

The systematic review protocol has been registered with the PROSPERO database (registration number: CRD42020139972) and adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009; Urrútia, & Bonfill, 2010; Page et al., 2021).

Inclusion and exclusion criteria

To be eligible for consideration, research studies must be original observations published in reputable, peer-reviewed journals and include cross-sectional studies of cohorts, cases and controls. Cohort studies are included in the present study because they typically involve analytical and observational research requiring at least one group of patients diagnosed with this SMI. The main methodological objective is to identify the relationship between risk factors, such as physical comorbidities, and health outcomes such as morbidity and mortality. Case-control studies are another type of observational research commonly used in healthcare settings to establish potential links between psychiatric disorders and physical comorbidities. They may also be experimental designs comparing these SMI patients with the general population, providing valuable insights. This latter type of study analyzes variations between patients with a diagnosis of schizophrenia and those without psychiatric conditions in regard to mortality, physical comorbidity, such as the occurrence of physical diseases, clinical traits of physical illnesses, prognosis, and healthcare service utilization (including length of stay, outpatient appointments, emergency room visits, and expenses).

The methodological decisions determining the selection of empirical papers sought to include the research associated with the aims of this study. Only publications in English, Spanish, and French were included, since these are the languages in which the authors are proficient.

To ensure accuracy, we excluded clinical cases, case series, and case studies with only one subject (*N* = 1). We also eliminated reviews, meta-analyses, theoretical studies, and clinical trials. No restrictions were placed on the healthcare environment or type of treatment, and the date of publication was unimportant.

Search strategy

We performed an extensive search of the literature in 2021 in scientific databases such as PubMed/MEDLINE, EMBASE, Scopus, Web of Science, PsycINFO, Cochrane Library, and ProQuest Health Research Premium Collection to collect relevant information (see Figure 1 for further details; Page et al., 2021). The search was narrowed down from 1/1/1991 to 31/12/2021.

To find the information, a search strategy was implemented involving a combination of specific terms such as “Schizophrenia” [Mesh] AND “Comorbidity” [Mesh], “Schizophrenia” [Title] AND (“medical comorbidity” OR “physical comorbidity”). We also examined the studies found in the search for any relevant references.

Selection of studies and data extraction

Two authors conducted a review of the titles and abstracts of the studies retrieved to identify potential studies that met the inclusion criteria. In addition, they manually scrutinized the reference lists of eligible publications. The two reviewers independently evaluated the full text of potentially eligible studies. They resolved discrepancies through deliberation, consulting with the last author when necessary. Thereafter, the first author meticulously analyzed each paper selected to prepare a first draft of the results summarized in the tables, which were subsequently reviewed by the third author. This involved scrutinizing the Method section to check the research design, and conduct a detailed analysis of the title, abstract, introduction (objectives), method, and results sections to extract the critical variables of the study listed in Tables 1 and 2, which include the author, design, country, year of publication, study design, sample size, age range of the sample, sex distribution, results, measures, and main conclusions.

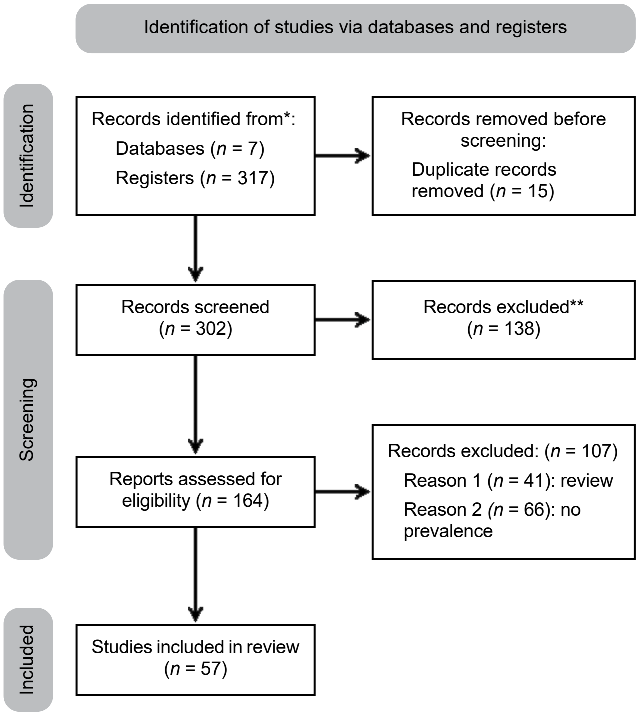

Figure 1. PRISMA 2020 Flow Diagram of the Present Systematic Review.

Table 1
Main findings of Mortality Studies Included in the Present Systematic Review

Study	*Country*	*Design*	*Population*	*Aims*	*Results*
Räsänen et al., (2003)	Finland	Cohorts	*N* = 203 patients with S ≥ 25 y/o, admitted to medium to long stay centers	To compare mortality and associated factors in patients with S *vs.* the general population.	As age increased, mortality approached that of the general population. In patients with S, the risk of death from all causes was four times that of the general population. In the 25-34 age group, the mortality risk was 12.9 times higher than that of the general population for men and 28.6 times higher for women. The diseases with the highest risk of mortality in patients with S vs. the general population were digestive (SMR = 17.5), respiratory (SMR = 9.3), and circulatory system diseases (SMR = 3.6), and neoplasms (SMR = 2.1).
D ’ Avanzo et al. (2003)	Italy	Cohorts	*N* = 1,515 institutionalized patients with S, aged 20-94	To compare mortality rates in patients with S before and after deinstitutionalization.	The SMR for all causes was 2.66 before discharge from a psychiatric hospital and 2.09 after discharge. Mortality remained high after discharge from the psychiatric hospital but was not associated with an increase after discharge.
Copeland et al. (2006)	USA	Cases and controls	*N* = 27,798 veterans ≥ 18 y/o Deceased (943 with S)	To compare the number of unexpected deaths among patients with S *vs.* those without S.	There were 20% of unexpected deaths in patients with S *vs.* 7% in patients without S. S was associated with a twofold increase in the risk of unexpected death (OR = 2.4, 95% CI 1.6-3.4).
Tokuda et al. (2008)	Japan	Cases and controls	*N* = 190,157 hospitalized patients ≥ 18 y/o (1,108 with S)	To compare patients with S and without S regarding mortality rate and causes of death.	There were no significant differences in hospital mortality rates (schizophrenic patients 5.0% vs. non-schizophrenic patients 4.0%). Patients with S were more likely to be older and male, and have had longer hospital stays, and more ICU admissions. The most important risk factors for mortality among patients with S were malignancy and cardiovascular disease. The main causes of death in hospitalizations of patients with S were suicide (14.5%), malignant lymphoma or leukemia (10.9%), stroke (9.0%), and sepsis (7.3%).
Laursen et al. (2011)	Denmark	Cohort	*N* = 2,450,812 patients (16,079 with S) from 15- 52 y/o	To compare the incidence of 19 chronic physical diseases between patients with psychiatric disorders and those with no psychiatric disorders.	Patients with S had higher incidence rates of hospital contacts in almost all explored physical illnesses and a Charlson comorbidity index twice as high as people without psychiatric disorders (incidence rate = .80; 95% CI .63-1.00). Chronic physical illnesses explain half the excess mortality in patients with S. The highest mortality rates were observed in psychiatric patients who were not admitted for their physical illness (possibly due to undertreatment or underdiagnosis).
Bodén et al. (2015)	Sweden	Cohorts	*N* = 209,592 patients ≥15 years with AMI (541 with S)	To compare mortality post AMI with S, BD, and the general population.	Patients with S were younger when they had their first AMI (63 years, compared with 68 years in BD and 71 years in the general population), had higher 30-day (OR = 2.58; 95% CI 1 .88-3.54) and one year mortality (OR = 2.55, 95% CI 1.98-3.29).
Hou et al. (2015)	Taiwan	Cases and controls	*N* = 24,368 hospitalized patients ≥ 18 y/o (8,264 with S)	To estimate the incidence and risk factors of SCD in patients with S.	The standardized mortality rate for MSC was 4.5. Risk factors for SCD were physical illness (RR = 2.91, *p* < .01), aggressive behaviors (RR = 3.99, *p* < .01), electrocardiographic abnormalities (RR = 5.46, *p* < .05), and first generation antipsychotics (RR = 5.13, *p* < .01).
Sohn et al. (2015)	USA	Cross-sectional	*N* = 42,416 discharges due to AMI (16,140 patients ≥ 18 years with mental illness, 26,276 without mental illness)	To compare post-AMI hospital mortality between patients with and without mental disorders, and to analyze differences between mental disorders.	They found no differences in post-AMI hospital mortality between patients with and without mental disorders in general. Patients with S were associated with increased in-hospital mortality post AMI (OR 1.72, 95% CI 1.02-2.90).

Table 1
Main findings of Mortality Studies Included in the Present Systematic Review (continued)

Study	*Country*	*Design*	*Population*	*Aims*	*Results*
Bradford et al. (2016)	USA	Historical cohorts	*N* = 34,664 patients ≥18 y/o with lung cancer (835 with S)	To do a lung cancer survival analysis in patients with and without S.	Risk of death was significantly higher in patients with S (RR = 1.33; 95% CI 1.22-1.44). Risk factors included advanced age, being Black, smoking, substance abuse.
Bitter et al. (2017)	Hungary	Cases and controls	65,169 patients with S and 325,435 controls ≥ 18 y/o	To compare mortality in patients with S vs. the general population.	Patients with S had a higher risk of all-cause mortality (RR = 2.4; *p* < .0001), and lower life expectancy: at 20 years, 11.5 years in men and 13.7 in women; at age 45, 8.1 years in men and 9.6 in women.
Hayes et al. (2017)	United Kingdom	Cohorts	259,598 patients ≥ 18 y/o (22,497 with S, 17,714 with BD, 219,387 controls)	To compare mortality in people with S and BD and in the general population.	Patients with S had higher mortality than controls (RR = 2.08 95% CI 1.98 - 2.19). The adjusted RRs for those with S increased by .11 per year between 2004 and 2010 and by .34 per year after 2010.
Tanskanen et al. (2018)	Finland	Historical cohorts	People ≥ 16 y/o, deceased from 1975 to 2014 (79,877 with S)	To compare mortality, age and causes of death among patients with S and the general population.	In patients with S, the median age of death was seven years earlier than in the general population. It ranged from 57.6 years in 1984 to 70.1 years in 2014 (general population from 70.9 to 77.5 years). The mortality difference with the general population is stable and does not increase (SMR 2.6 in 1984 and 2.7 in 2014).
Dalton et al. (2018)	Denmark	Cohorts	*N* = 56,152 Danish women ≥ 18 y/o with breast cancer (499 with S)	To compare the survival rate of patients with breast cancer with and without S.	Breast cancer patients with S have an increased risk of dying from any cause (HR = 1.55; 95% CI 1.32-1.82), an increased risk of dying from breast cancer (HR 1, 12 (95% CI .98-1.50), and a greater likelihood of not being assigned to a prescribed treatment (OR = 1.50; 95% CI 1.15-1.94).
Kugathasan et al. (2018)	Denmark	Cohorts	*N* = 221,772 patients ≥ 18 y/o (36,962 with S)	To compare all-cause mortality and survival after AMI in patients with S and without S.	Patients with S had a higher mortality rate (HR 9.94, 95% CI 8.71 to 11.35). The SMR remained stable over the years in patients with E, and decreased in the general population.
Laursen et al. (2019)	Denmark	Cohort	6,641,608 patients 10-94 y/o (47,554 with S)	To compare years of life lost in patients with S vs. the general population.	There were improvements in years of life lost between 1995 and 2015, in both the general population and people with S. Men with S lost 13.5 more years than the general population and women 11.4 years.
Kugathasan et al. (2019)	Denmark	Historical cohorts	*N* = 5,432,821 patients 18-85 y/o (30,210 with S)	To explore the association between comorbidity and mortality rates in patients with S vs. the general population.	All somatic diseases were associated with higher mortality in S (HR = 16.3, 95% CI 15.4-17.3). Patients with S had higher mortality regardless of the number of somatic diseases diagnosed. The mortality rate was more than twice as high for all individual somatic disease categories.

Note: y/o = years old; S = Schizophrenia; COPD = Chronic Obstructive Pulmonary Disease; USA = United States of America; HR = Hazard Ratio; AMI = Acute Myocardial Infarction; HF = Heart Failure; OR = Odds Ratio; MSC = Sudden Cardiac Death; PAF = Population Attributable Fraction; SMR = Standardized Mortality Rate; SMI = Severe Mental Disorder; ICU = Intensive Care Unit; HBV = Hepatitis B Virus; HCV = Hepatitis C Virus; HIV = Human Immunodeficiency Virus.

RESULTS

A meticulous search of seven scientific databases yielded 317 entries. Removing the duplicates left 302 entries. The elimination of 138 irrelevant articles narrowed the focus to 164 relevant items. Finally, after conducting a thorough analysis of each full-text article, we identified 57 publications that met our stringent inclusion criteria (Figure 1).

Mortality

The mortality rate of patients with schizophrenia is two to four times higher than that of the general population (Bitter et al., 2017; Bouza et al., 2010b; Gur et al., 2018; Hayes et al., 2017; Kugathasan et al., 2019; Laursen et al., 2019; Räsänen et al., 2003; Schoepf et al., 2014; Tanskanen et al., 2018; Table 1). In regard to sample size, the study with the largest sample was conducted by Tanskanen et al. (2018) in Finland, with 79,877 patients with schizophrenia, detecting a mortality rate 2.7 times higher than that of the general population. The study by Kugathasan et al. (2019) in Denmark was the second largest, with a sample of 30,210 patients with schizophrenia, obtaining a similar mortality rate, twice as high as that of the general population for all somatic diseases (from 2.16 per 1,000 in endocrine diseases to 2.85 per 1,000 in skin diseases).

The studies reviewed show that although patients with schizophrenia die from the same causes as those without this diagnosis, they have a shorter life expectancy. A Finnish study by Räsänen et al. (2003) of patients ages 25 to 34 found that the risk of mortality was 12.9 times higher for men and 28.6 times higher for women compared to that of the general population. Tanskanen et al. (2018) discovered that the gap in life expectancy was more significant among younger Finnish patients. Laursen et al. (2019) observed an increase in the number of years lost between 1995 and 2015 among individuals in Denmark. Specifically, men with schizophrenia lost 13.5 more years of life than the general population.

There appear to be disparities between authors in regard to the difference in life expectancy between patients with schizophrenia and the general population. In the United Kingdom (UK), Hayes et al. (2017) showed that hazard ratios (HR) adjusted for schizophrenia gradually increased from 2004 to 2009 and rapidly thereafter. However, Tanskanen et al. (2018) did not confirm this increase, as the standardized mortality rate for 79,877 Finnish patients with schizophrenia followed between 1975 to 2014 had remained stable for the previous 30 years.

Various studies have reported the diseases with the greatest impact on mortality. Kugathasan et al. (2019) found the leading causes of death to be respiratory, digestive, and cardiovascular diseases. Conversely, Bouza et al. (2010a) reported that circulatory, respiratory, and neoplasm cases accounted for 21%, 18%, and 17% of deaths respectively. In the article by Schoepf et al. (2014), the most common comorbidity in patients with schizophrenia was Type 2 Diabetes Mellitus (DM2). It was also a predictor of hospital mortality: alcoholic hepatopathy, Parkinson's disease, Type 1 Diabetes Mellitus (DM1), kidney failure, ischemic stroke, pneumonia, ferrocene anemia, chronic obstructive pulmonary disease (COPD), and bronchitis.

In terms of morbidity, the results reveal the following physical illnesses: cardiovascular diseases, respiratory diseases, Type 2 Diabetes Mellitus (DM2), oncologic diseases, and chronic infections (Table 2).

Cardiovascular diseases

Studies on mortality from post-hospital and long-term acute myocardial infarction (AMI) in North America and Northern Europe coincide with higher post-AMI mortality rates in patients with schizophrenia (Bodén et al., 2015; Hauck, et al., 2020; Kugathasan et al., 2018; Sohn et al., 2015). In Sweden, Bodén et al. (2015) compared 541 patients with schizophrenia with AMI with those with AMI without SMI. Patients with schizophrenia were younger at the time of AMI (with a mean age of 63) and had higher mortality rates (at 30 days). Kugathasan et al. (2018) studied 36,962 Danish patients with schizophrenia and AMI from 1980 to 2015 compared with the general population. They found higher mortality rates in patients with post-AMI schizophrenia at one and five years, and the absence of a decrease in the post-AMI standardized mortality rate.

In Taiwan, studies of sudden cardiac death (SCD) showed an increase in patients with schizophrenia (Chen et al., 2021; Hou et al., 2015). The largest study, led by Chen et al. (2021), of 170,322 patients with schizophrenia, found that 1,836 died of this cause. The standardized mortality rate was always > 1.00 and highest in male patients < 35 years of age. In addition, the risk of SCD increases with age, due to hypertension, and congestive heart failure, while drug-induced mental disorders decrease.

Respiratory diseases

Schizophrenia is associated with a higher probability of diagnosis of lung disease. The most extensive study was conducted at veterans' hospitals in the United States by Copeland et al. (2007). In a sample of 28,000 patients, the 3.4% with schizophrenia had an increased likelihood of a diagnosis of lung disease during the last year of life, pneumonia and COPD, regardless of whether they smoked. The lack of outpatient medical care in the year before death was cited as an indicator of this increased risk.

Recent research conducted in Finland by Partti et al. (2015) suggested that individuals with schizophrenia may experience impaired lung function, as measured by spirometry. In Denmark, Jørgensen et al. (2018), found that patients with COPD and comorbid schizophrenia were less likely to receive long-acting muscarinic antagonists (MRI) or prolonged-acting ß2 agonists, putting them at a higher risk of mortality within 30 days. However, the study did not find any evidence of a higher risk of re-admission.

Type 2 Diabetes Mellitus

Studies agree that patients with schizophrenia have a higher prevalence of DM2. In the UK, Schoepf et al. (2012) indicated that the prevalence in patients with schizophrenia is 11.3%. In Denmark, exposure to antipsychotics was associated with ketoacidosis and DM2 in a previously non-diabetic population with schizophrenia (Polcwiartek et al., 2017). A family history of diabetes was associated with a family history of schizophrenia in an Australian study (Foley et al., 2016). In North America (Soontornniyomkij et al., 2019), patients with chronic schizophrenia had higher insulin resistance and higher body mass index (BMI). Moreover, an at-risk subpopulation was identified with a clinical profile (including negative symptoms, high BMI and being non-white) in which prevention of metabolic comorbidities was recommended. Conversely, in Canada (Kurdyak, et al., 2017), patients with diabetes and schizophrenia have lower rates of recommended tests and higher rates of diabetes-related hospital visits than patients with diabetes alone.

Table 2
Main Findings of the Morbidity Studies Included in the Present Systematic Review

Study	*Country*	*Design*	*Population*	*Aims*	*Results*
Daumit et al. (2006)	USA	Cross-sectional	*N* = 733,904 patients (1,746 with S) ≥ 18a admitted for medical-surgical pathology	To compare complications, hospital stay and healthcare costs in patients with and without S.	There was a higher risk of the following medical-surgical complications in patients with S than in those without S: infection (OR = 2.49; 95% 1.28-4.88); sepsis (OR = 2.29; 95% 1.49-3.51); respiratory failure (OR = 2.08; 95% 1.41-3.06); deep vein thrombosis (OR = 1.96; 95% 1.18-3.26). In patients with S, average length of stay was 10 days or longer, while hospital expenses averaged $20,000 more.
Carney et al. (2006)	USA	Cases and controls	*N* = 727,336 patients ≥ 18 y/o with physical disease (1,074 with S)	To compare medical comorbidity in patients with S and patients without mental illness.	People with S were significantly more likely to have ≥1 chronic medical condition than those without mental illness. More than 33% had ≥ three medical comorbidities, almost three times more than controls (33.2% *vs*. 12.1%, respectively).
Copeland et al. (2007)	USA	Cohorts	*N* = 27,735 patients ≥ 18 y/o (943 with S) who died in VA hospitals	To compare diagnosis of pneumonia or COPD in the last year of life in patients with and without S.	60% of patients without mental illness received outpatient care the year before death, compared to 40% of patients with S. Hospitalized S patients had a higher risk of pneumonia (38% vs. 31%), and COPD (46% vs. 38%), regardless of whether they smoked. S is a risk factor for lung disease in the last year of life (OR = 1.9, 95% CI 1.6-2.2), and to a lesser degree in advanced lung disease (OR = 1.5, 95% CI 1.3-1.7).
Martens et al. (2009)	Canada	Cases and controls	*N* = 338,514 women 18-69 y/o (3,220 with S)	To compare women with and without S in cervical cancer screening with Papanicolaou test.	Women with S were less likely to have Pap smears (58.8% *vs*. 67.8%, *p* < .0001) compared to other women.
Bouza et al. (2010a)	Spain	Cohorts	*N* = 16,776 patients > 15 y/o admitted with S, compared to the national health survey of the general population	To compare the medical comorbidity of patients with S and the general population.	In patients with S, physical illness appears early in life (50%, 15-31 y/o) and increases in incidence with age (in > 53 y/o, at least 84% had one physical ICD-9 code). The most prevalent medical diseases are endocrine (16%), circulatory (15%), respiratory (15%), and digestive (10%). They present higher rates than the general population in diabetes (8% in S, and 5.02% in the general population), neoplasia (4.4%, and 2.37%), AIDS (1.1%, and 1.61 per 1,000 population). No differences were found for COPD or ischemic heart disease.
Bouza et al. (2010b)	Spain	Cohorts	*N* = 20,490,332 hospital discharges in patients ≥ 15 y/o	To compare admissions due to physical illness, impact on mortality, and resource utilization in patients with S and the general population.	In patients with S, hospitalizations for medical illnesses are frequent (34% of hospital admissions). 35% 1 ICD-9-CM code, 65% ≥ 2, admission was required at younger ages (mean age 53 y/o), hospital mortality was 6.9%, and the mean age of death was 63 y/o.
Shen et al. (2011)	Taiwan	Historical cohorts	*N* = patients ≥ 18 y/o admitted to the ICU (203 with S)	To compare risks of acute organ dysfunction and death in patients with ICU with and without S.	Patients with S had a higher risk of acute organ dysfunction (OR = 1.52; 95% CI = 1.09 to 2.10), and higher hospital mortality (24.1% *vs*. 14.4%, *p* < .001; OR = 1.56, 95% CI 1.08-2.24).
Schoepf et al. (2012)	United Kingdom	Cases and controls	*N* = 89,457patients ≥ 18 y/o hospitalized (679 with S, and 88,778 controls)	To compare physical comorbidity and factors associated with in-hospital mortality between patients with S and without S.	The predictors of mortality were age (RR = 1.1), DM2 (RR = 2.2), pneumonia (RR = 2.7), heart failure (RR = 2.9), and chronic kidney failure (RR = 3,2). Patients with S had a higher prevalence of DM2 (11.3% *vs*. 6.3%).
Lin et al. (2013)	Taiwan	Cohorts	*N* = 71,317 patients > 18 y/o with S; 20,567 BD	To compare age/sex/location incidence in those with S and the general population.	Women patients with S had a higher risk of cancer (RR=1.31, 95% CI: 1.17-1.48) but not men. Cancer risk decreases with increasing duration and age of onset of S.

Table 2
Main Findings of the Morbidity Studies Included in the Present Systematic Review (continued)

Study	*Country*	*Design*	*Population*	*Aims*	*Results*
Schoepf et al. (2014)	United Kingdom	Cases and controls	*N* = 15,598 hospitalized patients (1,418 patients with S, and 14,180 controls)	To compare the prevalence of physical comorbidity, especially T2DM, and its impact on in-hospital mortality between patients with S and without S.	Schizophrenic patients had a higher proportion of admissions to the emergency room (69.8 *vs*. 43.0%), a longer average length of stay (8.1 *vs*. 3.4 days), and a greater number of hospital admissions (11.5 *vs*. 6.3) and lower survival rates (1,895 *vs*. 2,161 days).
Partti et al. (2015)	Finland	Cross-sectional	*N* = 8,028 participants ≥ 30 y/o (67 with S)	To compare lung function measured by spirometry, and the prevalence of respiratory disease among patients with S and the general population.	Patients with S had lower spirometry values after adjusting for age, sex, smoking, abdominal obesity, DM2, metabolic syndrome, and physical activity, as well as a higher probability of pneumonia (OR = 4.9), COPD (OR = 4, 2), and chronic bronchitis (OR = 3.8) than the general population.
Razzano et al. (2015)	USA	Cross-sectional	*N* = 457 people ≥ 18 y/o (179 with S)	To estimate the prevalence of more frequent medical conditions in patients with S and the general population.	The five most common medical conditions in S patients were hyperlipidemia (45%), hypertension (44%), asthma (28%), arthritis (22%), and diabetes (21%). They were less likely to report having been diagnosed with hypertension, asthma, and arthritis. The odds of being diagnosed with diabetes or dyslipidemia were similar to those of the general population.
Sørensen et al. (2015)	Denmark	Cohorts	*N* = 954,351 people aged 15-32 y/o (4,371 developed S)	To estimate the prevalence of all somatic diseases treated before the first diagnosis of S, and the association with the development of S.	Of those who developed S, 4,180 (95.6%) had previous health contact due to somatic pathology. Any previous somatic contact was associated with an increased risk of S (RR = 2.04; 95% CI 1.77-2.37).
Nielsen et al. (2016)	Denmark	Cohorts	*N* = 1,403,183 people, born between 1977 and 2002	To investigate the association between S and infections.	People with hospital contact for infection are more likely to develop S than those without it (RR = 1.53, CI 1.46-1.61). People diagnosed with S are more likely to have had a hospital contact for an infection (RR = 1.73; 95% CI 1.57-1.91). A comorbidity index between S and infection of 1.40 (95% CI 1.34-1.46) was found, indicating an overlap between S and infection.
Foley et al. (2016)	Australia	Cross-sectional	*N* = 1,624 patients 18-64 y/o with psychosis (857 with S)	To determine whether there is familial comorbidity between DM2 and psychosis.	A family history of diabetes was associated with a family history of S in patients with a psychotic disorder (OR = 1.35, *p* = .01). Adjustment for demographic factors (age, sex, diagnosis, ethnicity, education, employment, income, and marital status) slightly strengthened the association (OR = 1.74, *p* = .001).
Kisely et al. (2016)	Australia	Cohorts	*N* = 4,700,000 people ≥ 15 y/o	To compare the incidence of and mortality from cancer in psychiatric patients and the general population.	Cancer incidence was the same as for the general population for most psychiatric disorders, but rates were lower for S (RR = .84; 95% CI .72-.98). Mortality increased in psychiatric patients (OR = 2.27; 95% CI 2.15-2.39).
Schulman-Markus et al. (2016)	USA	Cohorts	*N* = 9,754,267 ≥ 18 y/o with AMI (12,590 with S)	To compare therapeutic techniques and survival after AMI in patients with and without S.	In patients with S, there were fewer reduced revascularization procedures, higher in-hospital mortality rates, a younger age at diagnosis of AMI (58 *vs*. 67 y/o), more women (44% *vs*. 38%), and a greater likelihood of having several comorbidities, and a longer length of stay.
Ishikawa et al. (2016)	Japan	Cohorts	*N* = 12,475 patients ≥ 40 y/o hospitalized for gastrointestinal cancer (2,495 with S)	To compare stages of gastrointestinal cancer, treatment, and mortality in patients with and without S.	Patients with S had a higher proportion of stage IV cancer (33.9% v. 18.1%), less probability of receiving invasive treatment (56.5% v. 70.2%, OR = .77, CI 95% .69-.85), and higher in-hospital mortality (4.2% v. 1.8%, OR = 1.35, 95% CI 1.04-1.75).

Table 2
Main Findings of the Morbidity Studies Included in the Present Systematic Review (continued)

Study	*Country*	*Design*	*Population*	*Aims*	*Results*
Brink et al. (2017)	Denmark	Cases and controls	*N* = 7754 people ≥ 70 (667 with S)	To compare medical comorbidity, medication use, and healthcare use in patients with S and the general population.	Patients with S were less likely to receive cardiovascular medication (OR = .65; 98.75% CI .00-.50), and more likely to receive analgesics (OR = 1.46, 98.75% CI 1.04-2.05), and to have fewer outpatient visits (RR = .37; 98.75% CI .24-.55).
Bauer-Staeb et al. (2017)	Sweden	Cross-sectional	*N* = 6,815,931 people ≥ 18 y/o (21,232 with S)	To compare the prevalence of HIV, HBV, and HCV in patients with S and the general population.	In patients with S, the prevalence of infections was HIV .24% with S *vs.* .09% in the general population, HBV .53% with S *vs.* 9.22 in the general population, and HCV 4.58% with S *vs.* .61 in the general population.
Attar et al. (2017)	Denmark	Cases and controls nested in a cohort	*N* = 141 patients ≥ 18 y/o with AMI (47 with S, and 94 controls)	To compare examination and treatment offers after an AMI in patients with S and patients without mental illness.	Patients with S were less likely to be offered post-AMI examinations and treatment (*p* < .01). If they were offered them, they were more likely to refuse examinations (*p* = .10) and treatment (*p* = .09).
Lu et al. (2017)	USA	Historical cohorts	*N* = 611 patients ≥ 20 y/o with HF (40 with S)	To compare readmissions at 30 days and mortality in patients with HF with and without S.	Patients with S were 4.92 times more likely to be readmitted for HF at 30 days. (RR = 4.92, *p* < .001). No associations were found for mortality.
Kurdyak et al. (2017)	Canada	Historical cohorts	*N* = 1,140,057 patients with DM2 (26,259 with S)	To compare the quality of DM2 care between patients with and without S.	S was associated with worse management of DM2 as measured by average results in HbA1c, lipid test, and eye examinations (OR = .64, 95% CI .61-.67), more emergency room visits related to DM2 (OR = 1.34, (95% CI 1.28-1.41), and more hospitalizations (OR = 1.36, (95% CI 1.28-1.43).
Gabilondo et al. (2017)	Spain	Cohorts	*N* = 2,255,406 patients ≥ 18 y/o (7,331 with S)	To compare chronic comorbidities between patients with and without S	55.6% of patients with S had one comorbidity, and 29.3% had two or more. The most prevalent comorbidity was AHT (16.8%). Patients with S had a higher risk of Parkinson's (OR = 47.89), infectious diseases (OR = 3.31) and DM2 (OR = 2.23).
Spilsbury et al. (2018)	Australia	Historical cohorts	65,508 people ≥ 20 y/o deceased between 2009-2013 (1,196 with S)	To compare the use of health services in the last year of life of people with and without S.	In patients with S, during the last year of life, there were no differences in emergency visits. They were less likely to be hospitalized (HR = .53, 95%CI .44-.65) and had less access to specialized palliative care (27.5% *vs.* 40.4% of the matched cohort, *p* < .001.
Goueslard et al. (2018)	France	Historical cohorts	*N* = 45,655 patients 15-35 y/o hospitalized for DM2 (341 with S)	To compare complications and mortality of DM2 in patients with and without S.	Patients with S had a higher risk of readmission for hypoglycemia (OR = 3.21, 95% CI 1.99-5.20, hyperglycemia (OR = 7.01, 95% CI 3.53-13.90), ketoacidosis (OR = 2.01, 95% CI 1.49-2.70) and coma (OR = 3.17, 95% CI 1.90-5.27), in addition to higher hospital mortality (OR = 2.83, 95% CI 1.50-5.36).
Bailey et al. (2018)	USA	Historical cohorts	*N* = 579,851 hospitalized patients ≥ 18 y/o (5,234 with S)	To compare surgical results in patients with and without S.	Patients with S had 70% higher odds of a more prolonged length of stay than the 75th percentile for each type of procedure and surgical approach. The odds of death were slightly lower in patients with S.
Huang et al. (2018)	Taiwan	Historical cohorts	*N* = 715,756 people ≥ 20 y/o (532 with S)	To compare in comorbidities and evolution time patients with DMT2 with and without S.	The prevalence of S is higher in patients with T2DM than in the general population, especially in those under 60 y/o. From 2000 to 2010, it increased from .64% to .85%; This increase was also observed in the general population. Patients with S and T2DM were more likely to have multiple. comorbidities.
Jørgensen et al. (2018)	Denmark	Cohorts	*N* = 72,692 patients ≥ 30a with COPD (621 with S)	To compare readmissions and mortality in patients with and without S.	Patients with S were less likely to receive treatment with long-acting muscarinic antagonists or long-acting ß2-agonists (RR = .92; 95% CI .87-.98) and to have an increased risk of mortality at 30 days (OR = 1.27, 95% CI 1.01 to 1.59).

Table 2
Main Findings of the Morbidity Studies Included in the Present Systematic Review (continued)

Study	*Country*	*Design*	*Population*	*Aims*	*Results*
Gur et al. (2018)	Israel	Cases and controls	*N* = 5,484 people ≥ 18 y/o (1,389 patients with S, and 4,095 controls)	To compare mortality, morbidity and medical resource utilization in patients with S vs. the general population.	In patients with S, the mortality rate was almost double (7% *vs.* 3.8%), and the tertiary medical resource utilization was higher (mean admissions per year .2 *vs.* .12, visits to emergency rooms .48 *vs.* .36).
Brink et al. (2019)	Denmark	Cases and controls	*N* = 27,521 people aged 18-40 (4,924 with S)	To compare medical comorbidities and mortality in people with and without S.	In patients with S, the RR of CVD and cancer was similar to that of controls. The probability of having been diagnosed with CVD, cancer, lung disease or diabetes before dying was lower.
Heiberg et al. (2019)	Norway	Cohorts	*N* = 72,451 patients ≥ 18 y/o who died from CVD (814 with S)	To compare comorbidity and use of health services in people with E or TB and people without these diagnoses.	Patients with S were 66% more likely (OR 1.66, 95% CI 1.39 to 1.98) not to be diagnosed with CVD before cardiovascular death. Almost all (98%) individuals with undiagnosed S had had somatic medical visits before they died, compared with 88% of other patients.
Soontornniyomki et al. (2019)	USA	Cross-sectional	*N* = 285 patients aged 26-65 y/o (145 with S)	To compare insulin resistance between patients with chronic S and people without mental illness.	People with S had higher insulin resistance levels and higher BMIs than those without psychiatric disorders.
Fond et al. (2019)	France	Cohorts	*N* = 224,958 patients ≥ 15 y/o who died from cancer (2,481 with S)	To compare access to palliative care and indicators of high-intensity care at the end of life among patients with S and the general population.	Patients with S were more likely to receive palliative care in the last month of life (OR = 1.61, 95% CI 1.45-1.80; *p* < 0-0001), less likely to receive palliative care for high-intensity cancer at the end of life (chemotherapy and surgery), more likely to die younger, and to have less time between cancer diagnosis and death.
Pankiewicz-Dulacz et al. (2019)	Denmark	Cohorts	*N* = 7788 born 1975-1990 diagnosed with S	To determine risk factors for infections in patients with S.	The most significant risk factors associated with the development of central infections were age < 16 y/o (HR = 1.74, 95% CI 1.16-2.60), being female (HR = 1.83, 95% CI 1.60-2.10), presenting two physical comorbidities (HR = 3.70, 95% CI 2.33-5.88), depression (HR = 1.20, 95% CI 1.04-1.39), and substance abuse (HR = 1.36, 95% CI 1.14-2.62). Antipsychotic treatment was a protective factor (HR = .75, 95% CI .65-.86).
Chen et al. (2021)	Taiwan	Cohorts	*N* = 10,422,350 people (170,322 with S)	To estimate the effect of age on SMR, the risk of physical and psychiatric comorbidity, and sudden cardiac death in patients with S.	Patients with S had a higher risk of MSD than the general population. Factors associated with increased mortality were chronic liver disease, sleep disorders, dementia, organic mental disorders, and ischemic heart disease.
Hauck et al. (2020)	Canada	Historical cohorts	*N* = 108,610 patients ≥ 20 y/o AMI (1,145 with S)	To compare mortality and cardiac interventions in patients with AMI with and without S.	Patients with S had higher mortality, with HR=1.55 (95% CI 1.37-1.77) when adjusting for age, sex, income, rurality, geographic region, location, and comorbidity. The impact of revascularization on mortality was similar between those with and without S.
Korpela et al. (2020)	Finland	Cohorts	*N* = 10,933 children followed up to age 16 (227 with S)	To compare somatic diseases in patients with and without S.	Patients with S are more likely to have the following than controls: diseases of the blood and hematopoietic organs (7.9% in S *vs.* 4.0% in non-psychotic controls; HR = 2.00; 95% CI 1.25-3.22) and endocrine, nutritional, and metabolic diseases (22.5 *vs.* 12.7%; HR = 1.81; 95% CI 1.36-2.399.

Note: y/o = years old; S = Schizophrenia; VA = veterans; COPD = Chronic Obstructive Pulmonary Disease; USA = United States; HR = Hazard Ratio; AMI = Acute Myocardial Infarction; HF = Heart Failure; OR = Odds Ratio; MSC = Sudden Cardiac Death; PAF = population attributable fraction; BD = Bipolar Disorder; SMR = Standardized Mortality Rate; SMI = Severe Mental Disorder; ICU = Intensive Care Unit; HBV = Hepatitis B Virus; HCV = Hepatitis C Virus; HIV = Human Immunodeficiency Virus.

Schizophrenia was associated with a reduced likelihood of optimal diabetes care, and an increased likelihood of emergency room visits and hospitalization.

Oncologic diseases

According to research conducted by Lin et al. (2013) in Taiwan, individuals with schizophrenia, particularly women, have a greater likelihood of developing various types of cancer. This study, which included 71,317 patients, suggested that the risk of cancer decreased with longer periods of schizophrenia and earlier diagnosis before the age of 50. The authors highlighted the incidence rates of colon, breast, cervix, and uterus cancers, which increased if schizophrenia was diagnosed after age 50. Nevertheless, Kisely et al., (2016) found lower cancer incidence rates in schizophrenia patients in Australia, although mortality increased across all psychiatric patients.

In another study with US veterans, Bradford et al. (2016) found factors associated with increased risk of death: being older, Black, smoking at the time of cancer diagnosis, and substance abuse. In regard to lung cancer, survival was significantly lower in patients with schizophrenia. Homeless shelter utilization was associated with a lower risk of death.

Concerning breast cancer, in Denmark, Dalton et al. (2018) found lower survival rates in patients with schizophrenia, since patients are less likely to be assigned to treatment.

As for cervical cancer, diagnostic procedures in Canada (Martens et al., 2009) have found that women with schizophrenia are less likely to have Pap smears to detect this type of cancer.

In regard to access to palliative care and high-intensity care at the end of life, a French national study (Fond et al., 2019) found that patients with schizophrenia were more likely to receive palliative care, less likely to receive curative care (chemotherapy and surgery), more likely to die younger, have a shorter lapse of time between cancer diagnosis and death, and more likely to develop chest cancers and comorbidities.

Chronic infections

Interestingly, in Denmark (Nielsen et al., 2016), it was found that people with hospital contact with an infection are more likely to develop schizophrenia than those without such an infection, and vice versa. Another Danish study (Pankiewicz-Dulacz et al., 2019) found that risk factors associated with severe infections in patients with schizophrenia are being young, female, having a medical comorbidity, and substance abuse. Moreover, a history of pre-diagnosis antipsychotic treatment was negatively associated with infections.

In Sweden, Bauer-Staeb et al. (2017) conducted a study to estimate the prevalence of blood-borne viruses (such as HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV) in patients with SMI. Prevalence was higher in those with schizophrenia with HIV-.21%, HBV-.53%, and HCV-5.62%, with substance abuse contributing to this increased risk.

Information on the results of medical treatment and hospital access is provided in the following two sections.

Access to and Quality of Medical Treatment

Studies suggest that physical diseases in patients with schizophrenia are underdiagnosed and undertreated (Laursen et al., 2011). These patients are less likely to have required hospitalization in the year before death (Copeland et al., 2006). There were lower rates of diagnosis of cardiovascular disease, together with higher mortality rates (Brink et al., 2019; Correll et al., 2017; Heiberg et al., 2019) and utilization of tertiary medical resources. However, a study conducted in Israel by Gur et al. (2018) of 1,389 patients with schizophrenia, with follow-up for eight years, found that tertiary health care utilization was greater among patients with schizophrenia than among the general population.

A study conducted by Oud et al. (2010) in the Netherlands found that patients with psychotic disorders tended to have more frequent contact with their general practitioners (GPs), family doctors, including home visits, and telephone consultations. Additionally, they had a higher number of consultations overall. Patients aged 16 to 65 with psychosis and DM2, cardiovascular disease or COPD were assigned the same GP as other patients. Psychotic patients over the age of 65 had more frequent delirium. However, once these patients had been diagnosed, they were checked less frequently.

A study conducted in Australia (Spilsbury et al., 2018) showed there were more emergencies in a subgroup of patients with schizophrenia who died of cancer, asphyxiation, or intentional self-injury. Hospital admissions among those with schizophrenia were half those of patients without schizophrenia. However, these admissions increased by 50% when patients were treated in specialized palliative care, although patients with schizophrenia has less access to this type of care.

Hospital admissions

A study of medical-surgical discharges in the United States (Daumit et al., 2006) found that during their hospital stay, patients with schizophrenia have more complications than those admitted for the same reason without schizophrenia (such as more infections, respiratory insufficiency, deep vein thrombosis, and postoperative sepsis). These complications increase as these patients are at least twice as likely to be admitted to an intensive care unit (ICU) and to die

(Daumit et al., 2006). Similarly, hospital mortality in the ICU was 10% higher in schizophrenic patients in Taiwan, with an increased risk of acute organic dysfunction (Shen et al., 2011).

Likewise, average length of stay is higher in patients with schizophrenia. An increase of at least ten days and a minimum of $20,000 in 2001 (Daumit et al., 2006) has been estimated, together with a 70% greater likelihood of remaining above the 75 percentile (Bailey et al., 2018). Indeed, a hospital in Greece (Douzenis et al., 2012) discovered that there is a direct correlation between the length of stay of a patient and the severity of their comorbidities, the latter being the most significant factor in prolonging their stay.

DISCUSSION AND CONCLUSION

The main aim of this systematic review was to investigate the physical comorbidity of patients diagnosed with schizophrenia and the healthcare they received. The ultimate aim was to determine whether healthcare improvements in recent decades for the general population have positively impacted individuals diagnosed with schizophrenia.

The Impact of Physical Comorbidities on the Mortality of Patients with Schizophrenia

A crucial factor that could account for the increase in mortality in patients with schizophrenia is the extra medical care they receive compared to the general population (Moher et al., 2009). Patients with schizophrenia tend to receive palliative rather than curative treatment (Martens et al., 2009). Moreover, these patients are admitted for longer periods (placing them at a greater risk of infection) (Bauer-Staeb et al., 2017; Nielsen et al., 2016; Tokuda et al., 2008), yet have less access to early diagnosis (Brink et al., 2019; Heiberg et al., 2019; Laursen et al., 2014). We can therefore assume there is a lack of prevention and early intervention in these SMI patients globally that has persisted over time.

To improve the life expectancy of patients with schizophrenia, it is essential to create effective prevention plans to reduce the occurrence of physical illnesses in this vulnerable group, beginning with GPs. This task requires the involvement of both psychiatry and other medical specialties, with proper training, resources, and protocols in place, and strategies such as shared decision-making to ensure adherence to healthcare and medical protocols (Guadalajara et al., 2022).

Although the psychiatric care of patients with schizophrenia appears to have improved overall, as borne out by a 40% decrease in the number of suicides in this population (Tanskanen et al., 2018) between 1984 and 2014, the number of deaths due to physical causes such as cardiovascular disease and cancer has risen (Laursen et al., 2019; Nordentoft et al., 2021; Tanskanen et al., 2018).

Studies have shown that deinstitutionalization and liaison psychiatry have not significantly impacted mortality rates in patients with schizophrenia (D'Avanzo et al., 2003; Tokuda et al., 2008). To provide comprehensive care for these patients, it is essential to involve specialists from other areas of healthcare, particularly other physicians specializing in the comorbid illnesses detected.

Studies suggest that although the data are a matter for concern, individuals with schizophrenia are experiencing an improvement in longevity at a similar rate to the general population. However, a disparity remains as this population still has a life expectancy similar to that of the general population in 1988 (Laursen et al., 2019). One approach to reducing the metabolic impact of certain second-generation antipsychotics is to increase physical activity, which has shown promising results in various interventions (Gyllensten et al., 2020). Utilizing technology, such as mobile applications (mHealth apps), to improve lifestyle habits is an innovative, effective method worth exploring (Torous et al., 2017).

Physical Comorbidities with a Diagnosis of Schizophrenia

In regard to the principal physical comorbidities associated with this SMI diagnosis, our findings reveal a high prevalence of cardiovascular, respiratory and oncological diseases, significantly impacting the life expectancy of people with schizophrenia on every continent except Africa. The latest research indicates a rise in other illnesses (Laursen et al., 2014; Nordentoft et al., 2021).

Due to the characteristics of this psychiatric disorder, patients with schizophrenia are at a higher risk of contracting metabolic diseases, such as DM2, metabolic syndrome or cardiovascular diseases, which may be related to antipsychotic treatment, together with genetic and environmental factors (Bouza et al., 2010a; Foley et al., 2016; Korpela et al., 2020; Räsänen et al., 2003; Razzano et al., 2015; Tokuda et al., 2008). However indirectly, it has been found that these patients appear to use addictive substances associated with some of the physical comorbidities detected (such as cancer and SCD (Bradford et al., 2016; Chen et al., 2021; Kugathasan et al., 2019), the most harmful of which appears to be smoking nicotine or other substances.

A number of risk factors could therefore explain this increased risk: the tendency to lead a sedentary life (Vancampfort et al., 2017), treatment with atypical antipsychotics (Bernardo et al., 2021), the use of addictive substances (Bauer-Staeb et al., 2017; Kugathasan et al., 2019; Pankiewicz-Dulacz et al., 2019), difficulty understanding the disease itself (Oud et al., 2010), the absence of social support to access timely medical care, and the diagnosis, treatment or prevention of diseases (Laursen et al., 2011; 2014; Moher et al., 2009). Smart Screening could contribute to the early detection of physical comorbidities in patients and families if periodically provided in healthcare settings, as seen in initiatives in Mexico and Spain (Martínez-Nicolás et al., 2023a; 2023b).

The use of addictive substances (such as alcohol and tobacco), together with other unhealthy habits (such as a sedentary lifestyle and poor eating habits), could account for the increase in the incidence of these diseases (Correll, 2022). Tobacco use in patients with schizophrenia is estimated at between 49% and 80% (Hughes, 1993; Koskinen et al., 2009; Lasser et al., 2000). Conversely, alcohol abuse is estimated at around 20% (Contreras-Shannon et al., 2013), and a high BMI has been found in the profile of patients with schizophrenia and DM2. The development of atypical antipsychotics has enhanced the well-being of patients by reducing extra-pyramidal side effects. However, it has also led to an increase in metabolic-type side effects such as increased BMI and insulin resistance. Some antipsychotics have been found to elevate blood glucose levels and impair glucose tolerance, without involving intermediate mechanisms such as BMI (Stahl et al., 2009; Porras-Segovia et al., 2017). These effects could be attributed to the antagonism of MR cholinergic receptors, which could result in beta cell dysfunction (Poirier et al., 2002).

In addition, we discovered that patients with schizophrenia were receiving inadequate health care in comparison with the general population.

Healthcare utilization of Patients with Schizophrenia and Physical Comorbidities

The attitude of clinical professionals may be affected by the stigma of mental illness, such as patients' inability to use appropriate healthcare pathways, which in turn prevents them from adequately addressing their health issues (Bitter et al., 2017). Social stigma (also present in physicians), healthcare availability (community-based psychosocial interventions), and economic policies are required to ensure that patients with SMI benefit from the scientific advances and lifestyle changes that have increased the longevity of the general population (Lee et al., 2018).

Other factors related to services and providers that may hinder the treatment of medical pathology include financial barriers, and lack of time, poor integration into services, or a shortage of proper screening measures. For instance, although psychiatrists are usually the main healthcare providers for patients with schizophrenia, they are not sufficiently trained to detect or treat physical diseases (Räsänen et al., 2003). Likewise, the detection of health issues related to lifestyle factors, while easily measurable, is often overlooked in healthcare screenings. Furthermore, reference tests for critical physical parameters are not administered with the required frequency, and individuals with SMI face an array of challenges, including modifiable lifestyle factors, in addition to other medical factors (such as the side effects of psychotropic medications, and inadequate access to quality healthcare (DE Hert et al., 2011).

Limitations

This study has certain limitations, including the absence of quality verification for the research selected and the heterogeneity of the articles reviewed, although the process has been led by psychiatrists. The methodological decisions regarding the selection of papers with specific methodological designs also limited the quantitative analysis of the data provided, which is why a meta-analysis was ruled out. It is therefore not feasible to perform a quantitative synthesis of the results and generalize them. Furthermore, there were no significant findings with regard to specific variables related to genetics, moderate or severe mental health issues, or even environmental factors. This highlights the need for further analysis of comorbidities that could be limiting the healthcare access and life expectancy of this population group.

Strengths

Nonetheless, the study has covered a broad spectrum, with the methodological rigor corresponding to the most recent discoveries. Despite these limitations, we were able to achieve our main aim of exploring key research on physical comorbidities in patients diagnosed with schizophrenia to determine their morbidity, mortality, and healthcare, in addition to presenting our findings in a clear, concise manner. Future studies could replicate the strategy by incorporating quantitative and meta-analytic approaches. They could also investigate psychosocial variables together with other specific variables to determine how healthcare actions could benefit this vulnerable population group and their families.

Conclusion

Patients with schizophrenia have a higher mortality rate than the general population due to cardiovascular, oncological, respiratory, diabetes, and infectious diseases, all of which are underdiagnosed and undertreated. Uneven medical care for these patients appears to be widespread across time and space. To minimize the effects of physical illness on this group of patients, it is essential to implement effective prevention and intervention strategies and programs. It is also important to provide training for clinicians across all levels of care, from primary to tertiary. Enhancing patient survival rates and improving their quality of life requires examining the correlation between psychosocial and socio-economic factors, substance addiction, antipsychotic drug use, healthcare access, and lifestyle choices in future research.

Funding

The present research study has not received specific support from public sector, commercial or non-profit agencies.

Conflicts of interest

None.

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5. La segunda página debe contener los resúmenes del trabajo presentado en inglés y español. *Extensión máxima: 250 palabras.*
   - ***Artículos originales y Revisiones sistemáticas.*** Los resúmenes deben estar conformados por: Introducción, Objetivo, Método, Resultados y Discusión y conclusión.
   - ***Casos Clínicos.*** Los resúmenes deben estar conformados por: Introducción, Objetivo, Principales hallazgos, Intervenciones y resultados y Discusión y conclusión.
   - ***Palabras clave.*** Al final de cada resumen se incluirá un mínimo de cuatro y un máximo de seis palabras clave, separadas por comas y en minúsculas. Las palabras clave deben ser las mismas en inglés y en español. Éstas suelen emplearse para la indexación de los artículos, por lo cual tres de ellas deben encontrarse en el MeSH (*Medical Subject Headings*) que se puede consultar en: *http://www.nlm.nih.gov/mesh/MBrowser.html*.
6. A partir de la tercera página comienza el cuerpo del manuscrito, el cual deberá conservar la estructura señalada en el resumen.
   - ***Introducción (o Antecedentes en el caso de las Revisiones narrativas).*** El último párrafo de este apartado debe incluir de forma clara los objetivos del trabajo y, si se cree necesario, las hipótesis.
   - ***Método.*** Es preciso que cuente con las siguientes secciones:
     - Diseño del estudio
     - Participantes/descripción de la muestra
     - Sedes
     - Mediciones
     - Procedimientos
     - Análisis estadísticos
     - Lineamientos éticos.

   > *Nota*: En caso de los artículos de revisión y casos clínicos, estas secciones pueden ser modificadas de acuerdo con la guía PRISMA (revisiones sistemáticas o la guía CASE REPORT (casos clínicos).

   - **Resultados.** Se presentarán en una secuencia lógica dentro del texto. Pueden apoyarse con tablas, gráficas y figuras.
   - **Discusión y conclusión.** En esta sección se destacarán los aspectos nuevos e importantes del estudio y las conclusiones que derivan del mismo, así como las posibles implicaciones de sus hallazgos y sus limitaciones.
7. Después del apartado de Discusión y conclusión, es preciso agregar las declaraciones de los autores en el siguiente orden:
   - ***Financiamiento.*** En este apartado se debe declarar si el estudio o la preparación del manuscrito recibió algún tipo de financiamiento, indicando el nombre de la entidad que proporcionó los fondos.

     Ejemplo:

     Este estudio fue financiado en parte por el CONSEJO NACIONAL DE CIENCIA Y TECNOLOGÍA. (No. XXXXXXX).

     Si no se recibió ningún apoyo financiero, los autores deben declararlo también.

     Ejemplo:

     Ninguno.
   - ***Conflicto de intereses.*** En esta sección, los autores deberán declarar si tienen conflictos de intereses relacionados con su actividad científica. Tener un conflicto de interés no supone necesariamente un impedimento para la publicación del manuscrito. Si no existe conflicto de interés se debe insertar la siguiente frase: *“Los autores declaran no tener algún conflicto de intereses”*.
   - ***Agradecimientos.*** Cuando se considere necesario, se mencionarán después de las declaraciones anteriores los agradecimientos a personas, centros o entidades que hayan colaborado o apoyado en la investigación.
8. **Referencias.** Las referencias se colocan después de las declaraciones del autor (Financiamiento, Conflicto de intereses y Agradecimientos), y ***deben seguir exclusivamente las normas de publicación de la American Psychological Association (APA), en su última edición*** (https://normas-apa.org).
9. **Tablas y figuras.** Salud Mental establece un máximo de cinco elementos gráficos en total. ***El estándar solicitado para la elaboración de tablas y figuras es el de la American Psychological Association (APA), última edición*** (https://normas-apa.org)***.*** Éstas se colocarán al finaldel manuscrito después de las referencias:
   - Las tablas deben contener título y, en la parte inferior, una nota con el desglose de las siglas.
   - Las figuras deben enviarse en un formato de alta resolución (mínimo 300 dpi).
   - Los títulos de las tablas y los pies de las figuras deben ser claros, breves y llevar siempre el número correspondiente que los identifique. Dentro del texto, el autor debe indicar entre paréntesis y con mayúsculas en qué parte del texto sugiere insertar los elementos gráficos.

     Ejemplo:

     Se cambiaron las definiciones de algunos patrones conductuales (Tabla 3) de manera que fueran más comprensibles en el idioma español y se redefinieron las categorías que agrupan dichos patrones con base en la literatura especializada. (INSERTAR AQUÍ TABLA 3)

ARCHIVOS COMPLEMENTARIOS

1. ***Carta de autorización de uso de la obra.*** Debe estar firmada por todos los autores y enviarse en formato PDF que se puede descargar en http://revistasaludmental.mx/public/Carta-autorizacion-para-publicacion.pdf.
2. ***Carta de presentación.*** El autor debe exponer las fortalezas de su aportación científica, resaltando el alcan-

ce, la originalidad y la importancia de su contribución al campo de la salud mental. *Es de carácter obligatorio mencionar a tres revisores nacionales o internacionales en el campo de conocimiento del manuscrito sometido, favor de indicar el nombre completo y correo electrónico de cada uno de los revisores.* Debe cargarse en formato PDF.

ÉNFASIS Y PUNTUACIÓN

1. Es importante que los manuscritos eviten en general las notas a pie de página, aunque se pueden considerar si son claramente necesarias.
2. Las cursivas deben utilizarse para:
   - Destacar palabras extranjeras.
   - Enfatizar expresiones populares.
   - Mencionar títulos de libros, documentos ya publicados y publicaciones periódicas.
3. Las cursivas pueden emplearse para:
   - Resaltar términos significativos o importantes cuando se mencionan por primera vez.
   - Destacar una palabra u oración dentro de una cita.
4. Las comillas dobles deben usarse solamente para:
   - Citar párrafos de otros autores dentro del texto.
   - Citar textualmente fragmentos del discurso de los sujetos de estudio.
5. Evite el uso de paréntesis doble, es decir, un paréntesis dentro de otro. En su lugar utilice corchetes.
6. Puede emplearse guiones largos para indicar oraciones parentéticas.
7. Deben utilizarse de forma correcta todos los signos de puntuación. Por ejemplo, si emplea signos de interrogación en un texto en español, deben colocarse los de apertura y cierre correspondientes; se procede de igual manera con las comillas.

FÓRMULAS MATEMÁTICAS Y ESTADÍSTICAS

Para presentar los resultados se deben considerar las siguientes indicaciones:

1. Escribir con letra las cifras de cero a nueve y con números las cifras de 10 en adelante.
2. Utilizar números cuando se trate de fechas, muestras, etcétera.
3. Incluir en los datos estadísticos los intervalos de confianza.
4. Los símbolos estadísticos se escriben en cursivas (por ejemplo, *M, SD, n, p)*.
5. Expresar la probabilidad exacta con dos o tres decimales (por ejemplo, $p = .04$; $p = .002$) sin el cero adelante del punto decimal. En caso de ser menor a .001 indicarlo con un < .001.
6. Dejar un espacio antes y después de cada signo (a + b = c en lugar de a+b=c).
7. Emplear puntos en lugar de comas para indicar decimales.

VERIFIQUE LO SIGUIENTE ANTES DE SOMETER SU MANUSCRITO

Antes de enviar su manuscrito, cerciórese de adjuntar la documentación solicitada. A los autores, se les devolverá aquellos envíos que no cumplan con los lineamientos editoriales.

1. Manuscrito en formato en WORD.
2. Carta de presentación en formato PDF.
3. Carta de autorización de uso de obra en formato PDF.

GUIDELINES FOR AUTHORS

Salud Mental publishes original articles on psychiatry, psychology, neurosciences and other related fields in the following formats:

1. **Editorials**
   Written at invitation of the Director Editor, editorials express authoritative opinions on specific topics of interest to the scientific community and the area of mental health. They are designed to foster debate and promote new lines of research. *Maximum extension: 1000 words*.
2. **Original articles (peer-reviewed section)**
   These articles present research results unpublished in other journals, and can be written using the following methodologies:
   - *Quantitative methodology.* This methodology includes primary and secondary results from cross-sectional studies, clinical trials, cases and controls, cohorts, and quasi-experimental studies. *Maximum extension: 3500 words*.

     Depending on the type of study, manuscripts should adhere to the following guidelines:
     - Randomized clinical trials should adhere to the *CONSORT guidelines* (http://www.consort-statement.org).
     - Studies with non-experimental designs should adhere to the *TREND guidelines* (http://www.trend-statement.org).
     - Cross-sectional, cohort, and case-control studies should adhere to the *STROBE guidelines* (http://www.strobe-statement.org).
   - *Qualitative methodology.* This methodology includes focus group reports, in-depth interviews, semantic networks, and content analysis. *Maximum extension: 5000 words*.

     Articles using this type of methodology should comply with the *COREQ guidelines* (https://academic.oup.com/intqhc/article/19/6/349/1791966/Consolidated-criteria-for-reporting-qualitative).
3. **Review articles (peer-reviewed section)**
   - **Systematic reviews.** These reviews should preferably include a meta-analysis. *Maximum extension: 4000 words*.
4. **Case reports**
   They include reports on the effects of a diagnostic or therapeutic method that is useful or relevant in the medical, academic, or scientific field. *Maximum length: 2000 words.*
   These should comply with the *CASE REPORT guidelines* (https://www.care-statement.org/checklist).

Note. The word count for each of these sections excludes the title, abstracts, and keywords, as well as the funding, conflicts of interest and acknowledgments sections. Words included in tables, figures and references are not considered either.

LANGUAGES

Salud Mental receives and publishes only manuscripts in English.

ETHICAL ASPECTS IN PUBLISHING

See Ethical Guidelines for the journal at www.revistasaludmental.mx

AUTHORSHIP

The number of authors will depend on the type of manuscript submitted. The maximum number of authors for original or review articles is eight. Only in the case of multicenter studies will the maximum number of authors be increased to twelve, provided this is justified by the scope of the study.

In the event of collective authorship, the name of the editors or those responsible for the article will be included followed by "and the group..." when all members of the group consider themselves co-authors of the work. If the name of the group is to be included, even if not all its members are considered co-authors, the authors responsible will be mentioned followed by "on behalf of the ...group or "by the...group." In any case, the names and institutions to which members of the group are affiliated should be included in an appendix at the end of the manuscript.

EDITORIAL GUIDELINES

It is of the utmost importance for authors to consider the following before sending their manuscript:

1. Manuscripts should be written clearly and concisely, with no spelling or grammatical errors.
2. The text should be written in Word format, Times New Roman font, size 12, with double-spacing and 2.5 cm margins on letter size sheets.
3. Pages should be numbered consecutively, beginning with the title page, with the number written in the upper right corner.
4. The first page (showing the title) should contain the following sections in the order mentioned here:
   - *Title of article in Spanish and English*. The title should be descriptive and indicate the main results of the study. *Maximum extension: 25 words.*
   - *Short title in Spanish and English*. *Maximum extension: 6 words.*
   - *Full name of author and co-authors*. The authors must be listed and then an Arabic number must be placed in superscript, indicating the institution to which they are affiliated.
   - *Author ORCID number.* It is a requirement that all authors have their ORCID identification number, which can be obtained at https://orcid.org/register
   - *Author affiliation*. This should be indicated with Arabic numerals and in superscript. Affiliations should be placed immediately after authors' names (not as footnotes). Affiliations should specify the department, area, institution, city, and country of each author. It is not necessary to indicate the postal address. Institutions must be written in their original language, without translation. If the authors add acronyms, these must be included in the official name. No positions or degrees of the authors (such as doctor, resident, or researcher) should be written.

   . For example:

     Juan José García-Urbina,[1] Héctor Valentín Esquivias Zavala[2]

     [1] Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Ciudad de México, México.
     [2] Departamento de Publicaciones, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Ciudad de México, México.

- The **“Correspondence”** section should be placed at the end of the first page, indicating the corresponding author with their postal address, phone and email address. This will be the only author Salud Mental will contact during the process.

  For example:

  Correspondence:
  Juan José García-Urbina
  Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz.
  Calz. México-Xochimilco 101, San Lorenzo Huipulco, Tlalpan, 14370, Ciudad de México, México.
  Phone: 55 4152-3624
  E-mail: jurb@imp.edu.mx

5. The second page should contain abstracts of the article in English and Spanish. Each abstract should contain a maximum of 250 words.
   - **Abstracts of original articles and systematic reviews** should comprise the following: Introduction, Objective, Method, Results, and Discussion and Conclusion.
   - **Abstracts of Clinical Cases** should comprise Introduction, Objective, Main findings, Interventions, Results, and Discussion and Conclusion.
   - **Keywords.** At the end of each abstract, a minimum of four and a maximum of six keywords should be included, separated by commas and in lower case. Keywords must be the same in English and Spanish. These are used for indexing articles, which is why three of them must be found in the *MeSH* (*Medical Subject Headings*) (http://www.nlm.nih.gov/mesh/MBrowser.html).
6. The body of the manuscript begins on the third page, which should follow the structure indicated in the abstract:
   - **Introduction (or Background for Narrative Reviews)**. The last paragraph of this section should clearly include the objectives of the review and, if necessary, the hypotheses.
   - **Method.** This should contain the following sections:
     - Study design
     - Subjects/sample description
     - Sites
     - Measurements
     - Procedure
     - Statistical analysis
     - Ethical considerations (See ethical guidelines for publication. Add link)

       In the case of review articles and clinical cases, these sections may be modified in keeping with the PRISMA guideline (systematic reviews) or the CASE REPORT guideline (clinical cases).
   - **Results.** These should be presented in a logical sequence within the text. They can be supported with tables, graphs, and figures.
   - **Discussion and Conclusion**. This section will highlight new and relevant aspects of the study and the conclusions derived from it, as well as the possible implications of its findings and its limitations.
7. After the Discussion and Conclusion section, author statements should be added in the following order:
   - **Funding**. In this section, authors should declare whether the study or the preparation of the manuscript received any type of funding, indicating the name of the entity that provided the funds.

     For example:

     This study was partially funded by CONSEJO NACIONAL DE CIENCIA Y TECNOLOGÍA (No. XXXXXXX).

     If no financial support was received, authors must state it was well.

     For example:

     None.
   - **Conflict of interest.** In this section, authors must declare whether they have conflicts of interest related to their scientific activity. Having a conflict of interest will not necessarily prevent publication of the manuscript. If there is no conflict of interest, the following phrase must be inserted: “The authors declare that they have no conflicts of interest.”
   - **Acknowledgments**. If deemed necessary, acknowledgment of the people, centers or entities that have collaborated or supported the research will be mentioned after the previous statements.
8. **References.** Are placed after the authors’ declarations (Funding, Conflicts of interest, and Acknowledgements), and must adhere to the ***Publication Guidelines of the American Psychological Association (APA), last edition*** (https://normas-apa.org).
9. **Tables and figures.** *Salud Mental* establishes a maximum total of five graphic elements. The standard requested for tables and figures adheres to the ***Guidelines of the American Psychological Association (APA), last edition*** (https://normas-apa.org). These will be placed in the same document as the manuscript after the references.
   - Tables must contain a title and a note with an explanation of the acronyms used at the bottom.
   - Figures must be submitted in a high resolution format (minimum image size 300 dpi).
   - Titles of the tables and figure captions must be clear, brief, and always have an identifying number. Within the text, the author must indicate in parentheses and capital letters where the graphic elements should be inserted.

     For example:

     The definition of some behavioral patterns was changed (Table 3) so that they were more comprehensible in Spanish and the categories that group such patterns were redefined based on specialized literature.
     (INSERT TABLE 3 HERE)

COMPLEMENTARY FILES

1. **Authorization letter for Publication**. This should be signed by all the authors and submitted in PDF format. Download the form at http://revistasaludmental.mx/public/Authorization-letter-for-publication.pdf.
2. **Cover letter**. The author should describe the strengths of their scientific contribution, highlighting the scope, originality, and importance of their contribution to the field of mental health. *It is mandatory to mention three national or international reviewers in the field of knowledge of the submitted manuscript, please indicate the full name and email address of each of the reviewers.* This must be uploaded in PDF.

EMPHASIS AND PUNCTUATION

1. Manuscripts should generally avoid footnotes, although they may be considered if essential.
2. Italics should be used to:
    - Highlight foreign words
    - Emphasize popular expressions
    - Mention titles of books, published documents and periodicals
3. Italics can be used to:
    - Highlight significant or important terms when they are first mentioned
    - Highlight a word or sentence within a quote
4. Double quotes should only be used for:
    - Citing paragraphs from other authors within the text
    - Quoting verbatim fragments of the study subjects' words
5. Avoid using double parentheses, in other words, one parenthesis inside another, and use square brackets instead.
6. Long dashes can be used to indicate parenthetical sentences.
7. All punctuation marks must be used correctly. For example, if question marks are used in a Spanish text, the corresponding opening and closing signs must be included together with quotation marks.

MATHEMATICAL AND STATISTICAL FORMULAE

The following points must be considered when results are presented:

1. Write figures from zero to nine in letters and use numbers for figures from 10 onwards.
2. Use numbers with dates and samples, etc.
3. Include confidence intervals in statistical data.
4. Statistical symbols are written in italics (M, SD).
5. Express exact probability to two or three decimal places (for example, $p = 0.04$; $p = 0.002$), *with no zero in front of the decimal point.* If it is less than .001, it should be written as follows < 0.001.
6. Leave a space before and after each sign ($a + b = c$ instead of $a+b=c$).
7. Use periods instead of commas to indicate decimals.

PLEASE CHECK THE FOLLOWING BEFORE SUBMITTING YOUR MANUSCRIPT

Before submitting your manuscript, be sure to attach the requested documentation. Submissions failing to comply with the editorial guidelines will be returned to authors.

1. Manuscript in WORD format
2. Cover letter in PDF format
3. Letter authorizing the use of the article