ISSN 0185-3325
e-ISSN 0186-761X

salud mental

VOLUME 49 • ISSUE 2 • MARCH - APRIL 2026

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Instituto Nacional de Psiquiatría
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Directorio

Salud Mental, Año 49, No. 2, Marzo-Abril 2026, 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: https://revistasaludmental.gob.mx, correo electrónico: revistasaludmental@gmail.com. Editor responsable: Dr. Héctor Pérez-Rincón García. 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 Secretaría de Gobernación número 17472. Se terminó de imprimir en Editorial Cigome S.A. de C.V. Priv. de Oyamel S/N, Col. El Refugio, C.P. 50255, Toluca Estado de México. este número se terminó de imprimir en mayo del 2026, con un tiraje de 200 ejemplares. Distribuido por José Leobardo Romero Ibarra, Paseo de los Sauces 117, Casa Blanca, Metepec, Estado de México.

Salud Mental

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ISSN 0185-3325

salud mental

Volume 49 Issue 2 March-April 2026

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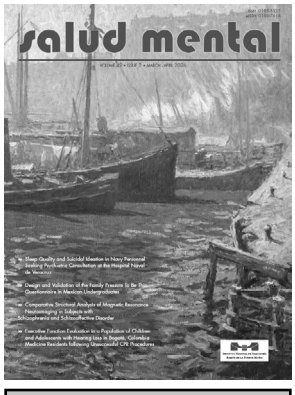

On the cover
Puerto de Amsterdam (Port of Amsterdam).
Late 19th century - Early 20th century.

JanHendrikWolter1873-1952
Oil painting.

Museo del Prado, Not on display.

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EDITORIAL
Volume 49, Issue 2, March-April 2026
10.17711/SM.0185-3325.2026.08

Psychiatry in the Contemporary World

Gerhard Heinze-Martin,[1] César Amaury Sánchez-Aguilar[1]

[1] Dirección de Enseñanza, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Ciudad de México, México.

Correspondence:
Gerhard Heinze-Martin
Dirección de Enseñanza, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz.
Calz. México-Xochimilco 101, San Lorenzo Huipulco, Tlalpan, 14370, Ciudad de México, México.
Phone: +52 (55) 4161-2489
Email: gheinze@inprf.gob.mx

Citation:
Heinze-Martin, G., & Sánchez-Aguilar, C. A. (2026). Psychiatry in the Contemporary World. *Salud Mental*, *49*(2), 49–51 https://doi.org/10.17711/SM.0185-3325.2026.08

INTRODUCTION

One of the fundamental needs of human beings, according to Erich Fromm—whose view we share—is planning the future (Romanetto, 2021). This priority, a universal necessity in an increasingly globalized world, bears directly on medicine in general and psychiatry in particular.

As psychiatrists, when we speak of planning, we cannot ignore the complex mind–brain dyad underlying every advance in psychiatry and compelling us to deepen our knowledge. Not everything we consider mental is therefore cerebral, nor can cerebral be said to be synonymous with mental. Nevertheless, we recognize the close interconnection between mind and brain, shaped by social, psychological, and biological factors that determine behavior—whether adaptive or maladaptive.

The human brain stands at the crossroads between the organism and experience. Its physiology and relationship with the mind can only be clarified if psychiatry works in concert with other disciplines, drawing on biological foundations while embracing social determinants. The complex interplay between what is mental and what is cerebral must be considered when planning and advancing psychiatric knowledge, since these terms are intimately related but not interchangeable.

Mental health has become a priority for global public health. Although the development of psychiatry as a humanistic medical discipline has achieved significant progress, much work remains to be done to ensure that individuals with mental disorders receive timely, effective care. Mental health legislation has lagged in many countries, and the rapid emergence of digital technologies, including artificial intelligence, poses new regulatory and ethical challenges for our field.

It is hardly surprising that the COVID-19 pandemic had profound psychosocial consequences. Health professionals worked with a daily reminder of their own vulnerability to illness and students were forced to adapt abruptly to virtual education, often at the cost of sociability and increased uncertainty. Workers faced economic instability, individuals in poverty experienced declining living standards while those with mental disorders frequently endured intense social isolation. Early diagnosis and timely treatment remain essential—not only to reduce human suffering but also to mitigate future financial and social costs.

Comorbidity of mental and physical disorders

The fragmentation of medicine into specialties and subspecialties—including psychiatry—has often been regarded as an obstacle to comprehensive care. Recent research suggests that depressive, anxiety, posttraumatic stress, and sleep disorders are associated with an increased risk of acute coronary syndrome. Posttraumatic stress and sleep disorders emerge as significant risk factors for acute coronary syndrome, indicating the potential impact of sleep quality on cardiovascular outcomes. Future research addressing these limitations could provide more nuanced insights into the association between mental health and acute coronary syndrome. (Gupta, 2026). This insight is particularly relevant given the growing comorbidity between mental and physical disorders.

Life expectancy among individuals with noncommunicable diseases has increased, heightening the risk of coexistence between psychiatric and somatic illnesses. Although treatments for severe mental disorders are often effective, they do not always lead to complete, sustained recovery. Psychiatrists must therefore strive to improve both the mental and physical health of their patients, reducing residual symptoms through optimal, integrative therapeutic strategies.

Psychiatry must also address challenges within the diagnostic and therapeutic relationship. Communication skills and cultural competence are indispensable to strengthening the physician-patient bond and gradually reducing stigma among both healthcare professionals and the general population.

Stigma toward people with mental illness

Eliminating discrimination against individuals with mental disorders remains a central challenge. The Lancet Commission on ending stigma and discrimination in mental health underscores the urgency of dismantling the structural and social barriers hindering recovery (Thornicroft, 2022). Stigma not only delays care but also exacerbates the suffering of patients and their families.

Although anti-stigma campaigns have been implemented in various countries, they have only been partially successful, particularly among non-psychiatric health professionals. Ending discrimination requires sustained educational efforts, social reform, and the active participation of individuals with lived experience.

Stress and illness

Chronic stress is known to produce harmful effects on both mind and body. Persistent emotional overload weakens immune function, contributes to atherosclerotic processes in the cardiovascular system, and increases the risk of myocardial infarction, diabetes, anxiety disorders, and depression. When stress becomes chronic, consistently high cortisol levels can damage multiple organs, leading to a state of enduring psychological distress.

Major depression frequently represents the final common pathway of prolonged stress, and its response to treatment may be delayed despite appropriate therapeutic strategies. Strengthening resilience—through psychotherapy, meditation, spirituality, and social support—can foster meaning, confidence, and inner peace. Positive emotions and adaptive coping mechanisms can mitigate disease severity, whereas persistent negative emotional states can aggravate it.

The COVID-19 pandemic offers a paradigmatic example. Whereas some individuals demonstrated resilience, others developed severe stress reactions requiring medical and psychological intervention. Globally, depressive and anxiety disorders rose markedly during 2020, underscoring the vulnerability of mental health systems already weakened by insufficient funding.

The dilemma of whether to continue antipsychotic treatment in schizophrenia

Relapse prevention in schizophrenia remains a critical issue for contemporary psychiatry. Persistent symptoms, functional disability, suicide risk, diminished treatment response after relapse, and increased healthcare utilization all underscore the importance of maintenance strategies.

Large register-based studies have demonstrated that the risk of relapse following the discontinuation of antipsychotics does not significantly diminish during the early years of illness and that long-term treatment is associated with increased survival (Tiihonen, 2018). Conversely, randomized clinical trials—such as those conducted by the HAMLETT-OPHELIA Consortium—have suggested that early dose reduction or discontinuation may confer functional benefits in subsequent years despite an increased short-term risk of relapse (Sommer, 2026).

Consensus generally favors maintenance therapy, although not all psychoses are equivalent, and personalized medicine must guide clinical decisions. Ongoing evaluation is essential to identifying patients who may safely reduce or discontinue medication.

Genetics and schizophrenia

Advances in genetics have shed new light on the biological underpinnings of schizophrenia. A large-scale meta-analysis conducted by the Schizophrenia Exome Meta-Analysis Consortium (SCHEMA) identified ultra-rare coding variants in ten genes that substantially increase risk (Singh, 2022). These findings highlight genes expressed predominantly in central nervous system neurons, many of which are involved in synaptic formation and function, including components of the glutamatergic system.

Although these variants account for a minority of cases, they offer valuable insight into mechanistic pathways —such as NMDA receptor hypofunction—and may guide the development of novel therapeutic interventions. Nevertheless, these biological findings must be incorporated into a broader biopsychosocial framework.

Psychedelics and therapeutic promise

In recent years, renewed scientific interest has emerged regarding the therapeutic potential of psychedelics, including psilocybin-containing mushrooms. Although early clinical trials suggest possible benefits for certain refractory conditions, these substances are not “miracle cures.” Their effects may be profound but are also context-dependent and

not without risk. Rigorous research is required to determine patient profiles, safety parameters, and long-term outcomes.

Precision psychiatry and pharmacogenomics

Evidence-based psychiatry has achieved significant progress, yet predictors remain insufficiently robust to guarantee fully precise treatment selection. Future advances will likely emerge from integrating experimental trials with real-world observational studies.

Pharmacogenomics offers a promising tool for personalized medicine, as genetic, epigenetic, and environmental factors influence drug metabolism, receptor sensitivity, efficacy, and safety. Despite its potential, cost-effectiveness and non-genetic variability remain limiting factors. Continued research is necessary before pharmacogenetic testing can be routinely incorporated into clinical decision-making.

Dementia syndrome

Another major challenge for contemporary neuropsychiatry is dementia—its risk factors, prevention, and management. Once established, dementia is considered impossible to reverse. Preventive strategies are therefore of paramount importance: addressing obesity, depression, sedentary lifestyle, social isolation, substance use, diabetes, hypertension, and hypercholesterolemia.

The 2024 report of the Lancet Standing Commission on dementia prevention, intervention, and care states that a substantial proportion of dementia cases could be prevented by modifying cardiovascular and socioeconomic risk factors (Livingston, 2024). Early identification and risk reduction are therefore critical priorities.

The future of psychiatry

What lies ahead for psychiatry and psychotherapy? The future will undoubtedly bring diverse responses shaped by social change, evolving schools of psychopathology, and patient needs. Psychiatry must not merely seek to survive but to recover mental health, with a harmonious relationship between the individual and society at its center.

Multidisciplinary collaboration will remain essential. Biological variability and social interconnectedness profoundly influence mental and physical equilibrium. Research into preventive and therapeutic innovations continues to expand, with increasing emphasis on integrated, biopsychosocial care models.

CONCLUSION

Individuals with mental disorders are integral members of society, yet stigmatization and discrimination continue to hinder timely intervention and recovery. It is our duty to launch broad educational campaigns, promote ethical and social justice, and advance biological, psychological, and social knowledge in psychiatry.

The brain is a complex organ, and although pharmacological and psychotherapeutic tools have enabled us to treat certain abnormalities, brain health is influenced by processes occurring throughout the organism and its environment. Psychiatry therefore has both a scientific and a humanistic responsibility: to integrate knowledge, reduce suffering, and foster resilience in an ever-changing world.

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ORIGINAL ARTICLE
Volume 49, Issue 2, March-April 2026
10.17711/SM.0185-3325.2026.09

Sleep Quality and Suicidal Ideation in Navy Personnel Seeking Psychiatric Consultation at the Hospital Naval de Veracruz

René Ocampo-Ortega,[1] Guadalupe Garduza-Cruz[2]

[1] Servicio de Salud Mental, Hospital Naval de Especialidades de Veracruz, Secretaría de Marina-Armada de México.
[2] Servicio de Urgencias, Hospital General Regional 1, Instituto Mexicano del Seguro Social.

Correspondence:
René Ocampo-Ortega
Hospital Naval de Especialidades de Veracruz. General Figueroa 151, Col. Centro, 91700, Veracruz, México.
Phone: +52 (22) 9932-6479 ext 290
Email: drocort@gmail.com

Received: 27 September 2024
Accepted: 28 February 2025

Citation:
Ocampo-Ortega, R., & Garduza-Cruz, G. (2026). Sleep Quality and Suicidal Ideation in Navy Personnel Seeking Psychiatric Consultation at the Hospital Naval de Veracruz. *Salud Mental, 49*(2), 53–60. https://doi.org/10.17711/SM.0185-3325.2026.09

ABSTRACT

Introduction. Very short sleep duration every night leads to a nearly threefold increase in the risk of death by suicide. **Objective.** To determine whether there is an association between sleep quality and suicidal ideation in Mexican naval personnel. **Method.** Transversal analytical study. The research was undertaken at the Hospital Naval de Especialidades de Veracruz, where a questionnaire on sociodemographic variables, the Pittsburgh Sleep Quality Index and a psychiatric interview including questions on suicidal risk were administered to naval personnel attending an outpatient psychiatry clinic. **Results.** The observed sample comprised 216 participants. In the logistic regression analysis, certain factors were associated with suicidal ideation regardless of age, sex and presentation of depressive disorders, including interrupted sleep (*OR* = 1.97, *p* = .042), snoring (*OR* = 2.48, *p* = .036), interrupted sleep due to cold (*OR* = 3.59, *p* = .002) or heat (*OR* = 2.88, *p* = .007), nightmares (*OR* = 3.69, *p* = .002), pain (*OR* = 3.35, *p* = .002) and individual perception of sleep quality (*OR* = 2.13, *p* = .016). **Discussion and conclusion.** Sleep interruption due to environmental variables, nightmares, snoring and pain in the naval military population may be an independent factor for suicidal ideation. However, studies with a larger sample not restricted to the clinical population are required.

Keywords: Sleep quality, suicidal ideation, suicide, military, risk factors, mental disorders.

RESUMEN

Introducción. En la literatura científica se ha observado que la duración corta de sueño se asocia a un riesgo aproximadamente tres veces mayor de muerte por suicidio. **Objetivo.** Determinar si existe asociación entre la calidad del sueño y la ideación suicida en militares navales mexicanos. **Método.** Estudio analítico transversal. La investigación se llevó a cabo en el Hospital Naval de Especialidades de Veracruz, donde se aplicó un cuestionario de variables sociodemográficas, el Índice de Calidad del Sueño de Pittsburgh y una entrevista psiquiátrica que incluyó preguntas sobre riesgo suicida al personal naval que acudió a la consulta externa de psiquiatría. **Resultados.** La muestra observada fue de 216 participantes. En el análisis de regresión logística que incluyó a las variables edad, sexo y depresión, la interrupción del sueño (*OR* = 1.97, *p* = .042), los ronquidos (*OR* = 2.48, *p* = .036), la interrupción del sueño por frío (*OR* = 3.59, *p* = .002) o calor (*OR* = 2.88, *p* = .007), las pesadillas (*OR* = 3.69, *p* = .002), el dolor (*OR* = 3.35, *p* = .002) y la percepción individual de la calidad individual del sueño (*OR* = 2.13, *p* = .016) se asociaron con la presentación de ideación suicida. **Discusión y conclusión.** La interrupción del sueño debido a variables ambientales, pesadillas, ronquidos y dolor en la población militar naval puede ser un factor independiente para la ideación suicida.

Palabras clave: Calidad del sueño, ideación suicida, suicidio, militar, factores de riesgo, trastornos mentales.

INTRODUCTION

Suicide is a deliberate act leading to death, constituting one of the main causes of preventable mortality (World Health Organization [WHO], 2024). Every year it accounts for one million deaths worldwide, affecting both civilian and military populations, with military suicide rates sometimes surpassing those due to accidents or combat (Kuehn, 2009; Olfson et al., 2017; Nock et al., 2013; Naifeh et al., 2019).

Although U.S. military personnel historically had lower suicide rates than civilians, since 2008, these rates have exceeded those of the general population (Kuehn, 2009; Nock et al., 2013). A systematic review of 1,278,837 active-duty service members found an 11% prevalence of suicidal ideation (95% CI 10-13%) and an 11% prevalence of suicide attempts (95% CI 9-13%) (Moradi et al., 2021). The estimated suicide mortality rate in this group is 18.5 per 100,000 person-years, making it the second leading cause of death (Nock et al., 2013).

In Mexico, there is a dearth of research on military suicide risk. A study of 246 Mexican naval personnel at a mental health facility reported suicidal ideation in 24.39% and suicide attempts in 9.76 % in the past year. Risk factors included lower military rank, a family history of suicide, and depressive and personality disorders. Suicide attempts were more common among young, single personnel with fewer than four years of service (Ocampo-Ortega & Portillo-Wong, 2020).

Military personnel face unique stressors that increase their risk of sleep disorders, including irregular shifts, deployment stress, and frequent relocation (Taylor et al., 2016). Sleep disturbances are widespread among this population, with 48.6% experiencing poor sleep quality and 11% having a diagnosed sleep disorder, primarily insomnia and obstructive sleep apnea (Capaldi et al., 2019).

Insufficient sleep is linked to post-traumatic stress disorder, depression, anxiety, and traumatic brain injury (Suh et al., 2013; Mysliwiec et al., 2013). It is also a recognized independent risk factor for suicide (Pigeon et al., 2012; Ribeiro et al., 2012; Bernert et al., 2015; Woznica et al., 2015; Vargas et al., 2020). However, some researchers argue that suicide risk is secondary to depressive disorders, as insomnia is a symptom of depression (McCall & Black, 2013; Winsper & Tang, 2014).

Although the neurobiological mechanisms linking sleep deprivation to cognitive dysfunction are not yet fully understood, evidence suggests that sleep loss impairs prefrontal cortex function, affecting cognitive tasks dependent on this region (Demos et al., 2016). Since the prefrontal cortex regulates higher-order cognitive functions (Lowe, Safati & Hall, 2017), suboptimal activity during sleep restriction could explain observed deficits (Jones & Harrison, 2001).

This study seeks to examine the association between Pittsburgh Sleep Quality Index variables, depression, and suicidal ideation in the past month among Mexican naval personnel evaluated at the psychiatry service of the Hospital Naval de Especialidades de Veracruz (HOSNAVESVER).

METHOD

Study design

This observational, analytical, cross-sectional study was conducted at HOSNAVESVER between April 2020 and November 2021.

Participants

A non-probability sample of military naval personnel referred for psychiatric evaluation by their superiors participated in the study. Retired military personnel, military personnel who had been evaluated by another psychiatric specialist or had received specific treatment for a sleep disorder in the past month were excluded from the study. Military personnel with a diagnosis of schizophrenia, severe bipolar disorder (mania with psychotic symptoms), cognitive impairment due to any cause and military personnel with a recent history of severe head trauma were also excluded. During the study period, 275 military personnel underwent psychiatric evaluation, 59 of which (21.45 %) did not agree to participate in the study. No significant differences were observed in the variables of military personnel who did or did not agree to participate However, the proportion of military personnel belonging to the marine infantry who agreed to participate in the study was greater than that of other services (88.73% of marines versus 75% of military personnel from other services; $\chi^2 = 6.06$; $p = .014$).

Measurements

A questionnaire on sociodemographic variables, the Pittsburgh Sleep Quality Index (PSQI) (Jiménez-Genchi et al., 2008) and a semi-structured psychiatric interview using the ICD-10 depressive disorder diagnostic criteria were administered. Suicidal ideation in the past month was assessed with the question from the suicidal risk section of the MINI Neuropsychiatric Interview version 5.0 (Lecrubier et al., 1997).

The ICD-10 criteria for depressive disorder require the presence of a set of core symptoms together with additional features determining the severity of the episode. Core symptoms include depressed mood, loss of interest and enjoyment and increased fatigability or reduced energy (at least two). In addition to core symptoms, (at least three, depending on the severity classification) of the following symptoms should be present: impaired concentration and attention, low self-esteem and feelings of worthlessness,

ideas of guilt and self-reproach. Other symptoms include pessimistic views of the future, ideas or acts of self-harm or suicidal thoughts, disturbed sleep, and diminished appetite. Symptoms must have been present for at least two weeks and should cause significant distress or impairment in social, occupational, or other important areas of functioning (WHO, 2019).

The Pittsburgh Sleep Quality Index (PSQI) is a self-rated questionnaire assessing sleep quality and disturbances during a period of one month. Nineteen individual items are grouped together to obtain seven "component" scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleeping medication use, and daytime dysfunction. The sum of scores for these seven components yields a global score. Clinical and clinimetric properties of the PSQI were assessed over an 18-month period with "good" sleepers (healthy subjects, $n = 52$) and "poor" sleepers (depressed patients, $n = 54$; sleep-disorder patients, $n = 62$). A global PSQI score greater than 5 yielded a diagnostic sensitivity of 89.6% and a specificity of 86.5% (kappa = .75, p less than .001) in distinguishing between good and poor sleepers (Buysse et al, 1989). The PSQI has been translated into Spanish (Royuela & Macías, 1997).

In Mexico, a cross-sectional study was conducted to evaluate the reliability and factorial structure of the Spanish version of the PSQI in a sample of psychiatric patients and control subjects. The study showed acceptable reliability (Cronbach's alpha = .78), significant correlations between the components and the global score (.53–.77), and a two-factor structure (sleep quality and sleep duration) (Jiménez-Genchi et al., 2008).

The suicidal risk section of the MINI Neuropsychiatric Interview version 5.0 is designed to quickly screen for the presence and severity of suicidal ideation and behaviors in the past month. The section begins with direct questions to determine whether the respondent has experienced thoughts related to death or self-harm. For example, it asks: "During the past month, have you thought that you would be better off dead, or have you wished you were dead?" "Have you wanted to harm yourself?" and "Have you thought about suicide?" These questions aim to capture a range of ideations—from passive thoughts about being dead to active suicidal thinking or a desire for self-harm. In this study, suicidal ideation was considered positive when an affirmative response was given to any of the three previous questions (Lecrubier et al., 1997).

Procedure

Patients referred for external psychiatric evaluation were invited to participate in the study. They were informed of the research and signed an informed consent form. Once the patient had agreed to participate, an interview was conducted. It included depressive symptoms based on the clinical criteria of the ICD-10 and questions about suicidal ideation from the MINI neuropsychiatric interview, after which the PSQI was administered. Evaluation time ranged from 30 to 40 minutes. Appropriate pharmacological treatment, psychological interventions and a safety plan were suggested for participants with depression and suicidal ideation, including hospitalization when necessary.

Statistical analysis

Variables were described in percentages and means. The chi-square test was used for the bivariate analysis and odds ratios were calculated with 95% confidence intervals. A p value less than .05 was considered significant. In the bivariate analysis, the association of the variables included in the PSQI and the presentation of suicidal ideation was analyzed using the chi-square test, calculating odds ratios and 95% confidence intervals. These variables included sleep latency, sleep duration, sleep efficiency, sleep disturbances such as difficulty falling asleep, waking up in the middle of the night or early morning, having to get up to use the bathroom, difficulty breathing, loud snoring, feeling hot or cold while sleeping, frequent nightmares, pain while sleeping, poor subjective sleep quality and daytime dysfunction (reduced daytime alertness, reduced daytime enthusiasm), and depressive disorder. PSQI variables such as difficulty falling asleep, waking up in the middle of the night or early morning, having to get up to use the bathroom, difficulty breathing, loud snoring, feeling hot or cold while sleeping, frequent nightmares, pain while sleeping, poor subjective sleep quality and reduced daytime alertness were considered positive if they had occurred three or more times a week during the past month. Poor subjective sleep quality was considered positive if the respondent answered "bad or very bad" in the past month. Reduced daytime enthusiasm was considered positive if their response was "a problem or a major problem" in the past month. Poor sleep quality was defined as a PSQI score over five. Finally, multivariate analysis was presented using logistic regression to determine the association between PSQI variables and suicidal ideation, with the inclusion of confounding variables such as age, sex and depression in the model. Data were analyzed using STATA 10.

Ethical considerations

The study was approved by the Bioethics Committee of the Universidad Cristobal Colón Campus Calazans in Boca del Río, Veracruz (Authorization Form No. 388). The study was based on the principles of the Helsinki Declaration and the Mexican General Health Research Act. Participants signed the informed consent letter on the understanding that refusal to participate in the study would not affect their subsequent medical or psychological care.

RESULTS

Sociodemographic and military characteristics of articipants

The total sample included 216 participants, 27.78 % of whom were female and 72.22 % male, with an average age of 33 years (*SD* 8.28, range 15-53 years). The average number of years in active service was 11.33 years (*SD* 7.55, range 0-29 years). Depressive disorders were present in 20.48 % of the sample ($n = 43$). At the time of the interview, 33.8 % ($n = 73$) of respondents had experienced suicidal ideation in the last month. (Table 1).

The prevalence of suicidal ideation was higher in men (68.86 %) than women (30.14%), although this difference was not statistically significant ($p = .580$). Regarding marital status, 35.65% were single or unpartnered, while 64.35% were married or partnered. No significant association was found between marital status and suicidal ideation ($p = .371$). Regarding military rank, most participants were sailors/petty officers (72.69 %), followed by officers/captains/admirals (20.37 %) and cadets (6.94%). Although suicidal ideation appeared to be more prevalent among sailors/petty officers(79.45 % vs. 69.23 % in those without ideation), this difference was not statistically significant ($p = .145$). Finally, as regards the branch of the Navy to which they belonged, 29.17 % of respondents belonged to the Marine Corps, and 70.83% to other services. A statistically significant association was found between suicidal ideation and belonging to a service other than the Marine Corps ($p = .034$), suggesting that members of these other services might be at a higher risk.

Table 1
Sociodemographic and military characteristics of participants

	Total sample[a]		*Suicidal ideation*		*No suicidal ideation*	
	n	*%*	*n*	*%*	*n*	*%*
Gender[b]						
Female	60	27.78	22	30.14	38	26.57
Male	156	72.22	51	68.86	105	73.43
Marital status[c]						
Single/ not partnered	77	35.65	29	39.73	48	33.57
Married/partnered	139	64.35	44	60.27	95	66.43
Military rank[d]						
Mariner/classes	157	72.69	58	79.45	99	69.23
Cadets	15	6.94	2	2.74	13	9.09
Officers/captains/admirals	44	20.37	13	17.81	31	21.68
Service branch[e]						
Marine corps	63	29.17	28	38.36	35	24.48
Other services	153	70.83	45	61.64	108	75.52

Note: [a] $n = 216$; [b] $p = .580$; [c] $p = .371$; [d] $p = .145$; [e] $p = .034$.

Association between sleep variables, depressive disorders, and suicidal ideation

In regard to PSQI sleep variables, 78.24% of the sample met the criteria for poor sleep quality. Average sleep latency in the sample was 52.78 minutes (*SD* 68.86; range 0 - 420 minutes). The average number of reported hours of sleep per night was 5.2 hours (*SD* 1.93; range .5 - 11 hours), with 124 military personnel reporting sleeping fewer than six hours per night in the past month (57.4% of the sample). The mean sleep efficiency in the sample was 79.70% (*SD* 20.52; range 12.5 - 100%).

Table 2 presents the bivariate analysis of sleep variables in the PSQI and the presence of suicidal ideation. Military personnel with poor sleep quality had a 2.57 times greater risk of presenting suicidal ideation compared to military personnel with adequate sleep quality ($p = .019$). Several significant associations were found between sleep parameters and suicidal ideation: sleep duration < 6 hours ($OR = 2.02$, $p = .019$), difficulty falling asleep ($OR = 1.94$, $p = .024$), waking up in the middle of the night or early morning ($OR = 1.98$, $p = .022$), difficulty breathing ($OR = 2.64$, $p = .041$), loud snoring ($OR = 2.58$, $p = .017$), feeling cold while sleeping ($OR = 3.97$, $p < .01$), feeling hot while sleeping ($OR = 2.99$, $p < .01$), frequent nightmares ($OR = 4.11$, $p < .01$, pain while sleeping ($OR = 3.68$, $p < .01$), poor subjective sleep quality ($OR = 2.80$ ($p < .01$), and reduced daytime enthusiasm ($OR = 5.51$, $p < .01$). Since one exclusion criterion for participating in the study was having taken sleep medication in the past month, item 7 of the PSQI was omitted from the analysis. At the same time, the presence of a depressive disorder was closely linked to suicidal ideation ($OR = 3.44$, $p < .01$). These results indicate that poor sleep quality and depressive symptoms are key risk factors for suicidal ideation.

Adjusted logistic regression

Logistic regression analysis, adjusted for age, sex, and depression, showed that certain sleep variables were significantly associated with suicidal ideation (Table 3): feeling cold while sleeping ($OR = 3.59$, $p = .002$), feeling hot while sleeping ($OR = 2.88$, $p = .007$), and loud snoring ($OR = 2.48$, $p = .036$). Other variables included frequent nightmares ($OR = 3.69$, $p = .002$), pain while sleeping ($OR = 3.35$, $p = .002$), poor subjective sleep quality ($OR = 2.13$, $p = .016$) and reduced daytime enthusiasm ($OR = 4.76$, $p = .013$). Variables such as sleep duration, difficulty falling asleep, waking up in the middle of the night or early morning, difficulty breathing and sleep quality were not

Table 2
Bivariate analysis: association between PSQI sleep variables, mental disorders and suicidal ideation

	Suicidal ideation		No suicidal ideation					
Clinical characteristic	*n*	*%*	*n*	*%*	χ^2	*O.R.*	*C.I. 95 %*	*p*
Sleep latency (more than 30 min)	52	36.36	36	49.32	3.35	1.70	.96 -3.01	.068
Sleep duration (less than 6 hours)	50	68.49	74	51.75	5.54	2.02	1.12 -3.66	.019
Sleep efficiency (less than 85%)	41	51.56	66	46.15	1.93	1.49	.84 -2.63	.165
Sleep disturbances								
Difficulty falling asleep[a]	35	47.95	46	32.17	5.13	1.94	1.08 -3.46	.024
Waking up in the middle of the night or early morning[a]	33	45.21	42	29.37	5.34	1.98	1.10 -3.56	.022
Have to get up to use the bathroom[a]	25	34.25	32	22.38	3.50	1.80	0.96 -3.36	.063
Difficulty breathing[a]	11	15.07	9	6.29	4.42	2.64	1.04 – 6.70	.041
Loud snoring[a]	16	21.92	14	9.79	5.94	2.58	1.18 – 5.65	.017
Feeling cold while sleeping[a]	22	30.14	14	9.79	14.4	3.97	1.88 – 8.36	< .01
Feeling hot while sleeping[a]	20	27.40	16	11.19	9.14	2.99	1.44 – 6.22	< .01
Frequent nightmares[a]	20	27.40	12	8.39	13.8	4.11	1.88 – 9.01	< .01
Pain while sleeping[a]	22	30.14	15	10.49	13.1	3.68	1.77 – 7.65	< .01
Poor subjective sleep quality[b]	46	63.01	54	37.76	12.3	2.80	1.56 – 5.03	< .01
Daytime dysfunction								
Reduced daytime alertness[a]	19	26.03	24	16.78	2.59	1.74	0.88 – 3.45	.110
Reduced daytime enthusiasm[c]	10	13.70	4	2.80	9.47	5.51	1.66-18.26	< .01
Poor sleep quality (PSQI > 5)	64	87.67	105	73.43	5.76	2.57	1.16 – 5.67	.019
Depressive disorder[d]	25	34.25	18	13.14	13	3.44	1.72 – 6.88	< .01

Note: [a] Reflects the number and percentage of participants answering this question with “3 or more times a week” in the past month; [b] Reflects the number and percentage of participants answering this question with “bad or very bad" in the past month; [c] Reflects the number and percentage of participants answering this question with “a problem or a major problem” in the last month; [d] Reflects the number and percentage of participants with ICD-10 clinical criteria of a depressive disorder.

Table 3
Logistic regression: association between psqi variables and suicidal ideation, adjusted for age, sex and depression

			95% CI		
Variable	*OR*	*SE*	*LL*	*UL*	*p*
Sleep duration	1.64	.524	.883	3.075	.116
Difficulty falling asleep	1.62	.505	.882	2.988	.119
Waking up in the middle of the night or early morning	1.64	.530	.873	3.092	.123
Difficulty breathing	1.82	.923	.678	4.919	.233
Loud snoring	2.48	1.077	1.063	5.812	.036
Feeling cold while sleeping	3.59	1.468	1.616	8.008	.002
Feeling hot while sleeping	2.88	1.128	1.342	6.213	.007
Frequent nightmares	3.69	1.538	1.629	8.353	.002
Pain while sleeping	3.35	1.303	1.569	7.187	.002
Poor subjective sleep quality	2.13	.669	1.150	3.945	.016
Reduced daytime enthusiasm	4.76	3.000	1.387	16.368	.013
Poor sleep quality (PSQI > 5)	1.96	.827	.861	4.484	.108

Note: CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

significantly associated after adjusting for age, sex, and depression. These results reinforce the idea that specific sleep disturbances, particularly pain while sleeping, temperature dysregulation, nightmares, and reduced daytime enthusiasm, may be involved in suicidal ideation, even after adjusting for demographic variables and depression.

DISCUSSION AND CONCLUSION

This study is part of a research project based on a clinical sample of naval military personnel at risk of suicide. It highlights the strong association between sleep quality and suicidal ideation among the military personnel evaluated. A high prevalence of poor sleep and its correlation with depressive symptoms emphasize the need for targeted interventions to improve rest in this population. Multivariate analysis revealed that factors such as feeling cold or hot while sleeping, loud snoring, frequent nightmares, and reduced daytime enthusiasm remained significantly associated with suicidal ideation, even after adjusting for depression, age, and sex. This suggests that sleep problems may

play an independent role in suicide risk rather than merely reflecting depressive symptomatology.

Military service members face a number of stressors and challenges putting them at a higher risk for insomnia than most civilians (Taylor et al. 2016). The observed percentage of poor sleep quality in this study (78.24% of the sample) is higher than that obtained in the study by Troxel et al., (Troxel, et al. 2015), who also used PSQI and found that 48.6% of a total sample of 1,957 military personnel experienced sleep problems. Although both studies address the impact of sleep disturbance on military personnel, they differ in scope, methodology, and focus. The U.S. study drew on a large, cross-sectional survey (N = 1,957) across all branches of the armed forces, analyzing the prevalence and consequences of sleep problems with a focus on operational readiness and mental health outcomes. Conversely, our study utilized a clinical, cross-sectional design with a smaller sample (N = 216) of naval personnel referred for psychiatric evaluation, specifically investigating the association between sleep quality and suicidal ideation using the Pittsburgh Sleep Quality Index (PSQI) and a psychiatric interview. Despite methodological differences, both studies identified high rates of sleep disturbances and highlighted shared risk factors such as nightmares, snoring, and sleep-related pain. However, our study found that specific sleep disruptions, including temperature-related awakenings, were independently associated with suicidal ideation, even after adjusting for depressive symptoms. Similar results regarding the association between sleep disorders and suicide risk have been reported in other studies (Ohayon, 2005; Taylor et al., 2007; Sjöström et al., 2007; Richardson et al., 2018; McCall & Black, 2013; Nadorff et al., 2013; Littlewood et al., 2019, Vargas et al., 2020).

In the present study, global sleep quality was not associated with the presence of suicidal ideation when depressive disorders were included in the logistic regression model. However, it was observed that factors such as feeling cold or hot while sleeping, loud snoring, frequent nightmares, and reduced daytime enthusiasm were independently associated with suicidal ideation. It is worth mentioning the possibility of the influence of environmental variables (excessive cold or heat) that affect the military population to a greater extent than other populations (Mysliwiec et al., 2016). Ribeiro et al. (2012) conducted a longitudinal study of U.S. military personnel, observing that insomnia predicted suicidal ideation even when controlling for depression, hopelessness, PTSD, anxiety, and substance abuse. Their results support the notion that sleep disturbances are independent risk factors for suicidality, reinforcing the importance of sleep-focused interventions in high-risk military groups. Although our study emphasized the predictive value of sleep disturbances beyond depressive symptoms, the longitudinal design of the study by Ribeiro et al. provides stronger evidence for a directional relationship between sleep problems and suicidal thoughts. Conversely, the detailed analysis of sleep parameters in our study offers valuable insights into specific sleep issues that may contribute to suicide risk. Together, these findings suggest that comprehensive sleep assessments should be incorporated into suicide prevention strategies in military settings and that future research should explore the underlying mechanisms linking sleep disturbances to suicidal behavior.

Decades of research have conclusively shown that adequate sleep quality supports cognitive abilities ranging from simple response speed to problem-solving, flexible thinking, and the ability to integrate new information into a common mental model. These mental processes underlie successful military operations (Seelig et al. 2010; Mysliwiec et al., 2016). Sleep is a vital military resource, hence the importance of having tools for the early, systematic detection of this health problem (Capaldi et al., 2019).

Sleep disruption is a particularly relevant problem among military personnel. Insomnia rates among military service members increase significantly (2.5-fold) during and after deployment to combat sites (Seelig et al. 2010) and may be associated with the high rates of suicidal ideation and attempted suicide observed in this population (Ribeiro et al. 2012; Leardmann et al., 2013). All the study variables associated with the presentation of suicidal ideation have a direct effect on nocturnal awakenings. Frequent nocturnal awakenings may be more distressing and produce greater dysfunction at the prefrontal level than other sleep continuity variables and better account for poor subjective sleep quality (Pigeon et al., 2012; Bernert et al., 2015; Woznica et al., 2015; Vargas et al., 2020).

Littlewood et al. published data from an ecological momentary assessment study suggesting that subjective sleep quality as well as objective and subjective short sleep duration significantly predicted suicidal ideation the following day (Littlewood et al., 2019). This study provides the first real-time examination of the relationship between sleep parameters, suicidal ideation, and entrapment. Findings revealed a unidirectional association, where shorter sleep duration and poorer sleep quality predicted increased suicidal ideation the following day, even after controlling for anxiety and depression. Additionally, sleep quality moderated the relationship between pre-sleep entrapment and suicidal ideation on awakening, suggesting that poor sleep increases the impact of emotional distress before sleep on next-day suicidal thoughts. Clinically, these findings highlight the importance of assessing and treating sleep disturbances in individuals at risk of suicide. Improving sleep duration and quality could serve as a potential intervention strategy to mitigate suicidal ideation. Psychological interventions targeting sleep problems, such as cognitive behavioral therapy for insomnia (CBT-I), could play a crucial role in suicide prevention efforts (Mysliwiec et al., 2016).

This study has notable strengths. First, it examines a

high-risk population, providing valuable insights into the association between sleep quality and suicidal ideation among Mexican naval personnel—a group with unique occupational stressors. Second, the study employs validated assessment tools, including the Pittsburgh Sleep Quality Index (PSQI) and the MINI Neuropsychiatric Interview, ensuring reliable measurement of sleep disturbances and suicidal ideation. Third, the study adjusts for key confounding variables such as age, sex, and depression, allowing for a more accurate evaluation of the independent relationship between specific sleep disturbances and suicidal ideation. Moreover, the research highlights the importance of environmental factors such as extreme temperatures, nightmares, and snoring—factors often overlooked in suicide risk assessments. Finally, by focusing on an understudied military population, this study contributes to the growing body of evidence on sleep-related suicide risk, underscoring the need for tailored interventions in military mental health care.

This study also has limitations that should be considered when interpreting findings. First, the sample was limited to 216 naval personnel from a single psychiatric clinic, introducing selection bias and reducing the generalizability of results to the broader military population. It is necessary to include all military naval personnel at the national level, which could be done at the annual physical evaluation through the administration of self-applicable scales such as the PSQI used in the present study. Second, the cross-sectional design precludes establishing causality between sleep quality and suicidal ideation, highlighting the need for longitudinal studies to assess how these factors evolve over time. Third, while the study controlled for age, sex, and depression, other potential confounding variables—such as substance use, PTSD, work shifts, and medication use—were not fully explored. Additionally, reliance on self-reported measures (PSQI) may have introduced recall and social desirability bias, potentially leading to underreporting of sleep disturbances and suicidal thoughts. The lack of objective sleep assessments, such as polysomnography or actigraphy, limits the ability to examine physiological sleep disruptions. Furthermore, findings may not be generalizable to other military branches, as sleep conditions and risk factors may differ. Lastly, the stigma associated with suicide in military environments may have encouraged the underreporting of suicidal ideation, affecting the accuracy of prevalence estimates.

In conclusion, this study highlights a significant association between sleep disturbances and suicidal ideation among Mexican naval personnel. These findings suggest that sleep problems may play a direct role in suicide risk rather than merely reflecting depressive symptomatology. Future research should include larger, more diverse samples, utilize longitudinal designs, incorporate objective sleep measures, and address additional psychological and environmental factors to improve the understanding of sleep-related suicide risk in military populations. Prospective studies measuring baseline sleep quality of military personnel from the moment of recruitment are required to be able to estimate risks with greater validity and accuracy as they progress through military life. Efforts should be made to reduce the stigma surrounding suicide in military populations to improve the accuracy of self-reported data. Finally, developing and implementing targeted interventions addressing both sleep disturbances and mental health issues could significantly enhance suicide prevention strategies in military settings.

Funding

None.

Conflict of interest

The authors declare they have no conflict of interest. The opinions expressed in this article are the responsibility of the authors and do not reflect the point of view of the Secretaría de Marina-Armada de México, the High Command or any of the establishments, or operational or administrative units comprising it.

Acknowledgements

The authors thank the Secretaría de Marina-Armada de México and the C. Director of Hospital Naval de Veracruz for facilitating the undertaking of this study.

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salud mental

ORIGINAL ARTICLE
Volume 49, Issue 2, March-April 2026
10.17711/SM.0185-3325.2026.10

Design and Validation of the Family Pressure To Be Thin Questionnaire in Mexican Undergraduates

José Pablo López Ramírez,[1] María Jimena Montes y Morán,[1] Yamile Fajer Díaz,[1] Miriam Barajas Márquez,[2] Claudia Unikel Santoncini[3]

[1] Facultad de psicología de la Universidad Anáhuac México Sur, México.
[2] Departamento de Psicología, Universidad Iberoamericana Ciudad de México.
[3] Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz. Ciudad de México, México.

Correspondence:
Claudia Unikel Santoncini
Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz. Calz. México-Xochimilco 101, San Lorenzo Huipulco, Alcaldía Tlalpan, Ciudad de México, México.
Phone: +52 (55)4160-5160
Email: clunikel@gmail.com

Received: 10 May 2024
Accepted: 7 March 2025

Citation:
López Ramírez, J. P., Montes y Morán, M. J., Fajer Díaz, Y., Barajas Márquez, M., & Unikel Santoncini, C. (2026). Design and Validation of the Family Pressure To be thin Questionnaire in Mexican Undergraduates. *Salud Mental*, *49*(2), 61–71. https://doi.org/10.17711/SM.0185-3325.2026.10

ABSTRACT

Introduction. Eating disorders are serious illnesses with a complex, heterogeneous etiology. Sociocultural pressure from the media, family, and peers are among the risk factors associated with their emergence. **Objective.** To design, obtain construct and convergent validity, total and test-retest reliability at three weeks of a Family Pressure To Be Thin Questionnaire in a Mexican university population, and undertake a comparison with a clinical group diagnosed with an eating disorder, and by sex. **Method.** The study was undertaken with a sample of 369 university students (men/women/non-binary) and 50 subjects diagnosed with an eating disorder. Exploratory factor analysis and first and second order confirmatory factor analysis were performed and the reliability of the scale and the test-retest reliability at three weeks were obtained. Correlations were analyzed to obtain concurrent validity with the Family Pressure Subscale of the Sociocultural Attitudes Towards Appearance Scale (SATAQ-4), and comparisons were made with the clinical group and by sex. **Results.** Based on the exploratory factor analysis, the scale was divided into eight factors, reduced to seven in the confirmatory factor analysis, and 10 questions were eliminated, with a model that fit the data. A Cronbach's Alpha value of .94 was obtained and test-retest reliability was .86. **Discussion and conclusion.** The results highlight the importance of contextualizing the family environment when examining eating disorders, with interventions aimed at reducing criticism of bodies and food being crucial. The scale consisted of 29 items divided into seven factors and was valid and reliable for the sample studied and will be useful for detecting one of the sociocultural risk factors for eating disorders.

Keywords: Validity, reliability, family pressure to be thin, measurement.

RESUMEN

Introducción. Los trastornos de la conducta alimentaria son enfermedades graves de etiología compleja y heterogénea. La presión sociocultural que proviene de los medios, la familia y los pares se encuentran entre los factores de riesgo asociados a su aparición. **Objetivo.** Diseñar, obtener la validez de constructo y convergente, la confiabilidad total y test-retest a tres semanas de un cuestionario de Presión Familiar hacia la Delgadez en población universitaria mexicana, así como la comparación con un grupo clínico diagnosticado con un trastorno de la conducta alimentaria y por género. **Método.** El estudio se llevó a cabo en una muestra de 369 estudiantes universitarios (hombres/mujeres/no binario) y 50 sujetos con diagnóstico de un trastorno de la conducta alimentaria. Se realizó un análisis factorial exploratorio y un análisis factorial confirmatorio de primero y segundo orden, se obtuvo la confiabilidad de la escala y la confiabilidad test-retest a tres semanas; se obtuvieron correlaciones para obtener la validez concurrente con la subescala de Presión Familiar del *Sociocultural Attitudes Towards Appearance* (SATAQ-4), y se hicieron comparaciones con el grupo clínico y por sexo. **Resultados.** A partir del análisis factorial exploratorio la escala se estructuró en ocho factores, que en el factorial confirmatorio se redujeron a siete, además de eliminarse 10 preguntas, con un modelo que ajustó a los datos. La confiabilidad Alfa de Cronbach fue de .94 y la test-retest de .86. **Discusión y conclusión.** Los resultados señalan la relevancia de contextualizar el ambiente familiar al investigar los trastornos alimentarios, siendo cruciales las intervenciones orientadas en reducir la crítica hacia los cuerpos y la alimentación. La escala se constituyó de 29 ítems distribuidos en siete factores y resultó válida y confiable para la muestra estudiada, y será útil en la detección de uno de los factores de riesgo socioculturales de los trastornos de la conducta alimentaria.

Palabras clave: Validez, confiabilidad, presión familiar hacia la delgadez, medición.

INTRODUCTION

Eating Disorders (ED) are serious psychiatric illnesses (American Psychiatric Association [APA], 2013; Klump et al., 2009) associated with concern with body weight or shape, and subsequent behaviors designed to achieve weight loss such as dietary restriction, binge eating, compensatory behavior such as food restriction, laxative use, induced vomit, and overtraining (Culbert et al., 2015). Disordered Eating Behaviors (DEB) are inappropriate behaviors characteristic of ED that do not meet the necessary diagnostic criteria (Unikel-Santoncini et al., 2010).

EDs predominantly affect women aged 13 to 25, the diagnostic ratio being10 females for every male (Erriu et al., 2020). According to data from the National Psychiatric Epidemiology Survey (Medina-Mora et al., 2003) conducted in the adult population, bulimia nervosa (BN) affects 1.2% (.6% of males, 1.8% of females) of the adult population.

Regarding the undergraduate population, studies from various countries have reported wide-ranging results regarding the prevalence of DEBs. For example, a study of Chilean students found that 16.9% of women and 8.7% of males are at a high risk of developing DEBs, while 25.6% of women and 33.8% of men are at a moderate risk (Escandón-Nagel et al., 2021). A study conducted in Spain reported that 19% of the population are at risk of developing EDs, including 21.2% of women and 15% of men. In Greece and Colombia, risk levels are between 44.1% and 61.1% for females, and between 9.6% and 38.9% for males (Martínez-González et al., 2014). Among Peruvian medical students, the risk of developing DEBs was found to be 12.5%, 31.7% for women and 10.8% for men (Zila-Velazque et al., 2022). (Mendoza & Olalde, 2019). A study of a representative sample of medical students in Mexico (Mendoza & Olalde, 2019) found that 8.6% were at high risk of DEBs, and 23.5% were classified as being at moderate risk. This was measured using the Brief Questionnaire for Measuring Disordered Eating Behaviors (Unikel-Santoncini et al., 2004). More males tended to be classified as high-risk (9.4% vs. 7.4%), whereas more females were classified as moderate risk (28.4% vs. 19.8%). The study also found that 5.9% of participants used diet pills, 1.6% used diuretics and .5% used laxatives (Mendoza & Olalde, 2019). A study conducted in Mexico City observed a DEB prevalence of 6.8% in females and 4.1% in males (Díaz de León-Vázquez et al., 2017). Conversely, a comparison of DEBs between Mexican and Canadian women found that the percentage of women at risk for developing DEBs was 17.7% and 4.5% respectively (Saucedo et al., 2017).

The etiology of EDs is complex and heterogeneous, involving both genetic and environmental factors (Mitchison & Hay, 2014). The interaction between temperament, early life relationships and life experiences may determine whether a person develops an ED (Le et al., 2017). In regard to environmental factors, sociocultural models highlight the beauty standards or ideals of extreme thinness and objectification for women in western culture as specific risk factors for ED (Striegel-Moore, et al., 2007).

The Tripartite Influence Model posits that sociocultural pressure regarding appearance can be divided into three sources: peers, family, and the media. The model proposes that this pressure is a crucial factor in the development of body image and eating disorders, through the internalization of the thin body ideal. This is compounded by the subsequent comparison of one's own physical appearance with this ideal (Keery et al., 2004; Schaefer et al., 2019).

Family characteristics constituting risk factors for ED development have been detected. Families of patients with EDs have been identified as more dysfunctional than those without ED. Patients with EDs describe their families as having low cohesion, and poor adaptability and communication, compared to those of participants without EDs (Sainos-López et al., 2015). Furthermore, overprotective behaviors have been observed in parents of anorexia nervosa patients (Le Grange, 2009). Family criticism of weight and body shape, low cohesion, and high parental expectations have been recognized as antecedent factors of bulimia nervosa development, compared to control groups with mixed psychiatric disorders or no psychiatric disorders (Le Grange, 2009).

Family pressure to be thin has mainly been measured through isolated questions within larger questionnaires. Few questionnaires exist that specifically measure sociocultural pressure to be thin. For example, the Influence of Body Aesthetic Models Questionnaire (Spanish acronym CIMEC), validated in Mexico (Vázquez et al., 2000), measures the influence of situations and agents promoting the current aesthetic model. This questionnaire, however, has only one question about family pressure to be thin: "Do you talk to family members about weight-losing activities or products?". Conversely, the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-4) includes a four-question subscale measuring family pressure to be thin. The third version of this questionnaire was validated in male Mexican undergraduates (Castillo et al., 2019). However, this version does not include questions specifically exploring comments by different family members, and the validation study did not include females.

Given the lack of a culture-specific psychometric instrument for measuring family pressure to be thin in a sample of Mexican undergraduates, a questionnaire was expressly designed for this purpose. Construct and convergent validity with SATAQ-4 was obtained together with a comparison with a clinical sample. Total reliability and test-retest reliability with a three-week period between responses were also calculated. Sex comparisons were made with all the variables included in the study. Both the clinical group and non-clinical were expected to obtain high scores in all variables.

METHOD

Participants

The eligibility criteria for the sample were being Mexican university students, being over 18, and being enrolled at a public or private Mexican university. Participants were selected through non-probabilistic convenience sampling.

The sample comprised 478 students, female (n = 259), male (n = 104), non-binary (n = 2), and unspecified (n = 4). Participants were enrolled in universities in Mexico City; Mexicali, Baja California; Villahermosa, Tabasco; Zacatecas, Zacatecas; and Morelia, Michoacán. Thirteen subjects did not agree to sign the informed consent form, 39 failed to meet the inclusion criteria and 57 answered the attention checks incorrectly, leaving a total of 369 participants (70.2% women, 28.2% men, .5% non-binary, 1.1% preferred not to answer). The average age was 20.75 (SD = 2.72), with an age range of 18 to 45, with no statistical differences between genders (women/men/nonbinary/did not answer). Ninety-three point two percent of participants were single, 4.3% were in a common law union, 2.2% were married and .3% were widowed. The sample comprised students from 19 universities in Mexico (n = 10 public schools and n = 9 private schools).

To obtain test-retest reliability, questionnaires were administered to the same individuals three weeks after the first time, with responses being obtained from 60 participants (68.3% women/28.3% men/1.7% non-binary/1.7% preferred not to answer).

The clinical sample comprised 50 subjects (39 women and 11 men), 11 of which were patients undergoing treatment for an eating disorder. Thirty-nine were undergraduate students who answered the question "Have you been diagnosed with an eating disorder?" affirmatively and specified that they had a diagnosis defined by the Diagnostic and Statistical Manual of Mental Illnesses (DSM-5) (APA, 2013). Those who said that they had DEBs, ate due to depression, or bigorexia, were excluded. The average age for the clinical sample was 21.54 years (SD = 2.70), with an age range of 18 to 43, 96% were single and 4% were in a common-law union. No statistically significant age differences were found between the student group and the clinical group.

Instruments

The Brief Questionnaire for Measurin Disordered Eating Behaviors (BQDEB) comprises 10 items exploring concern about gaining weight. It also examines the feeling of lack of control when eating, and restrictive, purgative and binge eating behaviors, in the past three months and was validated in Mexican clinical and student populations (Unikel-Santoncini et. al., 2004). A recent factor analysis obtained a Cronbach's alpha value of .76, and 64.7% of explained variance, divided into the following three factors: binge eating/purging, compensatory measures, restriction (Padrós-Blázquez et al., 2022).

The Social Attitudes towards Appearance Questionnaire (SATAQ-4) (Schaefer et al., 2015) was validated in the Peruvian (Zevallos-Delzo et al., 2017) and Colombian population (Villegas et. al. 2021) but has not yet been validated in Mexico. The instrument is divided into two factors. Internalization is the degree of acceptance of physical appearance expectations and stereotypes and includes the areas of thinness/low adipose index, muscularity, and general attractiveness. Pressure measures the level of perceived interference from various groups regarding their physical appearance. It includes family, peers, significant others, and the media (Schaefer et al., 2015). This questionnaire has four items specifically related to family pressure: "I feel pressure from my family members to look thinner," "I feel pressure from my family members to improve my appearance," "My family members encourage me to reduce my body fat level," and "My family members encourage me to get in better shape." Because this scale contains specific items about family pressure in the context of EDs, it is relevant for the validation of this scale. In the sample in this study, it obtained a reliability of .81 and was organized into a single factor explaining 64.11% of total variance.

The Family Pressure To Be Thin Questionnaire consists of 42 questions in Likert format, with five response options: 1-Never, 2-Almost never, 3-Sometimes, 4-Frequently and 5-Always. A higher score indicates greater pressure from the family regarding weight and body shape. Two attention checks were added to detect random responses, in the following format "If you are answering this questionnaire correctly, select the option "Frequently".

Procedure

The study was divided into three parts: Phase 1) Selection and inclusion of items; Phase 2) Construct validity; and Phase 3) Concurrent validity.

Phase 1

A bibliographic study was conducted of sociocultural pressure from the family on weight and body shape and the development of disordered eating behaviors. Fourteen questions were devised to conduct a semi-structured interview for university students (such as Does anyone in your family diet? How much importance do they give to weight and body shape in your family?). With these questions, eight interviews were conducted and subsequently analyzed to develop the 42 questions in the instrument.

Three experts on EDs were asked to evaluate the pertinence, relevance and conceptual clarity of each of the items comprising the instrument. They recommended including

all the questions with certain modifications, such as adding "obesity" in all the sections including the term "overweight". With the resulting version, a cognitive laboratory (n = 16, 13 women and three men) was organized with undergraduate students to check their understanding of the content and structure of the questionnaire.

A pilot study was subsequently conducted (n = 27) with undergraduate Mexican students, the response time was recorded, and a Cronbach's alpha reliability of .95 was calculated. This yielded a final version of the questionnaire which was subsequently tested with a sample of undergraduate students at Mexican universities to obtain its reliability and validity.

Phase 2

Responses were collected through a digital survey on the Office Forms platform between February and March of 2024; the questionnaire was shared with professors from various universities in Mexico so that they in turn could share it with their students. Analyses were conducted to obtain exploratory and confirmatory factorial validity; the latter considered both first and second order analysis.

Phase 3

The concurrent validity of the instrument designed with the Family Pressure Subscale of the SATAQ-4 and the BQDEB was obtained. Likewise, comparisons were made for each of the variables studied, by clinical group vs. student group, and by sex.

Statistical analysis

Frequencies and percentages of demographic variables (gender, career, parents' educational attainment, public or private school) were obtained, as well as the mean and standard deviation of the age variable. The sample was randomly divided into two groups. One comprised 60% of participants (n = 219) to conduct the exploratory factor analysis (Field, 2009), and the other comprised 40% (n = 150) to conduct the confirmatory factor analysis (Brown, 2015). The first sample met the quota of five to 20 participants for each survey item (Campo-Arias & Oviedo, 2008; Sánchez & Echevarry, 2004) while the second complied with the minimum of 150 subjects for confirmatory factor analysis (Wang & Wang, 2012). Item-total correlations were obtained considering a correlation of .20 or greater to retain an item according to the criterion proposed by Streiner and Norman (2008). In the exploratory factor analysis, we followed Yela's criteria (1997): 1) An item must have a saturation equal to or greater than .40; 2) An item is only included in one factor, the one in which it has a higher level of saturation; 3) There must be conceptual congruence between all the items included in a factor; 4) A factor must comprise at least three items. The reliability of the instrument and its factors was obtained with Cronbach's alpha and the three-week test-retest reliability was obtained with a bivariate correlation analysis.

The DWLS estimation method was used to conduct the confirmatory factor analysis of both the first and second order . The goodness-of-fit criteria for the first-order CFA were RMSEA $\leq$ .08, CFI $\geq$ .95, TLI $\geq$ .90, GFI $\geq$ .90 and SRMR $\leq$ .08 and probabilities, Z values and variance estimates were reported for the second-order CFA.

Since the family pressure subscale of the SATAQ-4 questionnaire has not been validated in Mexico, Cronbach's alpha reliability and the factorial structure of principal components with Varimax rotation were obtained. Bivariate correlations were performed with the total sample of students between DEBs, the Family Pressure To Be Thin Questionnaire, and the family pressure subscale of the SATAQ-4. Finally, we compared the sum of each instrument for the total sample of students with the sample with EDs, using a Student's t for independent samples, and a one-way ANOVA for the comparison by sex (eliminating subjects who preferred not to answer). Analyses were conducted in SPSS for Windows version 21 (IBM, 2012) and JASP (JASP team, 2020).

Ethical considerations

The project was approved by the Ethics Consulting service of the Anahuac University in Mexico. An informed consent form was designed for all the activities where information was collected and sent to all participants digitally prior to all activities.

RESULTS

Phase 2
Exploratory factor analysis

Item-total correlations were obtained, and since all the items showed values greater than .20, they were all included for exploratory factor analysis. A principal components analysis with Varimax rotation was conducted, yielding an eight-factor structure explaining 66.67% of variance (see Table 1). Factor 1, comprising 10 questions, was called "Negative comments directed at the individual's physique." Factor 2, consisting of nine questions, was called "Pressure to change an individual's eating behavior." Factor 3, including eight questions, was called "thin ideal-reinforcing comments." Factor 4, containing six questions, was called "Family beliefs about being overweight"; Factor 5 and 6, each comprising three questions, were called "Pressure from grandparents" and "Parental concern about being overweight" respectively. Factor 7, comprising four questions,

Table 1
Factor loadings of the exploratory factor analysis of the family pressure to be thin questionnaire

		Factor						
		1	*2*	*3*	*4*	*5*	*6*	*7*
8	*A member of my family has made comments that have made me want to lose weight.*	*.678*						
11	Comments made by my family about the body weight or shape of others have made me want to do things to lose weight (such as using laxatives or diuretics, dieting, exercise, and self-induced vomiting).	.749						
17	Comments made by my family members about the amount of food I eat have made me want to change my eating habits to lose weight.	.607						
19	Watching family members diet has resulted in me doing things to lose weight.	.708						
21	A member of my family has made comments that have made me want to lose weight.	.686						
32	A member of my family has made comments that have made me want to change my eating habits to lose weight.	.668						
35	Comments made by my family about their own body weight or shape have led me to do things to lose weight (such as using laxatives or diuretics, dieting, exercise, and self-induced vomiting).	.764						
39	Comments made by my family about my body weight or shape have led me to do things to lose weight (such as using laxatives or diuretics, dieting, exercise, and self-induced vomiting).	.793						
41	Watching my family members diet has negatively affected me.	.476						
2	During my childhood, my parents limited the amount or type of food I ate.		.580					
20	During my adolescence, my family members limited the amount or type of food I ate.		.698					
26	My family members have made negative comments about the amount or type of food I eat, insinuating that I am going to gain weight.		.575					
28	My father has commented that I should not gain weight.		.544					
29	My parents currently limit the amount or type of food I eat.		.685					
30	My family has pressured me to go on a diet to lose weight.		.479					
40	My family has pressured me to do exercise to lose weight.		.585					
1	Comments by family members about their own body weight or shape have negatively affected me.			.604				
7	Comments by my family about other people´s body weight or shape have negatively affected me.			.627				
9	My mother has remarked that I should not gain weight.			.511				
10	My father has made negative comments about other people's overweight.			.463				
12	In my family, it is very important to have a thin body because of physical attractiveness.			.401				
14	Comments made by my family about my body weight or shape have negatively affected me.			.651				
15	My family members have made or make comments about the amount of food I eat.			.512				
42	My mother has made negative comments about other people's overweight.			.613				
3	My family members treat people with overweight or obesity poorly.				.523			
23	My family believes that people with overweight are physically clumsy.				.713			
24	My family regards thinness as a synonym of health.				.464			
31	My family believes that overweight people are less smart.				.814			
37	My family believes that overweight people are worth less.				.719			
38	My family believes that people with overweight have little willpower.				.630			
4	My grandparents have remarked that I should not gain weight.					.594		
16	My grandparents have made negative comments about other people's overweight.					.789		
27	My grandparents have remarked that they worry or dislike gaining weight.					.674		
5	My mother has commented that she is worried or annoyed about gaining weight.						.736	
33	My father has remarked that he is worried or annoyed about gaining weight.						.728	
34	My mother has dieted or is dieting to lose weight.						.568	
18	My siblings have remarked that I should not gain weight.							.586
22	My siblings have made negative comments about other people's overweight							.660
25	My brothers have engaged in or are engaged in diets to lose weight							.753
36	My brothers have commented that they are worried or annoyed about gaining weight							.783

was called "Sibling Influence." Factor 8 included two questions, including number 24, which also loaded on factor 4, with which it had conceptual coherence. Question 13 was eliminated from the questionnaire as it failed to meet the necessary requirements to form a factor (Yela, 1997). Question 6 was excluded from the analysis.

Confirmatory factor analysis

The first order confirmatory factor analysis yielded a seven-factor structure (see Figure 1) showing adequate goodness of fit: RMSEA =1.00, 90% CI [= .00]; CFI = 1.00; TLI = 1.03; GFI = .98; SRMR = .056; Chi² (χ^2 =140.89, *df* = 356, p = 1.00). All items obtained statistically significant loads within their factors, with Z values between 7.06 and 30.73, all of which were statistically significant ($p < .001$). There were no modified or residual covariance indices once items 2, 3, 9, 10, 12, 15, 28, 36, 37, 41 and 42 had been eliminated. The final distribution of the items by factor was as follows: 1) questions 8, 11, 17, 19, 21, 32, 35, and 39; 2) questions 2, 20, 26, 29, and 30; 3) questions 1, 7, and 14; 4) questions 23 , 24, 31, and 38; 5) questions 4, 16, and 27; 6) questions 5, 33, and 34; 7) questions 18, 22, and 25 (see Appendix1. for the final version of the questionnaire in Spanish.

Second-order confirmatory factor analysis

Second-order confirmatory factor analysis yielded a unidimensional solution, leaving seven factors as in the first-order solution. All factors showed a probability of less than .001, with Z values ranging from 5.05 to 9.76, and variance estimates ranging from .66 to 1.82.

Reliability

The reliability of the scale and its factors was obtained, as well as the three-week test-retest reliability. The scale obtained a Cronbach's Alpha value of .94, .94 for factor 1, .85 for factor 2, .90 for factor 3, .79 for factor 4, .77 for factor 5, .66 for factor 6 and .63 for factor 7. The three-week test-retest reliability coefficient for the total scale was .86. In the second-order confirmatory factor analysis, a Cronbach's alpha value of .94 was obtained with a confidence interval of between .93 and .95.

Phase 3
Convergent validity

Convergent validity was obtained by correlating the family pressure subscale of the SATAQ-4 with the total scale and factors of the Family Pressure To Be Thin Questionnaire. The results showed that all of them were statistically significant ($p < .01$) and greater than .40 except for factor 7 of the scale and the SATAQ-4 Family Pressure Subscale (see Table 2).

Table 2
Correlations between the family pressure subscale of the SATAQ-4 and the total scale and factors of the family pressure to be thin questionnaire

		Factor					
SATAQ-4 subscale		*1*	*2*	*3*	*4*	*5*	*6*
Total scale	.725						
Factor 1	.663						
Factor 2	.634	.725					
Factor 3	.589	.718	.537				
Factor 4	.547	.479	.538	.482			
Factor 5	.422	.522	.501	.536	.504		
Factor 6	.488	.532	.532	.475	.561	.505	
Factor 7	.356	.405	.401	.314	.307	.330	.275

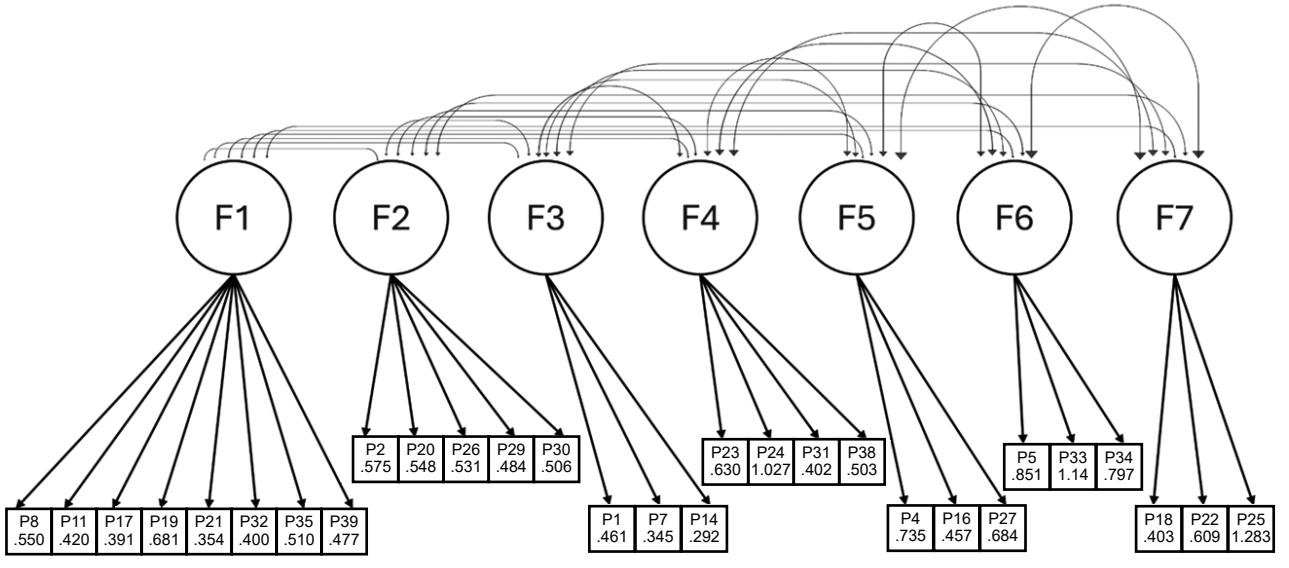

Figure 1. Confirmatory Factor Analysis of the Family Pressure To Be Thin Scale.

Comparison between Clinical and non-clinical groups

The student group and the clinical group were compared in regard to DEBs, the family pressure subscale of the SATAQ-4 questionnaire and the factors in the Family Pressure To Be Thin Questionnaire. The results showed statistically significant differences in all the variables measured with higher scores in the clinical group than in the student group (see Table 3).

Comparisons by gender

The gender comparison showed that the non-binary group scored almost as high as women in the DEB variable, factor 1, and higher in the Family Pressure Subscale of the SATAQ-4. This group also scored higher in factors 3 and 5 of the Family Pressure To Be Thin Scale, followed by the group of women, with the exception of factor 7, in which men scored higher. Statistically significant differences were found in DEBs, the total Family Pressure To Be Thin Scale and factors 1, 3 and 5 of the same scale (see Table 4).

Table 3
Comparison between the student group and the clinical group with EDs in DEBs, the family pressure subscale of the SATAQ-4 and the factors in the family pressure to be thin questionnaire

	Student Group		Group with ED Diagnosis			
	χ	SD	χ	SD	t	p
CAR	6.51	4.96	12.50	6.32	-7.70	< .001
SATAQ-4 Subscale	10.14	4.27	13.32	4.42	-4.90	< .001
Total Scale	87.37	30.01	120.57	35.26	-7.09	< .001
Factor 1	16.76	8.26	25.66	9.35	-7.01	-7.01
Factor 2	8.69	4.10	12.48	5.46	-5.85	< .001
Factor 3	7.82	3.36	11.00	3.55	-6.21	< .001
Factor 4	8.27	3.58	10.96	3.70	-4.94	< .001
Factor 5	6.23	3.06	8.22	3.48	-4.23	< .001
Factor 6	7.38	2.94	9.28	2.85	-4.27	< .001
Factor 7	5.62	2.60	7.00	3.16	-3.38	< .01

Table 4
Comparison between genders in DEBs, the family pressure subscale of the SATAQ-4 and the factors in the family pressure to be thin questionnaire

	Women n = 259		Men n = 104		Non binary n = 2	
	χ	SD	χ	SD	χ	SD
DEB	7.82	5.89	5.73	4.0	7.50	3.53
SATAQ-4 Subscale	10.78	4.54	9.80	4.03	13.50	.70
Total Scale	94.79	34.41	82.81	25.97	77.0	4.24
Factor 1	18.84	9.13	15.09	7.64	18.0	2.82
Factor 2	9.33	4.64	8.65	3.80	6.0	1.41
Factor 3	8.94	3.43	6.19	3.02	10.0	1.41
Factor 4	8.77	3.91	8.30	3.06	5.0	1.41
Factor 5	6.86	3.34	5.47	2.54	7.0	0
Factor 6	7.76	3.11	7.26	2.70	6.0	1.41
Factor 7	5.76	0.16	5.84	2.18	3.50	.70

DISCUSSION AND CONCLUSION

The process of elaboration and validation yielded a 29-item instrument divided into seven factors. Answers to these items correlated with the Family Pressure To Be Thin Subscale in the SATAQ-4. The data fit the model and good total and test-retest reliability was obtained, showing that the instrument has adequate psychometric properties for the sample studied. The results showed that the structure and content of the items fit the family component of the tripartite theoretical model (Keery, 2004), covering the behaviors mentioned in this theory such as criticism of weight and body shape and eating habits. The Family Pressure To Be Thin Questionnaire is a reliable, valid instrument which can be useful for assessing the risk of developing eating disorders.

The clinical group scored higher on all the variables studied than the control group, which is consistent with other studies recognizing family pressure as a risk factor in the development of DEBs and EDs (Mitchison & Hay, 2014). This is consistent with the high parental expectations and higher incidence of family criticism of weight and body shape observed in families of patients with BN (Le Grange et al., 2009). It suggests that family pressure constitutes a risk factor for the development of eating disorders. Likewise, these results point to the relevance of contextualizing an individual's family environment when investigating an ED, and as a factor in treatment and prevention. Interventions designed to improve family dynamics and reduce criticism of an individual's body image and diet can be crucial in a comprehensive approach to eating disorders (Fuentes Prieto et al., 2020).

In a sample of American, Australian, Italian, and British university women (aged 17 to 30), the Family Pressure on Appearance Subscale of the SATAQ-4 was found to correlate significantly with the measurement of DEBs, body dissatisfaction and self-esteem. Similarly, in the present study, higher scores were found in the clinical group than the non-clinical group across all measurements (Schaefer et al., 2015).

The SATAQ-4 has also been adapted for men considering masculine beauty ideals (Schaefer et al., 2015). The questionnaire in the present study showed adequate reliability and validity values in women and men. However, the sample of men was not large enough to conduct a separate analysis by sex, which does not allow us to replicate the findings of this widely used instrument.

A study measuring family pressure on appearance in healthy women with an average age of 21 years found that neuroticism is related to critical comments towards children and the expression of certain values in that respect. It concludes that a negative effect only occurs when children

display some form of vulnerability, as borne out by theories on multifactorial influences in the etiology of EDs (Davis et al., 2004).

A systematic review of family pressure contributing to the development of eating disorders in the Asian population (Sun et al., 2023) found that pressure exerted by the mother is the variable with the greatest influence on the development of EDs. In general, it has been reported that parental criticism has a direct influence on the practice of dieting and weight loss in university students as found in the present study. Nevertheless, our study does not include specific questions on the pressure exerted by mothers (Chng & Fassnacht, 2016; Rodgers et al., 2009; Wertheim et al., 2002).

The study conducted by Ordaz et al. (2018) found that in women of Hispanic origin in the United States, pressure from family and the media is a key factor in the development and maintenance of eating disorders. This was also observed in another study on the central role played by the family in Hispanic culture in the development and maintenance of eating disorders (van den Berg et al., 2008). The tripartite model posits the influence of the media, family and peers in the development of DEBs and EDs. In Mexico, a country with high percentages of overweight and obesity (Barquera et al., 2024), where the family occupies a central role, it is important to measure the pressure the latter exerts on the development of DEBs and EDs.

The fact that women scored higher than men on factors 1, 2, 3, 4, 5, and 6 suggests that women experience greater family pressure to be thin than men. This is congruent with the higher incidence of both ED and DEB in women, consistently identified in national and international literature (Erriu et al., 2020; Medina-Mora et al., 2003; Escandón-Nagel et al., 2021; Martínez-González et al., 2014; Zila-Velazque et al., 2022; Mendoza & Olalde, 2019; Unikel-Santoncini et al., 2004; Díaz de León-Vázquez et al., 2017). It also provides a possible explanation for the difference in the incidence of EDs between genders. It highlights the fact that the ideal of beauty in women is prevalent in today's society, fostering the desire for thinness, whereas in men it is less prevalent given that the male body ideal tends towards increased muscle mass (Marcos Quiles et al., 2013).

People who self-identified as non-binary scored higher on nearly all the variables measured than women. These results suggest that non-binary individuals experience more family pressure to be thin than men and women. These results are congruent with the rate of 4.7% of non-binary people with a professional diagnosis of EDs (Diemer et. al., 2018). This is higher than the rates for men and similar to that of women, meaning that as a group, non-binary people are at a higher risk of developing ED, at least in comparison with men. However, since there were only two non-binary individuals in this study, further research with a representative non-binary sample is required to confirm this finding.

Regarding the different types of validity assessed with the questionnaire in our study, it is important to note that the modifications proposed by the experts consulted mainly involved adding obesity in addition to overweight. They also involved ensuring that the language did not include words that could be interpreted as offensive or aggressive. In general, the authors regarded the questions as pertinent, relevant and clear, and considered that they adequately covered the construct they were designed to measure.

In regard to construct validity, the instrument measures the variable it is intended to measure since the explained variance exceeded 50% (obtained value = 66.67%). In other words, this is not due to chance and each item is selected to develop the operational definition, so that the instrument has construct validity. Conversely, the results of the concurrent validity of the instrument show that the same construct is being measured with an external parameter, the family pressure subscale of the SATAQ-4, an instrument widely used in international research. This shows that the instrument adheres to what was previously theoretically established. Likewise, the fact that higher values were obtained in the clinical sample than in the non-clinical sample, and with statistically significant differences, indicates that there is an association between the constructs and the pathology studied. The results of the second-order confirmatory analysis indicate that the instrument has adequate psychometric characteristics, making it a useful tool in the study of family pressure to be thin in Mexican university students.

This instrument allows us to measure a factor in the development of eating disorders that was previously impossible to measure in depth. At least in Mexico there are only isolated questions in various questionnaires (Schaefer et al., 2015; Unikel-Santoncini et al., 2004) to measure this construct. The Family Pressure To Be Thin Scale is useful for diagnosing the risk of DEBs and EDs in academic, institutional and health contexts. It measures a construct previously identified as a risk factor for EDs (Le Grange et al., 2009; Keery et al., 2004; Schaefer et al., 2019), which will allow the design of more accurate prevention and intervention programs. It will also allow for more research and understanding of the DEBs and EDs phenomena.

The non-probabilistic convenience sample constitutes the greatest limitation of the present study, since it prevents the generalizability of the use of the scale developed to the entire population of Mexican university students. This study included an exploratory factor analysis of the Family Pressure To Be Thin Subscale of the SATAQ-4 questionnaire to obtain convergent validity. However, it would also be important to validate the questionnaire with a different sample and corroborate its validity. At the same time, the self-report format of this questionnaire poses a risk of response bias due to social desirability or lack of motivation (del Valle & Zamora, 2021). It would be useful to administer the questionnaire to other populations, and to obtain its

predictive and divergent validity. Validating this psychometric instrument with a probabilistic and representative sample of the population, and exploring divergent validity and predictive validity could enhance its psychometric qualities and usefulness and relevance for statistical, clinical and research-focused applications. In conclusion, the modified, validated questionnaire obtained adequate psychometric characteristics, making it a brief, useful tool for examining the relationship between family pressure and other constructs associated with mental health in the Mexican university population.

Funding

None.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

We would like to thank the following professors for their help in implementing the study in various country-wide populations: MSc. Martha Betzaida Altamirano Martínez, Dr. Miriam Wendolyn Barajas Márquez, MSc. Blanca Edith Pintor Sánchez, Dr. Francisco Rivas González, María Estefanía Rodríguez López, Dr. Iraís Castillo Rangel and Yazmín González Alvarado.

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APPENDIX 1

Final version of the family pressure to be thin questionnaire in spanish

#	*Item*
1	*Algún miembro de mi familia ha hecho comentarios que me han llevado a querer hacer ejercicio para bajar de peso*
2	Los comentarios de mi familia sobre la figura o peso corporal de otros me han llevado a realizar alguna acción para bajar de peso (uso de laxantes, diuréticos, dietas, ejercicio, vómito autoinducido, etc.)
3	Los comentarios de mis familiares sobre la cantidad que como me han llevado a querer cambiar mis hábitos de alimentación, para bajar de peso
4	Ver que mis familiares hacen dietas me ha llevado a realizar alguna acción para bajar de peso
5	Algún miembro de mi familia ha hecho comentarios que me han llevado a querer bajar de peso
6	Algún miembro de mi familia ha hecho comentarios que me han llevado a querer cambiar mis hábitos de alimentación para bajar de peso
7	Los comentarios de mi familia sobre su propia figura o peso corporal me han llevado a realizar alguna acción para bajar de peso (uso de laxantes, diuréticos, dietas, ejercicio, vómito autoinducido, etc.)
8	Los comentarios de mi familia sobre mi figura o peso corporal me han llevado a realizar alguna acción para bajar de peso (uso de laxantes, diuréticos, dietas, ejercicio, vómito autoinducido, etc.)
9	Durante mi infancia, mis familiares me limitaban la cantidad o el tipo de comida que consumía
10	Durante mi adolescencia, mis familiares me limitaban la cantidad o el tipo de comida que consumía
11	Mis familiares han hecho comentarios negativos sobre la cantidad o el tipo de comida que consumo, insinuando que voy a subir de peso
12	En la actualidad, mis familiares me limitan la cantidad o el tipo de comida que consumo
13	Mi familia me ha presionado a hacer dietas para bajar de peso
14	Los comentarios que ha hecho mi familia sobre su propia figura o peso corporal me han afectado negativamente
15	Los comentarios de mi familia sobre la figura o peso corporal de otros me han afectado negativamente
16	Los comentarios que ha hecho mi familia sobre mi figura o peso corporal me han afectado negativamente
17	Mi familia cree que las personas con sobrepeso son físicamente torpes
18	Mi familia considera que la delgadez es sinónimo de salud
19	Mi familia cree que las personas con sobrepeso son menos inteligentes
20	Mi familia cree que las personas con sobrepeso tienen poca fuerza de voluntad
21	Mis abuelos han comentado que yo no debería subir de peso
22	Mis abuelos han hecho comentarios negativos acerca del sobrepeso de otros
23	Mis abuelos han comentado que les preocupa o les desagrada subir de peso
24	Mi mamá ha comentado que le preocupa o le desagrada subir de peso
25	Mi papá ha comentado que le preocupa o le desagrada subir de peso
26	Mi mamá ha hecho o hace dietas para bajar de peso
27	Mis hermanos han comentado que yo no debería subir de peso
28	Mis hermanos han hecho comentarios negativos acerca del sobrepeso de otros
29	Mis hermanos han hecho o hacen dieta para bajar de peso

salud mental

ORIGINAL ARTICLE
Volume 49, Issue 2, March-April 2026
10.17711/SM.0185-3325.2026.11

Psychometric Properties of the OREA-Mx Psychological Capital Scale in Older Mexican Adults

Alba Serrano-Cena,[1] Soraya Santana-Cárdenas,[2] Nancy Pamela Castro Zazueta[3]

[1] Facultad de Psicología, Universidad Autónoma de Coahuila, Saltillo, Coahuila De Zaragoza, México.

[2] Departamento de Ciencias Económicas y Administrativas, Centro Universitario del Sur, Universidad de Guadalajara, Jalisco, México.

[3] Doctorado en Psicología con Orientación en Calidad de Vida y Salud, Centro Universitario del Sur, Universidad de Guadalajara, Jalisco, México.

Correspondence:
Soraya Santana-Cárdenas
Departamento de Ciencias Económicas y Administrativas, Centro Universitario del Sur, Universidad de Guadalajara, Av. Enrique Arreola Silva No. 883, Colonia Centro, 49000, Ciudad Guzmán, Jalisco, México.
Phone: +52 (34) 1575-2222
Email: soraya@cusur.udg.mx

Received: 27 May 2024
Accepted: 10 March 2025

Citation:
Serrano-Cena, A., Santana-Cárdenas, S., & Castro Zazueta N. P. (2026). Psychometric Properties of the OREA-Mx Psychological Capital Scale in Older Mexican Adults. *Salud Mental*, *49*(2), 73–83. https://doi.org/10.17711/SM.0185-3325.2026.11

ABSTRACT

Introduction. Psychological capital includes components of optimism, resilience, hope and self-efficacy with an impact on psychological well-being. **Objective.** To assess the psychometric properties of the OREA instrument measuring psychological capital and to analyze the relationship between this construct and its dimensions and depression in a sample of older adults in Mexico. **Method.** Quantitative, cross-sectional, non-experimental study. A total of 314 older adults (> 60) completed the sociodemographic data and cognitive impairment, psychological capital and depression scales. The mean age was 75.46 (*SD* = 8.382), 74.2% were female and 28.7% had completed elementary school. Clinical depression was present in 23.2%. **Results.** Statistical analysis was performed using R Studio software version 2023.09.1+494. The Chi-square model fit (χ^2) corroborated the four-factor structure of the instrument (Model 1) and the general scale of the instrument (Model 2), obtaining adequate fit indices (Model 1= χ^2/gl = 1. 05; GFI = .99; CFI = 1, TLI = 1; RMSEA = .04 and SRMR = .04 and Model 2= χ^2/gl = 1.06; GFI = .99; CFI = 1, TLI = 1; RMSEA = .04 and SRMR = .03). Cronbach's Alpha and McDonald's Omega coefficients were greater than .70. There is a significant negative correlation between psychological capital and its dimensions and depression **Discussion and conclusion.** The OREA-Mx version is a preliminary scale with adequate reliability in its second-order factor integrating the four dimensions for Mexican older adults. The correlation between psychological capital through four dimensions with depression is negative and significant, showing the protective nature of psychological capital against depression.

Keywords: Psychological capital, validation, aging, depression, positive psychology.

RESUMEN

Introducción. El capital psicológico y sus componentes optimismo, resiliencia, esperanza y autoeficacia impactan en el bienestar psicológico. **Objetivo.** Evaluar las propiedades psicométricas del instrumento OREA que mide capital psicológico y relacionar este constructo y sus dimensiones con la depresión en una muestra de adultos mayores en México. **Método.** Estudio cuantitativo, transversal y no experimental. Un total de 314 adultos (> 60) completaron datos sociodemográficos y las escalas de deterioro cognitivo, capital psicológico y depresión. La media de edad fue de 75.46 años (*DE* = 8.382), el 74.2% eran mujeres y el 28.7% tenía estudios primarios. El 23.2% presentaba depresión clínica. **Resultados.** Se realizó el análisis estadístico con programa R Studio versión 2023.09.1+494. El modelo de ajuste a través de Chi-square (χ^2) corroboró la estructura de cuatro factores del instrumento (Modelo 1) y la escala general del instrumento (Modelo 2), obteniéndose índices de ajuste adecuados (modelo 1= χ^2/gl = 1. 05; GFI = .99; CFI = 1, TLI = 1; RMSEA = .04 y SRMR = .04 y modelo 2= χ^2/gl = 1.06; GFI = .99; CFI = 1, TLI = 1; RMSEA = .04 y SRMR = .03). Los coeficientes Alfa de Cronbach y McDonald Omega fueron superiores a .70. Existe correlación negativa significativa entre el capital psicológico y sus dimensiones con la depresión. **Discusión y conclusión.** La versión OREA-Mx muestra una estructura de segundo orden integrando las cuatro dimensiones que la conforman, mostrando unos datos preliminares de la escala con una fiabilidad adecuada para adultos mayores mexicanos. La correlación entre el capital psicológico a través de sus cuatro dimensiones con la depresión es negativa y significativa manifestando su influencia como factor carácter protector.

Palabras clave: Capital psicológico, validación, adultos mayores, depresión, psicología positiva.

INTRODUCTION

Since its inception, psychology has focused on the limitations and disorders of human beings to improve their mental state. However, Seligman & Csikszentmihalyi (2000) recognize that positive individual characteristics of an individual contribute to improving their well-being and quality of life and promoting healthy behaviors (González-Cantero et al., 2017; López-Bustamante et al., 2021).

This new approach to intervening in human matters has been the basis of positive psychology, which identifies the subjective evaluation of an individual's experiences as valuable, considering aspects such as well-being, life satisfaction, hope and happiness (López-Linares et al., 2023).

Psychological capital (PsyCap), a concept introduced by Luthans et al. (2007) from positive organizational behavior, includes four key dimensions: self-efficacy, optimism, hope, and resilience. These factors are considered a vital resource for the psychological well-being of individuals and their ability to cope with challenges in the workplace (Luthans et al., 2015; Luthans & Youssef-Morgan, 2017).

Luthans et al. (2015) define psychological capital as follows:

> *"the positive psychological state of a developing individual that is characterized by (1) the confidence to exert the necessary effort to succeed in challenging tasks (self-efficacy); (2) making positive attributions (optimism) about current and future successes; (3) persevering towards goals and redirecting one's trajectory towards goals in order to succeed (hope); and (4) strengthening oneself and going the extra mile when faced with adversity and problems (resilience) to maintain success"* (Luthans et al., 2015 p.2).

Research on PsyCap in recent years has been extensive and prolific, showing the relevance of the construct and its positive effects on various areas of work (Blasco-Giner, 2023; Nguyen et al., 2024).

PsyCap also plays an important role in various populations, particularly older adults facing unique challenges related to aging, such as isolation, decreased physical capacity and changing social roles, as noted by the World Health Organization [WHO] (2024). In aging contexts, psychological capital serves as a protective factor, making it easier to adapt to life changes. Some studies have shown that PsyCap dimensions are associated with lower levels of depression symptoms and better mental health, and increased life satisfaction in older adult populations (Bedaso & Han, 2021; Xin & Li, 2023), as well as improvements in health-related quality of life (Raluca et al., 2024).

The study of psychological capital is of interest to older adults facing a variety of psychological processes derived from aging. Precisely in relation to the retirement stage, Rivera-López et al. (2023) suggest including the development and strengthening of psychological capital in people at this stage of transition as a preventive strategy. Lack of empowerment can be a risk factor for suicidal ideation and/or behavior (Montes de Oca & Rodríguez, 2019).

This is crucial in Mexico, because over 26.9% of adults over 60 suffer from depression and more than 39.4% from loneliness, affecting their mental health and well-being. Data reveal an increase of both conditions between 2018 and 2021 (INEGI, 2023).

In Mexico, there is a scale of psychological capital validated for the working population (Santana-Cárdenas et al., 2018) and other instruments measuring components of psychological capital such as compassion (López et al., 2019), self-compassion (López-Tello et al., 2022), resilience (Camacho-Valadez, 2016) and self-efficacy (Ramírez Dorantes & Canto y Rodríguez, 2007). These scales were mainly designed for university students, and contain more than 17 items, which can be tiring for older adults to answer.

The OREA scale, developed by Meseguer-de Pedro et al. (2017) in Spain, was originally designed to measure psychological capital in working people. The OREA scale consists of a total of 12 items, with three items per dimension, included in its acronym, which stands for Optimism, Resilience, Hope, and Self-Efficacy in Spanish. The scale comprises items that were representative of a broad cross-section of the population in relation to the activities and tasks they performed in their jobs. In terms of jobs, 53.1% held operational and administrative positions, 33.9% were technicians, and 13% were managers. In terms of education, 31% had completed primary education, 31% held degrees, 20% had received vocational training, and 18% had finished high school. The scale has sufficient evidence of reliability and validity with a sample aged between 18 and 62.

The authors of the scale report adequate fit values (GFI = .943; CFI = .936; RMSEA = .07), meaning that it is a consistent measure of psychological capital with sufficient evidence of reliability and validity (Meseguer-de Pedro et al., 2017). The validation study of the OREA scale in Spain evaluated two different models to understand the structure of psychological capital in workers. The statistical analyses, using structural equations, permitted the comparison of a first unifactorial model with a second four-factor model plus a second-order factor. The results showed that the four-factor model (optimism, resilience, hope and self-efficacy) with a second-order factor, corresponding to the global construct of psychological capital, offered a better fit. It obtained satisfactory goodness indexes (GFI = .940; CFI = .946; RMR = .22; RMSEA = .070) in relation to the unifactorial model (GFI= .890; CFI= .859; RMR=.057; RMSEA = .094).

These findings support the psychological capital concept as a higher order construct in the Spanish context (Meseguer-de Pedro et al., 2017). And although OREA has shown positive psychometric properties in Spain, cultural and demographic factors require additional validation in different national contexts, particularly in Mexico, where

cultural attitudes and aging experiences can vary considerably (Platania & Paolillo, 2022).

So far, no scientific evidence has been identified to support adaptations of the OREA scale in other countries apart from Spain that analyse the psychometric properties of the adapted instrument as recommended by the International Test Commission (2017). This highlights the need for research to evaluate the relevance and validity of the OREA scale in new cultural contexts, such as the elderly population in Mexico, to ensure its adequacy and accuracy in measuring the components of psychological capital.

The Mexican context of aging and the specific challenges faced by older adults highlight the need to adapt and determine the validity and reliability of this scale for this population. In the aging process, internal resources such as resilience, self-efficacy, hope and optimism are essential for coping with situations of isolation, changes in social roles and diminished physical abilities, typical of this stage of life (Luthans et al., 2015; Ortiz et al., 2021; López-Linares et al., 2023). Validation of the OREA scale in Mexican older adults will make it possible to obtain a culturally appropriate instrument to measure psychological capital in this group, facilitating the design of interventions to improve their well-being and quality of life.

Research on psychological capital constitutes an area of interest in several sectors, specifically the older adult population, which in the Mexican case represents a group that will increase significantly in the coming years. This is why it is important to have studies and measuring instruments, in this case, for psychological capital. The objective of this study is therefore to evaluate the psychometric properties of the OREA instrument in a sample of older adults in Mexico and to analyze the relationship between this construct and depression in these participants.

METHOD

Study design

This research is a quantitative, cross-sectional, non-experimental study. Current instrumental research seeks to analyze the psychometric properties of a psychological scale adapted for the Mexican older adult population.

Participants

The study was conducted with 314 older adults between September 2023 and March 2024. Inclusion criteria were being aged 60 and over, having a Mini Mental State Examination scale score (De Beaman et al., 2004) ≥ 23 and living in the metropolitan area of Monterrey, Nuevo Léon, Mexico.

Procedure

First, permission was sought from the authors of the OREA scale (Meseguer-De Pedro et al., 2017) to adapt the questionnaire into the same language in another culture. The second step was to follow Vallejo et al.'s (2017) guidelines. The scale was given to three Mexican professionals with experience in positive psychology to make observations and contributions for each item to see if they are understandable, sound natural or could be rephrased. The third step was to check the suggested changes with one of the reviewers to ensure that the items were representative and clear and that the understanding and interpretation of the item was appropriate to the content (International Test Commission, 2017; Muñiz & Elosua, 2013). Two or more experts suggested changes to two items, and one expert suggested word changes or modifications in three items. Finally, five items were modified from their original version (Table 1).

As suggested by Vallejo et al. (2017) and the International Test Commission (2017), a pilot test was conducted with 31 subjects. Cognitive interviews were conducted with four of them, contributing to content validity and minimizing the influence of any cultural and linguistic differences in the target population. Although no observations were made about understanding, reviewers altered the format, eliminating mention of the dimension being evaluated at the end of each item. Visual icons were included to avoid statistical biases.

Table 1
Modifications from original version to scale adapted for the mexican population

OREA Questionnaire	*OREA Questionnaire*
At difficult times, I usually hope for the best	At difficult times, I choose to hope for the best
I manage to achieve my goals even though there are obstacles.	I manage to achieve my goals even though there are obstacles.
I think my life has meaning	I think my life has meaning
I am confident I could effectively handle unexpected events	I am confident I could handle unexpected situations or events successfully.
When I think about my future, I'm always optimistic.	When I think about my future, I'm always optimistic.
Even when things go wrong, I don't give up.	Even when things go wrong, I don't give up.
I believe every day is valuable	I believe every day is valuable
Whatever happens, I'm usually able to handle it.	Whatever happens, I'm usually able to handle it.
Overall, I expect more good than bad things to happen to me.	Overall, I expect more good than bad things to happen to me.
I am capable of making difficult decisions	I am capable of making difficult decisions
I feel my life has value and is worthwhile	I feel my life has value and is worth living
I can solve most problems if I put in the necessary effort.	I can solve most problems if I make enough effort.

The final version was administered in person to individuals over 60 in 29 nursing homes, seven community centers for older adults, and relatives' homes in the metropolitan area of Monterrey, Nuevo León. All the participants and directors of the centers signed an informed consent form.

Measurements

Socio-demographic data: data were collected on age, educational attainment, and marital status.

Cognitive Impairment: the Mini Mental State Examination (MMSE) is a cognitive scale developed by Folstein et al. (1975) with a total of 30 items. It assesses temporal orientation, spatial orientation, coding and free recall, attention and calculation, language, verbal and visual comprehension and praxis with a point response format for each item correctly completed/answered. Mexicans aged 60 or over participated in the validation process (De Beaman et al., 2004; Instituto Nacional de Geriatría, 2020). The cut-off point is a score of 23-24 with a sensitivity of .97 and a specificity of .88 calculated from the receiver operating characteristics (ROC) curve.

Psychological capital: The OREA scale measuring psychological capital created and validated with the working population in Spain (Meseguer-De Pedro et al., 2017) was used. This version consists of 12 statements with four dimensions assessed by three items each: Optimism, Resilience, Hope and Self-efficacy. Reliability measured through the Composite Reliability Coefficient was between .73 and .89. After a cultural adaptation, the number of statements and Likert-type responses ranging from 1-Strongly Disagree to 4-Strongly Agree was maintained. Examples of the dimensions assessed include "*At difficult times I choose to hope for the best*" (optimism), "*I am able to make difficult decisions*" (resilience), "*I think my life has meaning*" (hope), "*I am confident I could handle unexpected situations or events successfully*" (self-efficacy).

Depression: the ENASEM Depression Questionnaire (Aguilar-Navarro et al., 2007) comprises a total of nine dichotomous questions to detect depression considering the past week. Positive responses are scored, except for items 4, 6, 9 in which the negative response is scored as a positive response to a depressive symptom. Reliability and validity for the Mexican context was established for the adult population aged 65 or older. Internal consistency was adequate (Cronbach's alpha .74). A score of ≥ 5 suggests that the person has depression symptoms . Test-retest reliability was excellent (CCI = .933).

Statistical analysis

Data analysis was conducted using two R Studio statistical software programs (version 2023.09.1+494). Confirmatory factor analysis (CFA) was performed for construct validity analysis using the following statistical software packages: Parameters, apa, Haven, ggplot2, ggpubr, gridExtra, apaTables, reshape, GPArotation, mvtnorm, psych, nortest, psychometric, lavaan, nFactors, semPlot, MVN and semTools. The correlation between depression and capital was determined (the function of each package and the syntax for data analysis are presented in annexes 1 and 2).

Answers were analyzed using multivariate distributions to identify the mean scores and standard deviation of OREA items and dimensions. Given the ordinal nature of the items, a matrix of polychoric correlations was generated to identify grouping patterns. Following the criteria of Viladrich et al. (2017), low (< .40) and high (> .70) correlations were established as references.

The validity of the internal consistency of the instruments was verified through confirmatory factor analysis (CFA) using the results of the descriptive analysis previously conducted and the correlation between items. For the OREA-Mx scale, two models were specified. Model 1 proposes four factors (optimism, resilience, hope and self-efficacy) and a second order factor (psychological capital) while Model 2 proposes a general factor, namely that the 12 items in the instrument constitute an overall psychological capital dimension.

For the CFAs, we used the Unweighted Least-Squares (ULS) estimator because the instrument has an ordinal scale and a ceiling effect on responses and the sample comprised fewer than 400 subjects (Viladrich, et al., 2017).

Based on the ULS estimator, the goodness of fit of the models was evaluated by Chi-square (χ^2) with its degrees of freedom (*df*) and significance. For this index, a statistically null value of χ^2 was considered excellent. In the CFI and TLI approximate fit indices, values equal to or greater than .90 were considered acceptable. SRMR and RMSEA values between .05 and .07 were considered acceptable and below .05 were considered good (Hu & Bentler, 1999). Regarding reliability, scores above .7 on McDonald's Omega coefficients (σ); were considered adequate (Viladrich et al., 2017).

Finally, the relationship between psychological capital and anxiety symptomatology was analyzed using Spearman's Rho test.

Ethical considerations

The following study was approved by the graduate academic board of the Universidad Autónoma de Coahuila Faculty of Psychology. The ethical guidelines corresponding to the code of ethics of psychologists were followed (Sociedad Mexicana de Psicología, 2009), providing informed consent forms for the directors of the centers attended. All participants signed informed consent forms, in addition to meeting the inclusion criteria, which involves the absence of cognitive impairment as assessed by the MMSE scale (De Beaman et al., 2004; Instituto Nacional de Geriatría, 2004).

RESULTS

Three hundred and fourteen of the 411 individuals assessed met the criteria. The mean score of MMSE was 26.42 (*SD* = 2.010) meaning that not all of them had cognitive impairment. The mean age of participants was 75.46 years (*SD* = 8.382). Regarding socio-demographic data, 74.2% of the sample were female, while 28.7% had completed elementary school and 26.4% middle school. A total of 45.9% of the sample were widowed, and 44.6% were homemakers while 32.5% were paid workers; 37.9% lived in a residence and 23.2% (*n* = 73) suffered from depression.

Construct validity

A descriptive analysis (Table 2) of the twelve items comprising the scale was conducted to obtain the mean, standard deviation, total correlation of items corrected, skewness and kurtosis of the scale. The results indicate negative skewness and positive kurtosis. These data suggest a distribution of sample responses above the mean, showing a sharp, rather than a flat, curve. In a total of five items, the kurtosis was greater than two, including one in the Skewness data. Normality testing was performed by exploring the shape of the data distribution with the Shapiro-Wilk test, the results of which rejected the null hypothesis of normality with a probability level of $p < =.10$ for all items.

Since the data followed a non-normal distribution, the matrix of polychoric correlations of the instrument items was estimated (Viladrich et al., 2017). Correlations fluctuated between .57 and .94 and two concurrent measurement models were analyzed using the ULS estimator (Table 3). In Model 1, fit indices were $\chi^2/df = 1.05$; GFI = .99; CFI = 1, TLI = 1; RMSEA = .04 and SRMR = .04; whereas in Model 2, fit indices were $\chi^2/df = 1.06$; GFI = .99; CFI = 1, TLI = 1; RMSEA = .04 and SRMR = .03.

While both models showed good or adequate fit indices, in Model 1, the loadings of the self-efficacy and hope factors showed multicollinearity, which, following the recommendations of Farooq (2022), was corrected using an inequality constraint to avoid implausible values (Figure 1).

Table 4 shows the reliability analysis performed on the twelve items comprising the psychological capital scale, yielding adequate McDonald's Omega and Cronbach's Alpha internal consistency coefficients, all of which were ≥ .70.

Descriptive statistics of OREA-Mx and association with depression

In terms of psychological capital, participants scored *M* = 42.11 (*SD* = 5.74) on the overall OREA scale; *M* = 10.54 (*SD* = 1.53) in optimism; *M* = 10.35 (*SD* = 1.64) in resilience; *M* = 10.96 (*SD* = 1.55) in hope and *M* = 10.22 (*SD* = 1.74) in self-efficacy. In depression, measured through the ENASEM, they obtained a mean score of M = 2.75 (*SD* = 2.35). At the same time, an analysis of the correlations of psychological capital scores, their dimensions and depression was performed (Table 5). Results showed a positive correlation between all dimensions and psychological capital. However, with regard to depression, results showed a significant, negative correlation between clinical depression and psychological capital, self-efficacy, hope and optimism, and to a lesser but significant extent resilience.

Table 2
Comparison between the student group and the clinical group with EDs in DEBs, the family pressure subscale of the SATAQ-4 and the factors in the family pressure to be thin questionnaire

Items	*M*	*SD*	*TCIC*	*Skewness*	*Kurtosis*	*Shapiro-Wilk*
O1	3.45	.70	.438	-1.45	2.60	.000
R1	3.38	.70	.485	-1.01	.97	.000
E1	3.59	.64	.594	-1.59	2.48	.000
A1	3.28	.74	.603	-.97	1.00	.000
O2	3.48	.67	.7	-1.18	1.10	.000
R2	3.56	.59	.77	-1.27	2.04	.000
E2	3.72	.55	.79	-2.42	7.60	.000
A2	3.41	.73	.61	-1.24	1.51	.000
O3	3.59	.56	.804	-1.70	3.52	.000
R3	3.41	.69	.59	-1.04	.92	.000
E3	3.65	.59	.781	-1.85	4.08	.000
A3	3.54	.62	.796	-1.32	2.07	.000

Note: M = mean; *SD* = standard deviation; *TCIC* = total correlation of corrected items.

Table 3
Fit indices of proposed models

Model	*χ²/gl*	*CFI*	*GFI*	*TLI*	*SRMR*	*RMSEA*
Model 1 (four factors + second order factor)	1.05	1	.99	1	.04	.04
Interpretation of fit index	Excellent	Good	Good	Good	Acceptable	Good
Model 2 (a general factor)	1.06	1	.99	1	.03	.04
Interpretation of fit index	Excellent	Good	Good	Good	Acceptable	Good

Note: CFI = comparative fix index; *GFI* = goodness of fit index; *TLI* = tucker-lewis index; *RMR* = root mean square; *RMSEA* = root mean square error of approximation.

Table 4
Reliability analysis of psychological capital dimensions

Coefficient	*OREA*	*Opt*	*Res*	*Hop*	*Self*
Cronbach's Alpha	.92	.80	.85	.91	.85
McDonald's Omega	.99	.70	.76	.86	.77

Note: Opt = optimism; *Res* = resilience; *Hop* = hope; *Self* = self-efficacy.

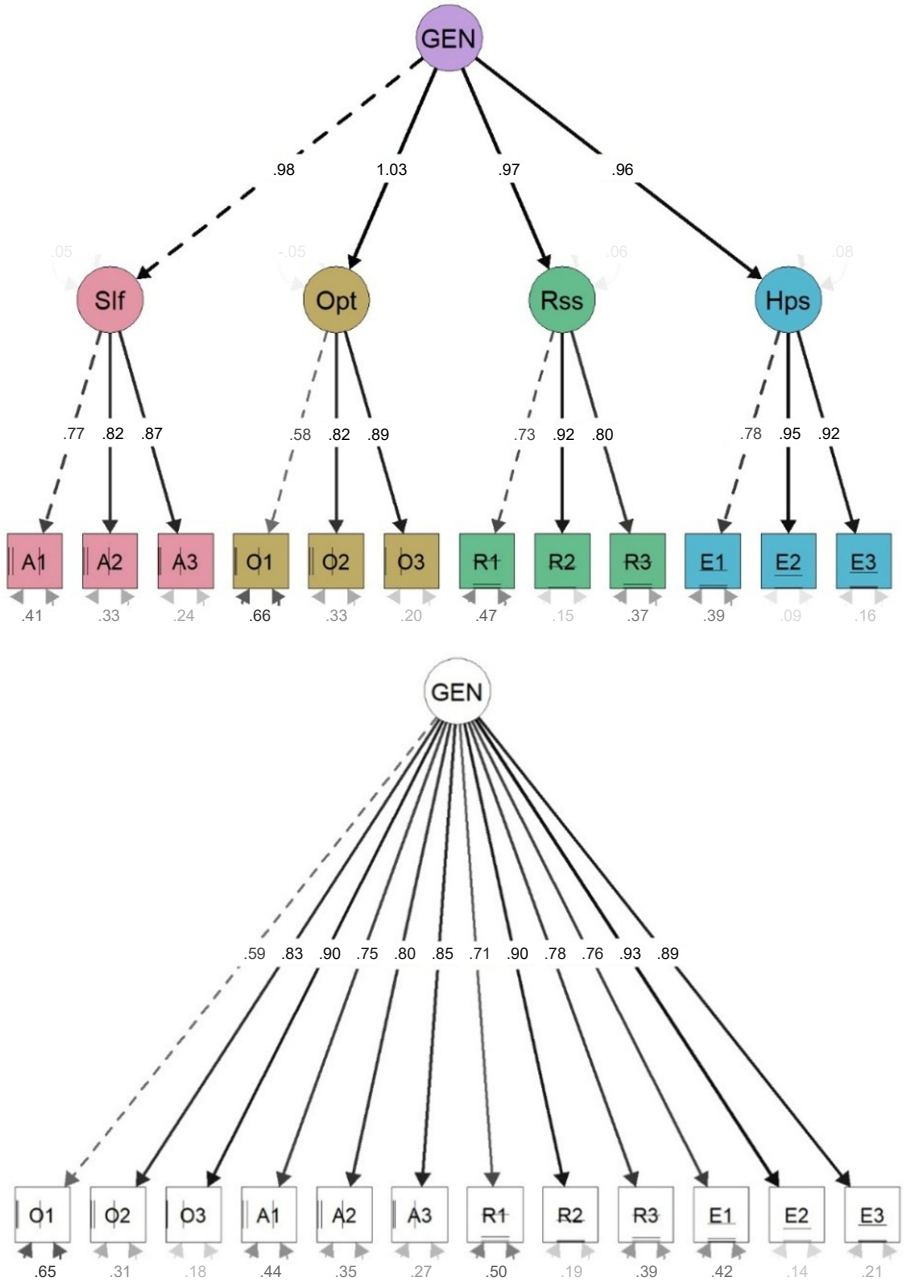

Figure 1. Confirmatory factor analysis. Above: Confirmatory factor analysis of Model 1. Below: Confirmatory factor analysis of Model 2.

Table 5
Correlations between psychological capital scores and their dimensions and depressive symptomatology

Psychological Capital	*Opt*	*Res*	*Hop*	*Self*	*Dep*
1.000	.870**	.885**	.812**	.895**	-.326**
Opt	1.000	.699**	.727**	.683**	-.253**
Res		1.000	.637**	.755**	-.214**
Hop			1.000	.652**	-.336**
Self				1.000	-.299**

Note: Opt = optimism; *Res* = resilience; *Hop* = hope; *Self* = self-efficacy; *Dep* = depression; * $p < .05$; ** $p < .01$.

DISCUSSION AND CONCLUSION

The aim of this study was to evaluate and validate the psychometric properties of the OREA psychological capital scale (Meseguer-De Pedro et al., 2017) applied to older adults in a city in the north of Mexico.

The reliability analysis and internal consistency coefficients were determined by using McDonald's Omega (.99) and Cronbach's Alpha (.92), indicating that the internal consistency of the scale is adequate, and that there is an intercorrelation between test items. The internal consistency data for

each of the dimensions were also adequate, ranging from .70 to .91. The kurtosis and skewness results are similar to the scores in the original instrument (Meseguer-De Pedro et al., 2017), with a tendency to show above-average responses.

The analysis of the scores obtained in the scale shows that Model 2, which conceptualizes psychological capital as a higher order integrating all its dimensions, presents solid, adequate adjustment indexes. Conversely, Model 1 also suggests that the dimensions of optimism, resilience, hope, and self-efficacy explain the construct of psychological capital, with consistent adjustment rates. In addition, in Model 1, multicollinearity problems were observed in the loads of the factors of self-efficacy and hope, which were adjusted through inequality restriction, following the recommendations of Farooq (2022), to avoid implausible values. The fact that the dimensions of self-efficacy and hope are highly correlated suggests that they are very similar to each other and should possibly be merged, given that they explain similar content. These findings support Model 2 as the optimal approach for understanding psychological capital as an integral resource encompassing various dimensions.

The second objective of this study was to evaluate the correlation between psychological capital, with its four dimensions (optimism, resilience, hope and self-efficacy), and depression. The results show a negative, significant correlation between psychological capital and depression, indicating that, as psychological capital improves, depression symptoms tend to decrease. This finding suggests that psychological capital, understood as a higher order construct, plays a protective role in mental illness. This higher-order characteristic has significant advantages in both prediction and intervention, since it makes it possible to approach psychological capital in an integrated way and focus intervention efforts on a set of interrelated strengths, which together enhance emotional well-being.

As an integral construct, psychological capital offers a structure that not only identifies specific areas of improvement (such as self-efficacy or optimism), but also facilitates holistic interventions covering all dimensions, thereby promoting a broader, lasting effect on well-being. In addition, these results are aligned with other studies confirming the positive impact of strengthening these resources on mental health and well-being, particularly in older adults (González-Celis & Lima-Ortiz, 2017; Ortiz et al., 2021; Rivera-López et al., 2023). It is therefore suggested that promoting psychological capital in this population could be an effective strategy for reducing vulnerability to depression and improving quality of life. Implementing intervention programs focused on psychological capital could have a significant impact on preventing and managing depression, thereby offering a protective, proactive approach to mental health care in older adults in Mexico.

In short, this research provides psychometric evidence of the validity of the OREA scale in a sample of Mexican older adults, extending its applicability beyond the Spanish population for which it was originally designed. In fact, the authors of the OREA scale (Meseguer-de Pedro et al., 2017) proposed cross-cultural or cross-national studies to determine whether results are similar in other countries. The results obtained in this research constitute a first approach to evaluating its psychometric properties in a different cultural context. This initial analysis suggests that the adapted version of this instrument maintains a coherent structure and adequate properties. However, one limitation of this correlational study is its inability to establish casual relations. Although the scale can be administered in the Mexican population with preliminary guarantees, it would be important to increase the sample.

The study presented here has further limitations. First, the adaptation and validation process was conducted with a specific sample of older adults in a city in northern Mexico. Caution is therefore recommended when generalizing the results to other regions of the country or to different cultural contexts. In addition, the procedures implemented, such as confirmatory factor analysis, were limited to a single sample, which prevents cross-sectional or longitudinal comparisons that could enhance the understanding of the psychometric properties of the instrument. It is also important to consider that self-reported data may be subject to response biases, which could influence the consistency of results. Future research expanding the sample and replicating the study in other cultural contexts could provide greater robustness and enable findings to be generalized.

This study shows a preliminary scale that is suitable for measuring psychological capital in a Mexican context, specifically in a city in the north of the country, which supports its use for future research and in clinical or social contexts serving older adults. Moreover, the negative and significant relationship between psychological capital and clinical depression highlights the potential of this scale to identify risk levels and psychological strengths in this population. These findings could be particularly useful for the design of preventive programs focused on the mental health of older adults, since they reinforce the importance of promoting psychological capital as a protective factor against depression. Incorporating the OREA-Mx scale into routine evaluations or intervention programs would not only make it possible to identify the risk of depression more accurately, but also to structure interventions enhancing optimism, resilience, hope and self-efficacy to improve the emotional well-being and quality of life of this population.

Funding

The first author was awarded a CONAHCYT grant for doctoral studies with grant number 824466.

Conflict of interest

The authors declare they have no conflicts of interest.

Acknowledgements

We would like to thank the public and private nursing homes and community centers in the city of Monterrey and the surrounding areas, such as the Dirección de Atención a Personas Adultas Mayores y Asistencia Social de Monterrey, Gericare, and others who opened their doors to us and gave us the possibility of improving the quality of life of older adults in Mexico.

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ANNEXES 1

Packages	*Function*	*Reference*
parameters	Processes the parameters of various statistical models	Lüdecke, D., Ben-Shachar, M., Patil, I., & Makowski, D. (2020). Extracting, Computing and Exploring the Parameters of Statistical Models using R. *Journal of Open Source Software*, *5*(53), 2445. https://doi.org/10.21105/joss.02445
apa	Takes the return value of a statistical test function and returns a structured string.	Github. (2025). *apa*. https://github.com/dgromer/apa
Haven	Imports and exports foreign statistical databases dto R.	Wickham, H., Miller, E., & Smith, D. (n.d.). *Cloud.r-project*. https://haven.tidyverse.org
ggplot2	Creates graphics by assigning variables and aesthetics.	Wickham, H. (2016). *Gráficos elegantes para el análisis de datos*. Springer-Verlag
ggpubr	Provides easy-to-use functions to create and customize ready-to-publish graphs based on 'ggplot2'	Kassambara, A. (2023). *Cran.r-project*. https://cran.r-project.org/web/packages/ggpubr/index.html
.gridExtra	Provides functions for organizing graphs and drawing tables	Auguie, B. & Antonov, A. (2017). *Cran.r-project*. https://cran.r-project.org/web/packages/gridExtra/index.html
apaTables	Creates tables in APA format from statistical results.	Field, A., Miles, J., & Field, Z. (2012). *Discovering Statistics Using R*. Sage.
reshape	Restructures and aggregates data in a flexible way using only two functions: casting and molding.	Wickham, H. (2007). Remodelación de datos con el paquete reshape. *Journal of Statistical Software*, *21*(12). https://www.jstatsoft.org/v21/i12/
GPArotation	Gradient projection algorithms for factor rotation.	Bernaards, C. A., & Jennrich, R. I. (2005). Gradient Projection Algorithms and Software for Arbitrary Rotation Criteria in Factor Analysis. *Educational and Psychological Measuremen*t, *65*(5), 676–696. https://doi.org/10.1177/0013164404272507
mvtnorm	Calculates multivariate normal and probabilities, quantiles, random deviations and densities.	Genz, A., & Bretz, F. (2009). Computation of Multivariate Normal and t Probabilities. Springer-Verlag.
psych	Multivariate analysis and scale construction using factor analysis, principal component analysis, cluster analysis and reliability analysis.	William, R. (2024). *Procedures for Psychological, Psychometric, and Personality Research* (Version 2.6.3). https://CRAN.R-project.org/package=psych
nortest	Five omnibus tests for testing the composite hypothesis of normality.	Gross, J. & Ligges, U. (2015). *Cran.r-project*. https://cran.r-project.org/web/packages/nortest/index.html
psychometric	Contains useful functions for correlation theory, meta-analysis (validity-generalization), reliability, item analysis, inter-rater reliability and classical utility.	Fletcher, T. (2023) *Cran.r-project*. https://cran.r-project.org/web/packages/psychometric/psychometric.pdf
lavaan	Fits a variety of latent variable models, including confirmatory factor analysis, structural equation modelling and latent growth curve models.	Rosseel, Y. (2012). lavaan: AnRPackage for Structural Equation Modeling. J*ournal of Statistical Software*, *48*(2). https://doi.org/10.18637/jss.v048.i02
nFactors	Indices, heuristics and strategies to help determine the number of factors/components to be retained.	Raiche, G., & Magis, D. (2023). *Cran.r-project*. https://cran.r-project.org/web/packages/nFactors/index.html
semPlot	Route diagrams and visual analysis of the output of various SEM packages.	Epskamp, A., Stuber, S., Nak, J. Veenman, M., & Jorgensen, T. (2022). *Cran.r-project*. https://github.com/SachaEpskamp/semPlot
MVN	Performs multivariate normality tests and graphical approaches and implements multivariate outlier detection and univariate normality of marginal distributions through graphs and tests and performs multivariate Box-Cox transformation.	Korkmaz S., Goksuluk D., & Zararsiz, G. (2014). MVN: An R Package for Assessing Multivariate Normality. *The R Journal*, *6*(2), 151–162. https://digitalcommons.unl.edu/r-journal/599/
semTools 2	Structural equation modelling, many of which extend the 'lavaan' package, e.g. to pool results from multiple imputations, probe latent interactions or test for measurement invariance.	Jorgensen, T.D., Pornprasertmanit, S., Schoemann, A.M., & Rosseel, Y. (2022). *semTools: Useful Tools for Structural Equation Modeling* (Version R 0.5-6.). https://cran.r-project.org/web/packages/semTools/index.html

ANNEXES 2

```
data=import("df")
ipak <- function(pkg){
 new.pkg <- pkg[!(pkg %in% installed.packages()[, "Package"])]
 if (length(new.pkg))
   install.packages(new.pkg, dependencies = TRUE)
 sapply(pkg, require, character.only = TRUE)
}

#usage
packages <- c("parameters","nortest","apa","haven","ggplot2","ggpubr","gridExtra"
      ,"apaTables", "reshape", "GPArotation", "mvtnorm", "psych", "psychometric",
      "lavaan", "nFactors", "semPlot", "lavaan", "MVN", "semTools")
ipak(packages)

#Descriptive analysis of the 12 items in the scale
describe(df)

# Shapiro-Wilk normality test
shapiro.test(df$O1)
shapiro.test(df$R1)
shapiro.test(df$E1)
shapiro.test(df$A1)
shapiro.test(df$O2)
shapiro.test(df$R2)
shapiro.test(df$E2)
shapiro.test(df$A2)
shapiro.test(df$O3)
shapiro.test(df$R3)
shapiro.test(df$E3)
shapiro.test(df$A3)
shapiro.test(df$OREA)
shapiro.test(df$Enasem)
shapiro.test(df$Self)
shapiro.test(df$Hop)
shapiro.test(df$Opt)
shapiro.test(df$Res)

# Correlation between psychological capital and depression
cor.test(x=df$OREA, y=df$Enasem, method = "spearman")
cor.test(x=df$OREA, y=df$Self, method = "spearman")
cor.test(x=df$OREA, y=df$Hop, method = "spearman")
cor.test(x=df$OREA, y=df$Opt, method = "spearman")
cor.test(x=df$OREA, y=df$Res, method = "spearman")
cor.test(x=df$OREA, y=df$Res, method = "spearman")

#Model 1 (four factors + second order factor)#
 Model 1 (four factors + second order factor)
  CAPfactor<-'
Selfs =~ A1+A2+A3
Opts =~ O1+O2+O3
Ress =~ R1+R2+R3
Hops =~ E1+E2+E3

GENERAL=~ Selfs+Opts+Ress+Hops
'
CFACAP <- cfa(CAPfactor,orthogonal=F, data= df, estimator="ULS",ordered
      =names(df))
summary(CFACAP, fit.measures=TRUE, std = T)
fitMeasures(CFACAP)
semPaths(CFACAP, intercepts = FALSE,edge.label.cex=1.5, optimizeLatRes =
      TRUE, groups = "lat",pastel = TRUE, exoVar = FALSE, sizeInt=5,edge.color
      ="black",esize = 6, label.prop=2,sizeLat = 6,"std", layout="tree2")
modindices(CFACAP, sort. = T, maximum.number = 10)
reliability(CFACAP)
reliabilityL2(CFACAP,"GENERAL")

#Model 2 (a general factor)#
  CAPfactor1<-'GEN =~ O1+O2+O3+A1+A2+A3+R1+R2+R3+E1+E2+E3'
CFACAP1<-cfa(CAPfactor1,orthogonal=FALSE,data=df,estimator="ULS",ordered
      =names(df))
summary(CFACAP1, fit.measures=TRUE, std = T)
fitMeasures(CFACAP1)
semPaths(CFACAP1, intercepts = FALSE,edge.label.cex=1.5, optimizeLatRes =
      TRUE, groups = "lat",pastel = TRUE, exoVar = FALSE, sizeInt=5,edge.color
      ="black",esize = 6, label.prop=2,sizeLat = 6,"std", layout="tree2")
reliability(CFACAP1)
```

salud mental

ORIGINAL ARTICLE
Volume 49, Issue 2, March-April 2026
10.17711/SM.0185-3325.2026.12

Comparative Structural Analysis of Magnetic Resonance Neuroimaging in Subjects with Schizophrenia and Schizoaffective Disorder

María Fernanda Andrade Reyes,[1] Francisco Polito Haro,[2] Alonso Benito De Celis,[3] Raúl Osorio Durán,[4] Mauricio Rosel-Vales,[5] Ana Fresán Orellana,[6] Mónica Flores Ramos,[6] Ricardo Arturo Saracco-Álvarez[7]

[1] Grantee of the Dirección General de Calidad y Educación en Salud, Secretaría de Salud, México. Escuela de Medicina y Ciencias de la Salud, Tecnológico de Monterrey, Campus Monterrey, México.
[2] Centro de Oncología y Radioterapia de Oaxaca, Secretaría de Salud, México.
[3] Benemérita Universidad Autónoma de Puebla, Puebla, México.
[4] Departamento de Imágenes Cerebrales, Subdirección de Servicios Clínicos. Instituto Nacional de Psiquiatría Ramon de la Fuente Muñiz, Ciudad de México, México.
[5] Subdirección de Consulta Externa, Servicios Clínicos. Instituto Nacional de Psiquiatría Ramon de la Fuente Muñiz, Ciudad de México, México.
[6] Laboratorio de Epidemiología Clínica. Subdirección de Investigaciones Clínicas. Instituto Nacional de Psiquiatría Ramon de la Fuente Muñiz, Ciudad de México, México.
[7] Subdirección de Investigaciones Clínicas. Instituto Nacional de Psiquiatría Ramon de la Fuente Muñiz, Ciudad de México, México.

Correspondence:
Ricardo Arturo Saracco-Álvarez
Subdirección de Investigaciones Clínicas. Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz. Calz. México-Xochimilco 101, San Lorenzo Huipulco, 14370 Alcaldía Tlalpan, Ciudad de México, México.
Phone: +52 (55) 4160-5349
Fax: +52 (55) 4160-5050
Email: saracco@inprf.gob.mx, dr_saracco@yahoo.com.mx

Received: 23 July 2024
Accepted: 11 March 2025

Citation:
Andrade Reyes, M. F., Polito Haro, F., Benito De Celis, A., Osorio Durán, R., Rosel-Vales, M., Fresán Orellana, A., Flores Ramos, M., & Saracco-Álvarez, R. A. (2026). Comparative Structural Analysis of Magnetic Resonance Neuroimaging in Subjects with Schizophrenia and Schizoaffective Disorder. *Salud Mental*, *49*(2), 85–90. https://doi.org/10.17711/SM.0185-3325.2026.12

ABSTRACT

Introduction. Schizoaffective disorder is a complex condition whose clinical manifestations overlap with those of schizophrenia, bipolar disorder, and depression. It is notoriously difficult to diagnose using the DSM-5 and ICD-11. Both the similarities with other diagnoses and the differences between the guidelines of these two diagnostic symptoms hamper its accurate diagnosis. Magnetic resonance imaging, however, is designed to identify specific differences and similarities in brain structures between disorders. **Objective.** To compare the total intracranial volume, gray matter, white matter, and cerebrospinal fluid in subjects with a schizophrenia or schizoaffective disorder diagnosis using a magnetic resonance imaging database drawn up by the INPRFM. **Method.** The images of 55 subjects per group (schizophrenia and schizoaffective disorder) were analyzed. The volumetric study was conducted using the CAT12 program for each of the images to obtain the total intracranial volume. The volumes of gray matter, white matter, cerebrospinal fluid, and total volume were compared using a general linear model including sex and group as fixed factors. **Results.** White matter volume was lower in schizophrenia, with no differences being observed by sex or sex and group interaction. No differences were found between groups in the remaining measurements. **Discussion and conclusion.** The study provides evidence of general neuroanatomical differences in schizoaffective disorder, supporting the notion that it is not just a variant of schizophrenia, but a clinically and biologically distinct condition.

Keywords: Schizoaffective disorder, schizophrenia, total intracranial volume, gray matter, white matter.

RESUMEN

Introducción. El trastorno esquizoafectivo es un diagnóstico complejo, con manifestaciones clínicas que se sobreponen con síntomas de otros trastornos, como esquizofrenia, trastorno bipolar y depresión. Diferencias que persisten para el establecimiento del diagnóstico entre el DSM-5 y la CIE-11, tanto las similitudes con otros diagnósticos como las diferencias en los criterios complican el diagnóstico diferencial. La resonancia magnética puede ser una herramienta que permita discernir las diferencias y similitudes específicas en las estructuras cerebrales entre trastornos. **Objetivo.** Comparar el volumen intracraneal total, materia gris, materia blanca y líquido cefalorraquídeo, en sujetos con diagnóstico de esquizofrenia y trastorno esquizoafectivo utilizando una base de datos de resonancia magnética del INPRFM. **Método.** Se analizaron las imágenes de 55 participantes por grupo (esquizofrenia y esquizoafectivo). El estudio volumétrico se obtuvo utilizando el programa CAT12 para cada una de las imágenes, obteniendo el volumen intracraneal total. Se compararon los volúmenes de materia gris, materia blanca, líquido cefalorraquídeo y volumen total mediante un modelo lineal general incluyendo sexo y grupo como factores fijos. **Resultados.** El volumen de sustancia blanca fue menor en la esquizofrenia, sin encontrar diferencias en el sexo, ni en la interacción entre sexo y grupo. No se observaron diferencias entre grupos en el resto de las mediciones. **Discusión y conclusión.** El estudio proporciona evidencia de disparidades neuroanatómicas generales en el trastorno esquizoafectivo, apoyando la noción de que no es sólo una variante de la esquizofrenia, sino una entidad clínica y biológicamente distinta.

Palabras clave: Trastorno esquizoafectivo, esquizofrenia, volumen intracraneal total, materia gris, materia blanca.

INTRODUCTION

The term "schizoaffective psychosis" was introduced by Jacob Kasanin to describe a group of patients with both affective and psychotic symptoms similar to schizophrenia, with acute onset in youth, following a stressful life event and with sufficient premorbid social adjustment. The term was further refined by Schneider in his famous "cases in the middle" as chronic psychoses behaving differently from schizophrenia. However, there has been controversy regarding the existence of the disorder as a distinct nosological entity (Arenas & Rogelis, 2006) ever since the term was first coined. It has been argued that it should be classified as a variant of schizophrenia or a major affective disorder (Abrams et al., 2008; Lake & Hurwitz, 2006), an in-between category (Cheniaux et al., 2008), or an independent entity (Tsuang, 1991). It has therefore been considered a clear failure of psychiatric disease classification systems (Shaw et al., 2008).

The fifth version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) defines schizoaffective disorder as a disorder with a prolonged major affective disorder as well as meeting criterion A for schizophrenia. At least two weeks of hallucinations and/or delusions without affective symptoms are also required (American Psychiatric Association, 2013).Conversely, the ICD-11 (International Classification of Diseases, 2024) defines it as the presence of all the characteristics of schizophrenia concurrently, or within a few days, with affective symptoms for at least four weeks. The main difference between these classification systems is that the ICD-11 conceptualizes schizoaffective disorder as a cross-sectional diagnosis, whereas the DSM-5 regards it as a longitudinal condition (Peterson et al., 2019). This complicates the establishment of an accurate diagnosis, which would facilitate the treatment, course, and prognosis of the condition.

This longstanding nosological debate is mainly due to the overlap between the clinical manifestations of schizoaffective disorder and those of schizophrenia and bipolar disorder, combined with the lack of specific biological markers to support diagnosis. Attempts have been made to pinpoint unique characteristics to identify schizoaffective disorder. For example, it has been found to be more prevalent in women than men, and it has an earlier age of onset, and a better prognosis and premorbid adjustment than schizophrenia (Benabarre et al., 2001; Saracco-Alvarez et al., 2009). Processing speed has also been proposed as a differentiating marker, being significantly higher in individuals with schizoaffective disorder than in those with schizophrenia (Mondragón-Maya et al., 2019). However, other studies have concluded that schizoaffective disorder follows a similar pattern to that of schizophrenia and bipolar disorder, with the same degree of deficient cognitive functions (Amann et al., 2012; Hartman et al., 2019).

Brain imaging techniques could be a source of specific biomarkers for psychiatric disorders. There is dearth of studies using computed tomography (CT) or magnetic resonance imaging (MRI) to analyze brain structures in schizophrenia and schizoaffective disorder. Most of them (Kuo & Pogue-Geile, 2019) fail to provide clear evidence of differences between diagnoses because the two pathologies are commonly included in a same group study or compared with other disorders. For example, Amann (2016) evaluated structural changes using voxel-based morphometry across four study groups with 45 subjects each: schizoaffective disorder, schizophrenia, bipolar disorder, and healthy controls. Patients with schizoaffective disorder were found to have a generalized reduction of gray matter similar to that of the schizophrenia group, and in both groups, this reduction was greater than in subjects with bipolar disorder Getz et al., 2002. Similar findings were observed in the study by Ivleva (2013). One hundred and forty-six patients with schizophrenia and 90 with schizoaffective disorder had gray matter reductions in similar regions compared to 200 healthy controls, while 115 patients with bipolar disorder had reductions in more limited regions. By including bipolar disorder, these studies concluded that schizoaffective disorder is closer to schizophrenia than bipolar disorder.

There is a need for research focusing exclusively on comparing the neuroanatomy of schizophrenia and schizoaffective disorder. Understanding the unique brain changes of each disorder can shed light on the clinical heterogeneity observed in practice, which can have significant implications for classification and clinical management. The main objective of this study is to compare total intracranial volume (Kijonka et al., 2020), specifically gray matter (GM), white matter (WM), and cerebrospinal fluid (CSF) volumes, in subjects diagnosed with schizophrenia and schizoaffective disorder. To this end, we used an MRI database drawn up by the Ramón de la Fuente Muñiz National Institute of Psychiatry (INPRFM).

METHOD

Study design

We performed an observational study with comparison groups, involving secondary analysis of a brain image database of subjects with schizophrenia and schizoaffective disorder.

Study sample

This study retrospectively used voxel-based morphometry on brain MRI images from the INPRFM database. All cases with a diagnosis of schizophrenia and schizoaffective

disorder in the hospital registry were included, followed by a search for those who had undergone magnetic resonance imaging in the past five years. Since clinical files were not documented, only images with subjects' sex and diagnosis were recorded. The final sample size was 55 complete images for each study group: subjects diagnosed with schizophrenia and those diagnosed with schizoaffective disorder. Inclusion criteria were brain MRI images of subjects evaluated at the INPRFM with a diagnosis of schizophrenia or schizoaffective disorder according to DSM-5-TR criteria, with at least two continuous years of this diagnosis, and images including a complete protocol of the scanner's routine sequences. Exclusion criteria were brain images with anything distorting any sequence and preventing the measurement of the volume to be studied, and images of subjects with structural diseases or anatomical variables. This study was approved by the INPRFM ethics and research committee.

MRI Acquisition and processing

Brain images were acquired with a Philips Ingenia 3 Tesla scanner and subjected to scanner protocol sequencing with a T1-weighted spin-echo sequence. The 110 brain images from the INPRFM database were processed using the method described earlier. Images were converted from the DICOM Connectivity Framework format to NII (MITA, 2020). Normalization was performed using Statistical Parametric Mapping 12 (SPM12) software in MATLAB (MathWorks, 2024) to remove artifacts and/or adjust the temporal and dimensional space of the images. This process corrects image deformities, matching the image in the reference field that adapts the original image, creating a lack of uniformity. The image must be normalized, and processing must be carried out using software that evaluates and adjusts distortions as part of the analysis, to analyze brain images using reference images (CAT12, 2023; The FIL Methods Group, 2014).

The procedure involves iteratively performing tissue classification by estimating tissue posterior probability mappings (TPMs) from the functional/anatomical image intensity values of the reference and registration, estimating the nonlinear spatial transformation that best approximates the posterior and anterior TPMs until they converge. Once the images had been normalized, they were subjected to a segmentation algorithm into classes according to the tissues observed: gray matter, white matter, and cerebrospinal fluid using the Computational Anatomy Toolbox CAT12 (Kurth, Gaser & Luders, 2015). Areas not belonging to the tissues of interest were removed.

The segmented images were 121 x 145 x 121 voxels with a voxel size of 1.5 x 1.5 x 1.5 x 1.5 mm. The range of values was varied so that each voxel had a value of approximately -800 to 32,800. At this point, images from the schizoaffective disorder group were automatically normalized in intensity to the same range of values as the schizophrenia group. Areas containing bone and adjacent soft tissue were removed. Finally, the volumetric study was performed using CAT12 (CAT12, 2023) for each of the 110 brain images, and the total volumes of GM, WM and CSF were measured.

Statistical analysis

For statistical analysis, we used SPSS Statistics 21. For demographic variables, age and sex, we used descriptive statistics, frequencies and percentages for nominal variables and means, and standard deviations for continuous variables. Initially, sex and age were compared between both groups using Chi-square (χ^2) and Student's t-test for independent samples, respectively, to determine their inclusion as covariates to control in subsequent comparative analyses. As we observed a difference by sex between groups, this variable was included as a covariate in subsequent analyses.

To obtain the total intracranial volume (TIV) in cubic centimeters (cc), the three values of interest, WM, GM and CSF (Kijonka et al., 2020), were added together and the meninges were not included in the analysis. General linear models were used to compare these variables between the schizophrenia and schizoaffective groups. These included the group (schizophrenia versus schizoaffective) and sex (men versus women) as fixed factors, and group by sex interaction.

Ethical considerations

The study protocol and procedures were approved by the Institutional Review Board of the INPRFM (CEI/C/062/2022), a specialized psychiatric institution dedicated toto clinical care, research, and teaching. Allimages were obtained from the INPRFM brain imaging department database.

RESULTS

Of the total 110 images obtained, 44.5% (n = 49) corresponded to men and the remaining 55.5% (n = 61) to women. Differences by sex were observed, where 67.3% (n = 37) of the images in the schizoaffective group corresponded to women, compared to 43.6% (n = 24) of the images in the schizophrenia group (χ^2 = 6.2, 1 gl, p = .01). The average age for the schizophrenia group was 37.6 years (*SD* 16.82), and 40.20 years (*SD* 10.14) for the schizoaffective group, with no differences between groups (t -.9, 108 df, p = .33).

The results of the comparison of TIV are shown in Table 1. A difference was observed between the schizophrenia and schizoaffective groups in WM volume, which was greater in the schizoaffective group. This difference was not observed between men and women, nor was there any interaction between group and sex. Regarding GM, CSF, and TIV, no differences were observed between groups, by sex, or in the interaction between group and sex.

Table 1
Comparison of white matter, gray matter, cerebrospinal fluid and total intracranial volume between groups and interaction by sex

	Schizophrenia n = 55		*Schizoaffective disorder n = 55*		
	Mean	*SD*	*Mean*	*SD*	*Test statistics*
White matter					
Men	411.5	26.2	424.2	25.7	Group F = 5.09, *p* = .02*
Women	409.3	24.6	419.5	25.9	Sex F = .46, *p* = .49
Total	410.5	25.3	421.0	25.7	Group x sex F = .06, *p* = .8
Gray matter					
Men	623.6	138.0	628.0	120.9	Group F = .08, *p* = .77
Women	644.3	136.1	655.2	133.8	Sex F = .81, *p* = .36
Total	632.7	136.3	646.3	129.3	Group x sex F = .01, *p* = .90
Cerebrospinal fluid					
Men	144.3	48.5	141.5	45.8	Group F = .22, *p* = .63
Women	154.4	37.6	148.8	44.3	Sex F = .98, *p* = .32
Total	148.7	44.0	146.4	44.5	Group x sex F = .02, *p* = .87
Total intracranial volume					
Men	1179.4	149.8	1193.9	144.1	Group F = .27, *p* = .60
Women	1208.1	143.3	1223.5	140.6	Sex F = 1.04, *p* = .30
Total	1191.9	146.3	1213.8	141.1	Group x sex F = 0, *p* = .98

Note: SD: Standard Deviation. * $p < .05$.

DISCUSSION AND CONCLUSION

In this study, we compared the total intracranial volume of subjects diagnosed with schizophrenia and schizoaffective disorder. A significant difference was found in WM volume between the two groups, whereas TIC, GM and CSF showed no differences. These findings may support the conceptualization of schizoaffective disorder as a separate condition from schizophrenia. However, there is still limited evidence from brain imaging comparing structural brain changes exclusively between these study groups. These diagnoses are usually classified as a single group in studies comparing them with other conditions such as bipolar disorder and depression (Ivleva et al., 2012; Madre et al., 2013; 2016). This strategy does not allow us to pinpoint specific differences and similarities in brain structures between schizoaffective disorder and other disorders, particularly with schizophrenia, limiting the evidence that could clarify part of the nosological difficulty explained.

GM volume changes are the most commonly reported findings in current research. Amann et al. (2016) and Ivleva et al. (2013) concluded that GM reductions in individuals with schizoaffective disorder resemble those in individuals with schizophrenia when compared to bipolar disorder. This could correlate with our finding of no difference in GM in the comparison between schizoaffective disorder and schizophrenia.

Differences between schizophrenia and controls show a greater reduction in total brain volume (TBV), including GM and WM, as described in many samples (Bethlehem et al., 2022; Fusar-Poli et al., 2013). However, these studies do not specifically analyze schizoaffective disorder as we did with the sample in our study.

The changes observed in WM have only been explored in patients with schizophrenia. Kubicki et al. (2005) included abnormalities in WM through structural MRI, voxel-based morphometry, and diffusion tensor imaging. Their findings suggested an alteration in the distribution of white matter cells and in the processes of maturation and myelination in individuals with schizophrenia. A study comparing monozygotic and dizygotic twin pairs discordant for schizophrenia with healthy control twin pairs found that both schizophrenic twins and their healthy twins had a decrease in total WM volumes. However a decrease in GM was only observed in the schizophrenia group (Hulshoff Pol et al., 2004). These authors concluded that WM alterations reflect a higher genetic risk. GM changes, however, are more associated with environmental factors, suggesting

that the findings in our study are due to differences in brain development origin, with fewer alterations due to environmental influences in the schizoaffective group.

Our study compared the structures mentioned above, highlighting that the group with schizoaffective disorder has a larger WM volume than the schizophrenia group. However, it is striking that, in other studies, the total volumes of both groups are smaller than the average of healthy control groups. For instance, in schizophrenia, a reduction of over 2% was estimated (Haijma et al., 2013), which in our sample increases the general volume reduction percentage in individuals with schizophrenia to 8.3% and in those with schizoaffective disorder to 6.6%. This is above the average of other studies (1,300 cc), which can be explained by the progression of volume loss with advancing age, as our sample is in the fifth decade of life. These differences could explain the various clinical presentations existing between these disorders. This finding underscores the importance of continuing to investigate differences between the two groups to identify the specific characteristics of each disorder, define possible biological markers, and increase the evidence of schizoaffective disorder as distinct from schizophrenia.

Although the use of whole brain volumes does not identify local anatomical abnormalities, it does indicate the presence of a general process. More advanced technologies could provide a more detailed analysis of these neuroanatomical changes. Some studies have used functional MRI (fMRI) to examine patterns in brain function and propose phenotypes or biomarkers for psychiatric disorders (Miranda et al., 2021). For psychotic disorders, Yan et al. (2022) used fMRI time series to integrate neural networks, clustering and interpretation for schizophrenia, bipolar disorder with psychotic symptoms, schizoaffective disorder and healthy subjects. This study proposed a deep classification and clustering framework to interpret disease-related networks and visualize the relationships among these groups. Interestingly, even with newer approaches, the schizoaffective group proved the most challenging to isolate and classify.

The following limitations should be considered. When examining WM, GM, and CSF volumes, only a general idea of structural changes can be obtained, making it difficult to correlate more directly with clinical manifestations of the conditions and possible hypotheses about their pathophysiology. Healthy controls were not considered in this comparative analysis, which may have biased the interpretation of results. Additionally, clinical information (time since diagnosis and pharmacological treatment) was unavailable for this study. Both variables could have implications for the structural changes found, as observed in schizophrenia (Moncrieff & Leo, 2010; Yang et al., 2021; Andreasen et al., 2013).

In conclusion, this study provides evidence on the neuroanatomical differences between schizoaffective disorder and schizophrenia, supporting the notion that schizoaffective disorder is not merely a variant of schizophrenia, but a clinically and biologically distinct entity. Our findings emphasize the importance of research focusing exclusively on comparing the neuroanatomy of these disorders for a deeper understanding of their underlying pathophysiology. Additionally, they draw attention to the need to consider these differences in clinical practice, which could have significant implications for the diagnosis, nosological classification, and therapeutic management of patients with schizoaffective disorder.

Future research using functional brain MRI could shed further light on the differences in the clinical phenomenon in patients and contribute to the development of a more consistent nosology of psychosis.

Funding

None.

Conflict of interest

The authors declare that they have no conflicts of interest.

Acknowledgements

Thanks are due to Dr. María de Lourdes Martínez Gudiño, Departamento de Imágenes Cerebrales INPRFM, and the Dirección General de Calidad y Educación en Salud, Secretaría de Salud, México.

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salud mental

ORIGINAL ARTICLE
Volume 49, Issue 2, March-April 2026
10.17711/SM.0185-3325.2026.13

Executive Function Evaluation in a Population of Children and Adolescents with Hearing Loss in Bogotá, Colombia

Sofía Ramírez-Guerrero,[1] Daniela Gómez-Barrera,[2] Isabella Monsalve-García,[2] Daniel Felipe Bueno-Santamaría,[1] Iván Pradilla,[1] Alberto Vélez-Van-Meerbeke,[1] Claudia Talero-Gutiérrez[1]

[1] Grupo de Investigación en Neurociencia (NeURos), Centro de Neurociencia - NeURovitae, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

[2] Semillero de Investigación en Neurociencia (SemineURos). Centro de Neurociencia - NeURovitae, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

Correspondence:
Claudia Talero-Gutiérrez
Neuroscience Research Group (NeURos). Center for Neuroscience-NeURovitae, School of Medicine and Health Sciences, Universidad del Rosario, Cra 24#63C-69, Bogotá, Colombia.
Phone: +57 (31) 5895-9271
Email: claudia.talero@urosario.edu.co

Received: 30 July 2024
Accepted: 25 March 2025

Citation:
Ramírez-Guerrero, S., Gómez-Barrera, D., Monsalve-García, I., Bueno-Santamaría, D. F., Pradilla, I., Vélez-Van-Meerbeke, A., & Talero-Gutiérrez C. (2026). Executive Function Evaluation in a Population of Children and Adolescents with Hearing Loss in Bogotá, Colombia. *Salud Mental, 49*(2), 91–98. https://doi.org/10.17711/SM.0185-3325.2026.13

ABSTRACT

Introduction. Hearing loss, regardless of the degree or etiology, delays language acquisition and communication skills and consequently executive function development. **Objective.** The aim of this study is to measure executive function performance in a population of children and adolescents with hearing loss in Bogotá, Colombia. **Method.** A cross-sectional observational study was conducted with participants between 5 and 16 years old with prelingual hearing loss and no previous diagnosis of intellectual disability. Six subtests were selected from the Child Neuropsychological Scale to evaluate performance in the following domains: planning and organizing, visual memory, non-semantic graphic fluency, cognitive flexibility, and attention. **Results.** Overall, percentile mean scores for the total population were average or above average for all subtests. Subjects scored lowest in visual memory domains, including both encoding and recall skills and highest in attention and non-semantic graphic fluency subtests. No significant associations were observed between independent variables (age at diagnosis, chronological age, degree of HL, type of hearing aid, and sex) and subtests scores. **Discussion and conclusion.** Although hearing loss can delay executive function development, our sample of Colombian children and adolescents with hearing loss receiving multidisciplinary therapy reported similar executive function performance to their normal hearing peers.

Keywords: Hearing loss, children, adolescents, executive function.

RESUMEN

Introducción. La hipoacusia, independientemente del grado o etiología, implica un retraso en la adquisición de las habilidades lingüísticas y comunicativas, y consecuentemente en el desarrollo de las funciones ejecutivas. **Objetivo.** El objetivo de este estudio es determinar el desempeño de la función ejecutiva en una población de niños y adolescentes hipoacúsicos en Bogotá, Colombia. **Método.** Se realizó un estudio observacional transversal con participantes entre 5 y 16 años de edad, con hipoacusia prelingual y sin diagnóstico previo de discapacidad intelectual. Se seleccionaron seis subpruebas de la Escala Neuropsicológica Infantil para evaluar el desempeño en los siguientes dominios: planeación y organización, memoria visual, fluidez gráfica no semántica, flexibilidad cognitiva y atención. **Resultados.** En general, la población total obtuvo puntajes correspondientes al promedio o superior al promedio en todas las subpruebas. Las puntuaciones más bajas correspondieron a los dominios de memoria visual, incluidas las habilidades de codificación y recuerdo, mientras que las puntuaciones medias más altas se registraron en las subpruebas de atención y fluidez gráfica no semántica. No se observaron asociaciones significativas entre las variables independientes (edad al momento del diagnóstico, edad cronológica, grado de pérdida auditiva, tipo de ayuda auditiva y sexo) y el desempeño en las subpruebas. **Discusión y conclusión.** Aunque la hipoacusia puede retrasar el desarrollo de la función ejecutiva, nuestra muestra de niños y adolescentes colombianos con hipoacusia que asistieron a terapia multidisciplinaria reportaron un desempeño similar de la función ejecutiva en comparación con los puntajes estandarizados de pares con audición regular.

Palabras clave: Pérdida auditiva, niños, adolescentes, función ejecutiva.

INTRODUCTION

Hearing loss (HL) is characterized by the inability to identify sounds below standard hearing thresholds (Lieu et al., 2020). Approximately 1.57 billion people have HL globally, a figure that is expected to rise to 2.45 billion people by 2050 (Haile et al., 2021). HL prevalence in Colombia is 4.3 per 1000 individuals under 10 years old (Vargas Dìaz & Neira Torres, 2015). Children and adolescents with HL may have delayed language development, compromising their performance in a variety of everyday tasks, particularly those related to executive function (EF). This is an integrated set of abilities resulting in a coordinated, flexible approach to achieve specific goals (Tirapu Ustárroz et al., 2008).

EF skills development is affected by a range of environmental factors, among which language acquisition may exert the strongest influence (Botting et al., 2017). Cognitive processes such as naming, categorization, generalization of the surrounding environment, and the capacity for abstraction are fostered by language (Svirsky et al., 2000), strengthening verbal and non-verbal task performance related to EF (Castellanos et al., 2016). Deaf children who have experienced a period without full access to both auditory and linguistic input have been found to experience greater difficulty in developing their EF, compared to their cochlear implant using peers (Hall et al., 2018; Figueras et al., 2008).

Surowiecki et al. (2002) underlined the association between attention, performing continuous tasks, and EF. In hearing-impaired children, attentional functions may be impaired or altered due to the differences in information processing. The absence of hearing input overloads the visual system affecting the ability to perform tasks properly. Moreover, Mitchell and Quittner (1996) considered that impairments in continuous performance tasks could be due to impaired cognitive abilities and difficulty determining which stimuli are targets and which are not. Both theories support and attempt to explain the concept of an increased risk of developmental impairment and poor task performance in children with HL compared to their normal-hearing peers (Kirby et al., 2019).

Several studies have shown that, compared with their normal-hearing peers, children and adolescents with both unilateral and bilateral HL experienced greater difficulty in tests of working memory, inhibition, cognitive flexibility, and attention (Figueras et al., 2008; Hall et al., 2018; Kirby et al., 2019; Kronenberger et al., 2013; Surowiecki et al., 2002). However, there is a dearth of studies focused on the Latin American, specifically Colombian pediatric population with HL and their EF performance. Moreover, there are a limited number of publications evaluating EF through neuropsychological tests adapted for the Spanish-speaking population.

The aim of this study is to determine EF performance in a population of children and adolescents with prelingual HL in Bogotá D.C, Colombia. It also seeks to describe the relationship between EF performance and individual HL characteristics such as the length of hearing aid or cochlear implant use, degree, etiology, and type of HL.

METHOD

Study design

A cross-sectional observational study was conducted according to the STROBE guidelines for cross-sectional studies.

Setting

The study was conducted at Fundación CINDA (Centro de Investigación e Información en Deficiencias Auditivas) (Center for Research and Information on Hearing Impairment) in Bogotá, Colombia. This center attends the hearing-impaired population through a multidisciplinary rehabilitation program focused on the development of communication skills. Most children at this center had either a cochlear implant or some sort of hearing aid and had attended therapy from an early age. Individuals at CINDA receive therapy based on the auditory-verbal therapy (AVT) methodology (Brennan-Jones et al., 2014). This type of therapy uses acoustic phonetic stimulation, designed to develop children's perception and auditory discrimination skills to achieve normal language development.

Participants

Participants were included on the basis of the following criteria: being aged between 5 and 16, prelingual HL (HL diagnosed before language acquisition), attending in-person therapy at the CINDA foundation who were also enrolled in regular schools, and providing written parent consent. Exclusion criteria included not having parental consent to participate in the study, individuals with post lingual HL, chronological age outside the established age range, concomitant diagnosis of intellectual disability as borne out by their medical records, and attending virtual-modality therapy. A total of 70 children were selected for the study. Those who did not meet the inclusion criteria were excluded from the study.

Intellectual disability can impact an individual's performance in cognitive and executive function tasks. Individuals with hearing loss and concomitant intellectual disability, according to their medical records, were therefore excluded from the study. To rule out intellectual disability, an initial evaluation was conducted by a multidisciplinary team comprising psychologists, speech-language pathologists and occupational therapists with experience working with children with HL. Standardized

tests were used in each discipline to place children in age groups for motor development, communication and intellectual functioning. For the latter, the institution's psychologists the WISC-R with the appropriate scores for the HL population.

A previous study showed a mean Complex Figure Retrieval score of 9.40 with a standard deviation of 3.91 (Rosselli-Cock et al., 2004). Taking an absolute accuracy of 10% to estimate this mean with an alpha of .05 yielded a sample size of 66 participants. Seventy participants were eligible and completed the tasks.

Measurements

Clinical and demographic factors were extracted from medical records at Fundación CINDA. Regarding HL, the following aspects were recorded for each participant: age at diagnosis, determined by the date of the hearing test or evoked potential reports; degree of HL, according to criteria defined by the American Speech-Language-Hearing Association (ASHA) (Clark, 1981); type of HL (conductive or neurosensorial) and laterality of HL (unilateral or bilateral) determined at the time of diagnosis and outlined in the medical records; type and model of hearing aid, and length of device use determined by the date of surgery in the case of cochlear implants or by the date of first programming for hearing aids. Risk factors for congenital HL were determined in accordance with the Joint Committee of Infant Hearing criteria (JCIH, 2019).

Each participant entered the examination room accompanied by one of their parents, where they were asked by a trained examiner to perform a series of selected EF tasks for approximately one hour. Examiners included a medical doctor with previous research experience in studies with children with neurodevelopmental and hearing disorders and three medical students, all of whom were trained to conduct the tests by an experienced psychologist in the field. Afterwards, parents were able to clarify issues regarding their children's performance. Finally, results were collected in an Excel database for subsequent statistical analysis.

The Child Neuropsychological Evaluation 2nd Edition, known in Spanish as ENI-2, evaluates neuropsychological development in children and adolescents between 5 and 16 years old. It is the first of its kind adapted to the Latin American pediatric population. The ENI-2 measures performance in thirteen cognitive areas including attention, constructive skills, memory (encoding and delayed recall), perception, oral language, metalinguistic skills, reading, writing, visuospatial skills, conceptual skills, and EF (Matute et al., 2014). The ENI-2 demonstrated good reliability through procedures such as test-retest, inter-rater reliability, and correlations with other psychometric tests such as the Wechsler Intelligence Scale for Children (WISC). It has also proven useful in the evaluation of various populations, including children with attention deficit hyperactivity disorder and learning disorders. Considering the particular characteristics of the population studied, only six cognitive subtests were chosen out of the thirteen available tests. We selected three domains that directly evaluate EF including fluency (verbal and graphic), cognitive flexibility, and planning and organizing, in addition to visual memory and visual attention subtests. We did not include subtests with a higher verbal component such as the verbal fluency and verbal memory subtests given that the population consisted of children and adolescents with HL. In addition, we did not include a large number of studies to prevent fatigue and distractibility in participants (Matute et al., 2013). These included the following:

- *Constructive skills:* The examiner presented a complex geometric figure to participants who were asked to copy it as accurately as they could. The drawing was scored according to the number of correct elements included. The maximum score was 12 points for children between 5 and 8 and up to 15 points for children aged 9 to 16.
- *Visual memory (encoding):* Participants were shown a series of geometric figures one by one. Each figure was shown for approximately one second. After all the figures had been presented, the participant was asked to draw the figures they remembered. This was repeated three more times. The number of correct figures was registered, the maximum score in each trial being 12 points for children aged 9 to 16, and 9 for those aged5 to 8. Examiners also evaluated the presence of intrusions, the inclusion of figures outside the original series, as well as perseverance, the repetition of a figure already included in the same trial.
- *Visual memory (recall):* 30 minutes after copying the complex figure, participants were asked to recall and draw the mentioned figure as accurately as they could.
- *Visual attention:* Participants were presented with a standardized matrix containing large and small animal silhouettes. They were asked to cross out the larger animal figures in the matrix. A point was awarded for every large animal crossed out, and a point was deducted for every small animal crossed out, with a perfect score of 44 points for all age groups.
- *Planning and organizing:* Participants were presented with three differently colored and sized wooden blocks. They were shown different configurations in which the blocks could be assembled and asked to replicate them with the fewest number of movements. A point was awarded for every correct construction made with the fewest number

of movements, for a total of 11 points for all age groups.

- *Non-semantic graphic fluency:* Using a standardized matrix, participants were asked to draw as many different designs composed of four lines only. A point was assigned for every correct design making a total of 34 points for all age groups.
- *Cognitive flexibility:* Using the feedback (correct or incorrect) provided by the evaluator, participants were asked to identify the principle (color, shape or number) underlying the grouping of a set of 54 cards. The number and percentage of correct answers was registered.

A raw score was obtained after each subtest had been conducted. Raw scores were converted to their equivalent normative scores (T score, percentile, scalar score) using the normative tables provided by the ENI-2 application manual. Although ENI-2 score systems are different for each age group (5 to 8 and 9 to 16 years old), the raw score obtained by each participant was subsequently converted to its equivalent normative score (T score, percentile, scalar score) allowing its comparison with an age-matched normative sample. Comparisons were made directly with established normative scores, rather than with each other. As indicated in the application manual, percentiles were then categorized as follows: percentile >84 (Superior), 84 (High average), 26-75 (Normal or average), 16 (Low average), 5-9 (Limit), ≤ 2 (Very low) with higher percentiles indicating better performance. Percentiles were used in statistical analysis as both a continuous and a categorical variable.

Statistical analysis

Data were recorded in a Microsoft Excel format. Raw scores obtained by each participant for each EF domain (visual attention, visual memory-encoding, visual memory-recall, cognitive flexibility, constructive skills, non-semantic graphic fluency, planning and organizing) were converted to standard scores (scalar score, T score and percentile) according to the normative score tables by age provided by the ENI-2 Application Manual (Matute et al., 2013). Statistical analysis was performed using STATA v18.5. Data were tested for normal distribution with the Shapiro-Wilk normality test. We used arithmetic mean and standard deviations for quantitative variables, and percentages and simple frequency distribution to describe qualitative variables. Given that the outcome variables did not follow a normal distribution, we performed non-parametric tests for variable comparison (Mann-Whitney test for 2-category variables and Kruskal-Wallis test for > 2 category variables). A $p < .05$ was considered significant.

A subgroup analysis was performed, categorizing each outcome variable (EF percentile) into group 0 (percentile 15 or less) and 1 (percentile > 15). This allowed direct comparison between individuals who had achieved an average or above average median score with those who had achieved a lower-than-average score. Additionally, we tested subgroups by degree of HL (moderate, severe, profound) to evaluate potential changes in the median subtest scores with increasing HL severity.

Ethical considerations

This is a study with minimal risk in accordance with resolution 008430 issued in 1993 ("Scientific, technical and administrative standards for health research") by the Colombian Ministry of Health. It follows national legal and ethical guidelines as well as those contemplated in the latest modification (World Medical Association [WMA], 2013) of the Declaration of Helsinki of the WMA ("Ethical principles for research involving human subjects"). This study was approved by the ethics committee at Universidad del Rosario with approval number DVO005 1825-CV1512.

RESULTS

A total of 70 participants were evaluated, including 34 girls (48.6%) and 36 boys (51.4%) aged between 5 and 16 with a mean age of 10.25 ± 3.02 years (range 5.2 to 15.8). According to the type of HL, only two participants (2.9%) were diagnosed with conductive HL, 67 with neurosensorial HL (95.7%), and one remained unclassified due to the lack of information in their medical records. Most participants had profound (80%), followed by severe (10%) and moderate HL (4.3%). No information in medical records regarding the degree of HL was available for four individuals (5.7%). Almost all participants had bilateral HL (97%), except for two who had unilateral HL (3%). Regarding the type of hearing aids, 53 of the 70 participants were cochlear implant users (75.7%), 18 out of 70 used hearing aids (25.7%), 17 used both (24.3%), and only three used a bone conduction system (4.3%). Age at diagnosis, as determined by a complete audiological evaluation or confirmed by auditory evoked potentials, ranged from one month to four years old. Risk factors for childhood HL in the population evaluated are outlined in Table 1.

HL and EF Performance

A total sample of 70 participants performed each EF subtest. Five participants were unable to complete the subtests for the cognitive flexibility domain, meaning that these data were excluded from the corresponding analysis. Raw scores for all subtests were converted to percentiles according to the age-matched normative samples included in the ENI-2

Table 1
Risk factors for hearing loss observed in the population studied

Risk factor	*Number of participants*	*Specific conditions identified (n)*
Family history (first degree) of childhood HL	5 (7.4 %)	
Neonatal intensive care > 5 days	15 (22.1%)	
Hyperbilirubinemia + exchange transfusion	4 (5.9%)	
Use of aminoglycosides > 5 days	6 (8.8%)	
Asphyxia or hypoxic ischemic encephalopathy	16 (23.5%)	
In utero infections	3 (4.4%)	Cytomegalovirus (2) Toxoplasma (1) Rubeola (1)
Craniofacial malformations and other birth conditions	8 (11.8%)	Hydrocephalus (2) Craniotomy (1) Bilateral microtia (2) Cochlear hypoplasia and vestibular dilatation + unique cochlear-vestibular cavity (1) Congenital bilateral labyrinth malformation + cochlear dysplasia (1) Oral facial clefting (1) Microcephalus (1)
Genetic syndromes	3 (4.4%)	GJB2 gene mutation (1) Waardenburg syndrome (2)
Culture-positive postnatal infections	9 (13.2%)	Bacterial meningitis (4) Chickenpox (5) Roseola (2) Measles (1)

Note: Based on the JEHDI 2019 guidelines for newborn hearing screening (JCIH, 2019).

Table 2
Descriptive results for executive function performance subtests

	N	*Missing*	*Mean*	*Median*	*SD*	*Minimum*	*Maximum*
Attention	70	0	73.5	79.5	26.8	.1	99.0
Visual memory encoding	70	0	28.5	26.0	26.4	.1	95.0
Constructive skills	70	0	61.0	75.0	26.9	.1	91.0
Non-semantic graphic fluency	70	0	73.8	95.0	34.7	.1	99.0
Visual memory recall	70	0	27.0	7.0	33.3	.1	95.0
Cognitive flexibility	65	5	54.1	63.0	39.3	.1	99.0
Plan/organize	70	0	50.9	50.0	27.0	.1	95.0

application manual. Standardized percentiles for each subtest are given in Table 2.

Overall, percentile mean scores for the total population were average or above average for all subtests (Figure 1). Participants scored lowest in the visual memory domains, including both encoding and recall skills, with the highest mean scores being reported for the attention and non-semantic graphic fluency subtests.

Among individuals who scored below average, 52.9% of participants scored below the 15th percentile for the visual-memory recall subtest, 5.7% for attention, 41.4% for visual memory–encoding, 10% for constructive skills, 14.3% for non-semantic graphic fluency, 16.9% for cognitive flexibility, and 10% for planning and organizing scores (Table 3).

Given that data for EF subtests did not follow a normal distribution, a non-parametric Mann Whitney test and Kruskal Wallis test were conducted to determine the association between EF scores and independent variables (age at diagnosis, chronological age, degree of HL, type of hearing aid and sex). However, no significant differences were found between the variables mentioned and EF subtest performance. Subgroup analysis by degree of HL showed no significant differences in terms of EF subtest performance.

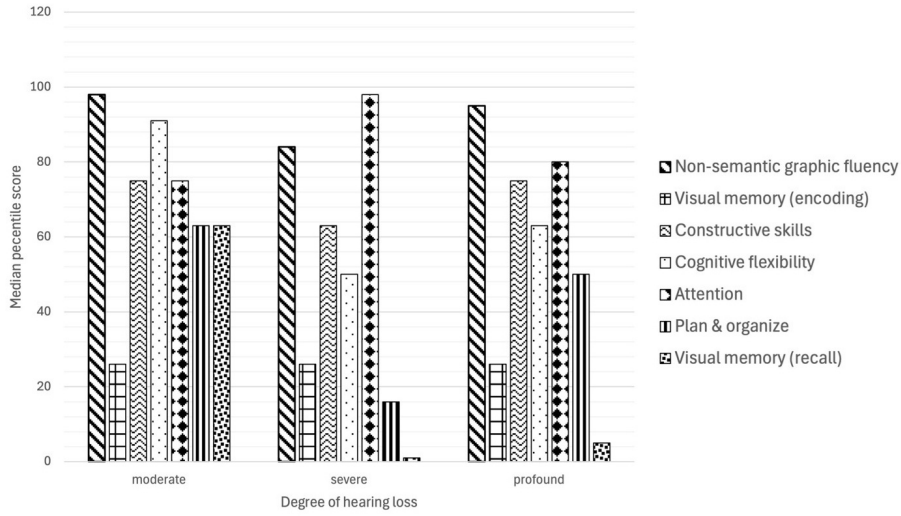

Figure 1. Median percentile scores by degree of hearing loss (HL).

Table 3
Frequencies and percentages of participants' scores above and below average according to the normative scores for each executive function subtest

Subtest	*Total (n)*	*Percentile*	*Frequency (n)*	*%*
AT	70	>15	66	94.3
		15 or less	4	5.7
VM-EN	70	>15	41	58.6
		15 or less	29	41.4
CS	70	>15	63	90.0
		15 or less	7	10.0
NSGF	70	>15	60	85.7
		15 or less	10	14.3
VM-RE	70	>15	33	47.1
		15 or less	37	52.9
CF	65*	>15	49	83.1
		15 or less	10	16.9
PO	70	>15	63	90.0
		15 or less	7	10.0

Note: Visual attention (AT), visual memory-encoding (VM-EN), constructive skills (CS), non-semantic graphic fluency (NSGF), visual memory-recall (VM-RE), cognitive flexibility (CF), planning and organizing (PO). * 5 participants were unable to complete the assessment, and were therefore excluded from the quantitative analysis.

DISCUSSION AND CONCLUSION

This study demonstrated the characteristics of EF performance in children and adolescents with prelingual HL, comprising both cochlear implant and hearing aid users, who were receiving auditory-verbal therapy. Notably, over half the participants obtained normal and even above normal normative scores in most of the domains evaluated, except for the recall memory subtest. Given that subtests were selected due to their limited auditory input, these results could reveal a strength in this population, associated with visual information processing. Nonetheless, participants obtained lower scalar scores in the visual memory tasks, which could be explained by a shorter attention span, distractibility and fatigue due to the duration and complexity of the tasks. These deficits may therefore be attributable to environmental factors, rather than a visual deficit in itself.

Our findings are supported by recent studies comparing 32 children with cochlear implant with their regular hearing peers, using multiple cognitive subtests (De Giacomo et al., 2021). These included forward and backward digit span tests for evaluating working memory, phonemic and categorical fluency subtests for cognitive flexibility, the inhibition and control of the impulse response-Continuous Auditory Feedback, and The Tower of London Test for planning and organizing. This study demonstrated that children with cochlear implants have significantly lower scores than normal hearing children in all EF domains, which the authors argue may be attributable to the absence of auditory stimuli and hearing deprivation during the perinatal period.

Findings showed no significant correlation between the length of time from diagnosis to device implementation and EF performance. Conversely, one study demonstrated that children with cochlear implant activation at a younger age performed better in working memory and cognitive flexibility domains, which could potentially be explained by the early recovery of auditory input (De Giacomo et al., 2021). Furthermore, this study concluded that hearing correction should be implemented before the age of three and a half in accordance with a critical period of brain plasticity, which enhances auditory capacity and EF development. Moreover, it has been demonstrated that young children with early cochlear implant activation, under two years of age, can develop age-appropriate basic phonological and cognitive skills compared with their normal hearing peers, particularly in regard to the working memory domain (Zhang et

al., 2022). This demonstrates that early hearing aid implementation is essential for adequate auditory stimulation and therefore improved performance in EF-dependent tasks.

Apart from hearing deprivation and auditory rehabilitation, language development constitutes an influential factor in the development of EF in children with HL. A recent study found that deficient language tended to increase the percentage of Flanker Interference Effect errors, meaning a decrease in inhibitory control, in 40 children with and without cochlear implants, compared with their normal hearing peers (Merchán et al., 2022). Linguistic development and its impact on EF is therefore determined by multiple factors rather than solely cochlear implant use. These factors include age at cochlear activation, social and environmental factors, appropriate exposure to language during the early years of life, school attendance, constant social interaction, and learning sign language, which contributes to stronger spoken language outcomes after cochlear implant activation (Merchán et al., 2022).

Most of the population evaluated belong to a low socioeconomic status, which limits their learning environment. However, at Fundación CINDA participants have had the opportunity to access integral therapies, including AVT, which focuses on attending, early vocalizing, recognition, feedback, sound locating, memory, sound distance and levels, producing vowels and consonants, speech discrimination and comprehension, short- and long-term memory and memory span (Ashori, 2022). Consequently, individualized integral therapy combined with coordinated communication with families and schools, can guarantee early intervention and facilitate language development and performance in EF.

Moreover, recent reports have considered AVT to be extremely useful for improving EF in children with cochlear implants (Ashori, 2022). This randomized case control study evaluated a group of 36 preschoolers, who received 20 sessions of AVT, with pre- and post-intervention assessments using the Behavior Rating Inventory of Executive Function Preschool Version. Findings suggest that AVT enhanced EF in participants in all subscales, including auditory skill, short-term memory, working memory, linguistic processing, planning and organizing.

In addition, a relationship has been proposed between the auditory correction method and EF, as well as speech perception and vocabulary. There is evidence that speech perception in adverse listening contexts is a key variable for linguistic, cognitive, and socioemotional development (Boerrigter et al., 2023). The aforementioned study compared speech perception, language development, and EF in children with severe HL with hearing aids and cochlear implants, finding poorer perception of soft speech in hearing aid users, related to receptive vocabulary and planning difficulties. This provides insights for future research related to EF performance in children with HL who communicate with and without sign language.

The cross-sectional nature and lack of statistical significance of the results make it difficult to determine the exact association between EF performance and HL characteristics (such as degree and type). This could potentially be improved in future studies by increasing the sample size and performing a longitudinal study, with more than one measurement per participant, to better highlight the directionality of EF performance as a potential consequence of HL. Despite selecting a limited number of subtests, the length of the test may have tired participants and eventually led to lower performance due to lack of interest, demotivation, and inattention. Although raw scores were converted according to the normative tables provided by the ENI-2, the lack of a control group limited the methodological quality of the study. Regarding the cognitive flexibility subtest, data from five participants were not considered for analysis due to their incomplete assessments, possibly influencing the statistical significance of our results.

In conclusion, participants showed performed better on attention and non-semantic graphic fluency subtests, while reporting more difficulties in visual memory domains, including both encoding and recall skills subtests. Nonetheless, our sample of Colombian children and adolescents with HL who were receiving multidisciplinary therapy achieved similar EF results to their normal hearing peers.

Funding

None.

Conflict of interest

The authors declare that they have no conflicts of interest.

Acknowledgements

We would like to thank the professionals, parents, and participants at Fundación CINDA who contributed to this research.

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Discurso con motivo de la solemne ceremonia conmemorativa del XX aniversario del fallecimiento del Dr. Ramón de la Fuente Muñiz (1921-2006)

Dr. Eduardo A. Madrigal de León

En nombre del Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, de la Asociación Psiquiátrica Mexicana, del Consejo Mexicano de Psiquiatría y de la Asociación de Médicos Egresados de este Instituto, les damos la bienvenida y agradecemos su asistencia a esta solemne ceremonia conmemorativa del XX aniversario del fallecimiento de nuestro maestro y fundador el Dr. Ramón de la Fuente Muñiz.

Hemos organizado esta ceremonia como convocantes las, tres instituciones creadas directamente por él, y como convocados, las personas e instituciones que fueron sus amores y a las que dedicó toda su energía en una brillante y ejemplar trayectoria. En primer lugar, su familia: sus hijas, hijo, sus niet@s y cónyuges, bisnietos aquí presentes y los demás a la distancia.

La Secretaría de Salud, con la presencia de la Dra. Patricia Clark Peralta, secretaria del Consejo de Salubridad General, en representación del Secretario de Salud, Dr. David Kershenobich Stalnikowitz, el Dr. Carlos Arturo Hinojosa Becerril, titular de la Comisión Coordinadora de Institutos Nacionales de Salud y Hospitales Federales y de la comunidad de nuestro Instituto.

La Universidad Nacional Autónoma de México, de la cual fue alumno distinguido, profesor emérito, funcionario, consejero y doctor *honoris causa*, representada por sus máximas autoridades: el Sr. Rector General, Dr. Leonardo Lomelí Vanegas, y la Dra. Ana Carolina Sepúlveda Vildósola, directora de la facultad de medicina de la UNAM.

Agradecemos también, y nos honra, la presencia de la Dra. Yerania Emiree Enríquez López, nueva comisionada nacional de Salud Mental y Adicciones, a quien aprovechamos para darle la bienvenida y desearle éxito en su gestión.

Saludo y agradezco la presencia de nuestros invitados especiales; mis compañeras y compañeros directores de los Institutos Nacionales de Salud y Hospitales Federales, los vocales de la Junta de Gobierno del Instituto, los presidentes de la Asociación Psiquiátrica Mexicana; el Consejo Mexicano de Psiquiatría, la Asociación Mexicana de Psiquiatría Infantil, la Sociedad Médica de Egresados de nuestro Instituto; directores de la CONASAMA, los directores de los Hospitales Fray Bernardino Álvarez y Juan N. Navarro, el jefe del departamento de Psiquiatría y Salud Mental de la UNAM; la Dra. María Elena Medina Mora, directora emérita de nuestra Institución; ex presidentes de la APM, funcionarios de varias instituciones amigas; y los miembros de esta comunidad; funcionarios, investigadores, profesores, personal médico y paramédico, la representación sindical, las y los médicos residentes. Y a todos ustedes, señoras y señores que nos acompañan. Bienvenidos.

El MAESTRO DE LA FUENTE: VISIONARIO DE MENTE ABIERTA Y PENSAMIENTO SISTÉMICO

En el marco de esta conmemoración, iniciamos el 25 de marzo, con el apoyo de su organizador e inspirador, el Dr. Francisco Gómez-Mont Ávalos, el XXII Coloquio de Neurohumanidades, un banquete académico que convoca, cada seis meses, a una gran variedad de especialistas de los más diversos campos del conocimiento y de la cultura para el intercambio, la confrontación constructiva de ideas y formas de pensamiento, como para la innovación y actualización sobre las diversas disciplinas que con-

vergen en el estudio y abordaje de la mente, la salud y la enfermedad mental. Tal y como lo hubiera querido el Maestro de la Fuente, pues cuando concibió y diseñó el Instituto de Psiquiatría, lo hizo desde la perspectiva de la teoría general de sistemas, el pensamiento sistémico, holístico, integral e integrador; defendiendo las convergencias, superando falsos dilemas y aplicando esta manera de pensar y organizar el trabajo de atención clínica e investigación en nuestras tres grandes vertientes: la investigación en neurociencias, en la clínica y en las ciencias epidemiológicas y sociales.

Somos una casa abierta y receptiva a los cambios, a las diferentes formas de pensamiento, sobre todo a la discusión seria y al intercambio transdisciplinar e interdisciplinar, cuidando, por supuesto, que cada quien se responsabilice de sus opiniones, aseveraciones, fundamentos y prácticas. Lo hacemos a través de estos foros y simposios, hemos organizado 40 ediciones de la Reunión Anual de Investigación, en la que damos cuenta de los principales avances en el trabajo multidisciplinario de nuestros investigadores, y mantenemos convenios con 67 universidades e instituciones de investigación nacionales y extranjeras.

EL LEGADO DE LA INVESTIGACIÓN

Al momento de fundar el Instituto, por encima de las otras dos tareas sustantivas, el maestro de la Fuente puso a la investigación como prioridad y lo definió con claridad en el mandato:

> *Relacionar, a través de la investigación, las disciplinas psicológicas y médicas para modificar la forma de entender la enfermedad mental, brindar una atención integral, transformar los hallazgos científicos en programas aplicables a la comunidad, formar recursos humanos sensibilizados y capacitados, mejorar las prácticas para la prevención de la enfermedad y formular recomendaciones para las políticas públicas en el país.*

El Instituto cuenta con 114 investigadores de carrera, más 14 funcionarios haciendo también investigación, 105 pertenecientes al SNI y, 2 eméritos.

Nuestro repositorio cuenta con 4,090 artículos publicados en revistas de alto impacto, de nivel 3 hacia arriba. Mantenemos; desde hace varios años, el tercer lugar entre los institutos del índice H, que mide las citaciones, y recientemente ocupamos el quinto lugar del ranking internacional Nature Index, entre las instituciones líderes en productividad científica en salud.

Tenemos 179 protocolos vigentes en 10 líneas de investigación, entre las que destacan, históricamente el estudio de las adicciones en México; todas las encuestas nacionales sobre el consumos de sustancias adictivas, alcohol y tabaco que se han levantado en el país, han sido elaboradas por nosotros y, en las tres últimas ediciones, en colaboración fundamental con nuestro instituto hermano de Salud Pública. Líneas de investigación en neurobiología y bases neurobiológicas de la conducta y las funciones mentales; la violencia en todas sus formas y en diversos grupos sociales; alternativas terapéuticas y de diagnostico para las enfermedades mentales; estudio de bases cerebrales en animales y desarrollo de tecnología biomédica aplicable al estudio del cerebro; modelos de intervención, psicoeducación y evaluación de redes sociales para la prevención, identificación temprana y atención oportuna de los problemas de la salud mental.

Somos Centro Colaborador de la OPS/OMS en materia de salud mental y adicciones desde hace 51 años.

Hace 8 años, en conjunto con nuestra máxima casa de estudios, la UNAM, se creó el Centro de Salud Mental Global, orientado principalmente a la investigación multicéntrica internacional, con una fructífera producción anual.

Como nos lo enseñó el Maestro de la Fuente, nuestros investigadores, a la hora de concebir un nuevo proyecto o línea de investigación, todos procuran hacerse dos preguntas: primera, la obligada científicamente y que se busca responder; pero la segunda, que consideramos tan importante como la primera, es el impacto social que buscamos con este proyecto, considerando los determinantes sociales, los problemas emergentes y las demandas de la actualidad. Pruebo mi aseveración con las centenas de financiamientos que, a lo largo de la historia, seguimos recibiendo de incontables instituciones y fundaciones públicas y privadas, nacionalesy extranjeras.

Además, esto acompañado de cientos de productos, consistentes en materiales de diverso tipo: libros, guías, manuales, cursos de educación continua, capacitación y, modernamente, programas de psicoeducación que utilizan las redes sociales. Son productos útiles para la traslación y la aplicación, directa o indirecta, en diversos grupos poblacionales objetivo.

SU PREOCUPACIÓN POR LA ATENCIÓN INTEGRAL PARA PACIENTES

Consciente de la exclusión histórica de los enfermos mentales del mundo "normal" y de sus médicos del mundo médico –propiciada, entre otras causas, por el aislamiento de los asilos psiquiátricos construidos en lugares alejados de las ciudades, en un sistema de atención paralelo al sistema de atención a la salud en general–, el Maestro de la Fuente, lucha y logra posicionar, como ningún otro en México, a la psiquiatría dentro del ámbito médico y en el concierto de las demás especialidades médicas.

La atención integral en esta institución, se realiza en dos modalidades: la atención hospitalaria y la atención ambulatoria; esta última a través de once clínicas temáticas especializadas, modelo único de atención en México, lo que nos permite estudiar a fondo al enfermo y su patología particular. Además, en ellas formamos, año con año, a varios

psiquiatras provenientes de todo el país y del extranjero en cursos de alta especialidad. Asimismo, desarrollamos un programa experimental de atención en el primer nivel en el Centro de Salud Mental y Adicciones (CESAMAC), ubicado en el centro de la ciudad, proyecto sucesor de la clínica de atención a pacientes con alcoholismo que el Dr. De la Fuente impulsó desde antes de la fundación del Instituto.

En el campo de la atención integral, no quiero dejar pasar y mencionar que, acorde a las demandas contemporáneas, hemos venido desarrollando, desde hace siete años, un ambicioso programa de atención a distancia, Telesalud Mental, con dos modalidades: la atención directa a los pacientes y, sobre todo, la atención a través de la Telementoría, única manera de acortar, ahora y en el futuro, la enorme brecha de atención a la población que requiere nuestros servicios.

Quiero destacar también que, bajo la coordinación de la CCINSHAE, desde la pandemia tenemos el mandato y desarrollamos con toda responsabilidad, un programa especial para la atención de la salud mental del personal de salud y de los médicos residentes, no solo de nuestras instituciones hermanas, sino de todo el país, a través de atención presencial y, sobre todo, a distancia.

EL MAESTRO DE LA FUENTE DIVULGADOR CIENTÍFICO Y CULTURAL

Fue un promotor de las publicaciones científicas en cada institución que fundó. Destaca la revista *Salud Mental*, creada incluso antes de la fundación del Instituto, de la mano de su primer y único editor, el Dr. Héctor Pérez-Rincón García; hemos publicado 48 volúmenes, con seis números por año, además de varios números y ediciones especiales. Es sin duda, la mejor y más reconocida revista especializada de México y Latinoamérica. También, hace seis años, en nuestra institución fundamos la revista *Mente y Cultura*, abierta a las demás disciplinas, dirigida a diversos profesionales de habla hispana, cuenta con seis volúmenes y dos números anuales a la fecha.

En la APM, fundó desde su inicio la revista *Psiquiatría* y, atendiendo sus preocupaciones y consejos para la publicación de obra científica propia y al alcance de los psiquiatras mexicanos y profesionales que leen en español en 2012, fundamos la editorial de la APM. En el lapso, esta editorial a publicado 85 títulos, divididos en dos grandes áreas: los científicos, temáticos y de actualización; y por otra parte, los de literatura, poesía, cuento, novela y divulgación cultural. La editorial de la APM camina a convertirse en una de las mejores editoriales temáticas en el idioma español.

ARQUITECTO DE LA PSIQUIATRÍA MEXICANA

Fue el arquitecto moderno de la psiquiatría mexicana; amó como pocos su profesión, y en particular, su especialidad, a la que le devolvió su identidad perdida en el tiempo y la definió con precisión:

"Hay en la psiquiatría una dualidad aparente: sus dominios son, por una parte, la experiencia subjetiva y los procesos interpersonales, y por otra, las funciones superiores del cerebro. Cuando los críticos señalan que los psiquiatras

tenemos la alternativa de “perder la mente”, que es lo que nos distingue de los neurólogos, o “perder el cerebro”, que nos distingue de los psicólogos, la alternativa es ficticia, ya que la ciencia avanza en la dirección de restaurar la unidad de la mente y el cerebro, y en este proceso, trasforma las enfermedades mentales en cerebrales, sin que por ello dejen de ser mentales”, fue dicho esto hace 65 años.

Al gremio, entonces incipiente, le dio unidad y fuerza política; fundo la Asociación Psiquiátrica Mexicana hace exactamente 60 años y fue el primer presidente. Hemos organizado centenas de eventos académicos en todo el país; destacan 29 congresos nacionales bienales y, coorganizado con la Asociación Mundial de Psiquiatría, tres congresos mundiales. El primero, en 1971, celebre en la memoria de todos los que asistieron, por su impecable organización, su calidad académica y, sobre todo, el recuerdo de la anfitrionia, consistente en el disfrute pleno de la calidez, la convivencia y la amistad con la que nos mostramos los mexicanos. Esto ocurrió hace 55 años. El año pasado tuvimos la oportunidad, el Dr. Heinze y su servidor, de cenar con el profesor Norman Sartorius, de 94 años, uno de los líderes de la psiquiatría mundial en los dos últimos siglos, quien nos comentaba, emocionado, que el mejor congreso al que ha asistido en su vida fue el Congreso Mundial en México en 1971.

La Asociación Psiquiátrica Mexicana es la agrupación mas grande e influyente de la psiquiatría mexicana, cuenta con 2,300 socios activos y 700 socios en adiestramiento y afiliados, y hoy día, la mayor parte de las instituciones psiquiátricas del país, las integramos y dirigimos, socios activos de la APM.

En 1972, fundó el Consejo Mexicano de Psiquiatría para validar y asegurar, a través de la certificación, la debida formación y calidad académica de los psiquiatras mexicanos, al igual que los demás de cualquier otra especialidad. Desde su fundación, el Maestro de la Fuente inscribe al Consejo Mexicano de Psiquiatría entre los primeros consejos agrupados en el Comité Normativo Nacional de Consejos de Especialidades Médicas, CONACEM.

Actualmente, somos 4,323 especialistas certificados en psiquiatría, psiquiatría infantil y de la adolescencia y medicina del sueño, de los cuales 2,395 cuentan con recertificación vigente.

EL LEGADO DEL HUMANISTA, FORMADOR Y MAESTRO

Su pasión y principal actividad fue la docencia: fue el maestro por antonomasia. Formó directamente, durante cincuenta años como profesor titular, a más de 500 especialistas en psiquiatría, e indirectamente, a traves de sus libros y folletos, a varias centenas más. De sus múltiples libros, conferencias, artículos, obras en coautoría y en autoría directa, destaca su libro de *Psicología Médica*, dirigido principalmente a estudiantes de pregrado de medicina y psicología, publicado en 1959, lleva 2 ediciones con más de cuarenta reimpresiones.

Para muchos de nosotros, y es mi caso, su lectura en el pregrado fue determinante para decidirme por la especialidad de psiquiatría. Lo he vuelto a leer para esta conmemoración y no encuentro un solo concepto, una sola interpretación, ni un solo párrafo que no tenga plena vigencia el día de hoy.

Nuestro Instituto instauró, desde 1990, la residencia en psiquiatría, que ha egresado hasta la generación 2026, a 634 especialistas en psiquiatría y varios más subespecialistas y graduados en cursos de alta especialidad; somos sede también de las maestrías y doctorados en ciencias médicas y de la salud pública, con enfoque en salud mental. Toda esta historia, siempre de la mano y con el apoyo incondicional de nuestra alma mater, la Universidad Nacional Autónoma de México, con sus facultades de Medicina y Psicología principalmente.

En todas las áreas de su polifacética vida, es un practicante y predicador del concepto canónico de las humanidades y de la filosofía humanista, que, en sus palabras, se resume en la certeza de que lo esencial es anteponer los valores de la vida humana a otros valores: el valor máximo es el hombre mismo, y se reconoce que todos los hombres son igualmente dignos, perfectibles y poseedores de estas potencialidades.

En sus célebres cursos, repetía incansablemente la importancia de la empatía y la escucha atenta, la comprensión; en suma, la visión de la persona y no solo de la enfermedad y el enfermo médico.

En uno de sus artículos más leído, publicado en 1993, denominado *Acerca de la Identidad del Psiquiatra*, el Maestro de la Fuente escribe uno de los párrafos más bellos que enaltecen nuestra especialidad. Lo utilizamos para darles la bienvenida a nuestros residentes y también para despedirlos después de su formación exitosa.

- No es fácil ser psiquiatra –dice el Maestro De la
- Fuente–, requiere poseer, en grado apreciable: integridad, responsabilidad, confiabilidad, sensibilidad, algo de imaginación y compasión. Jaspers se refirió a posser esa “rara combinación del escepticismo del científico y una profunda fe existencial”.
- Es, pues, un privilegio que solo debe ser puesto al alcance de quienes, además de tener adiestramiento técnico e integridad personal, estén animados por un interés genuino en los problemas humanos.

EL LEGADO FAMILIAR

En esta apretada síntesis damos cuenta de cómo sus discípulos hemos administrado su legado. Pero no solo somos nosotros, sino también, de manera muy especial y sublime, la familia de la Fuente ha acrecentado la continuidad de ese

legado. A través de la fundación familiar, tres de nuestros investigadores jóvenes, trabajadores en nuestra institución u otras, pero egresados de la nuestra, reciben cada año, después de participar en riguroso concurso, los premios más cuantiosos que se otorgan en este país para impulsar a estos jóvenes en su esencial tarea. Además, encabezadas primero por su nuera, Mónica y ahora por su nieta, Mariana, se han hecho cargo del voluntariado de nuestro Instituto, que ha cumplido la noble tarea de apoyar a nuestros pacientes más necesitados con medicamentos, ropa, ayuda a familiares, etc. Famlia de la Fuente: esta comunidad les vive agradecida, recibimos atentos su consejo y orientación cuando acudimos para ello; sentimos y disfrutamos de su amor y también, cuando ha sido necesario, nos acogemos a su mano protectora, son ustedes muy dignos herederos de la estirpe de su padre.

EL MAESTRO DE LA FUENTE, VISIONARIO Y PATRIOTA

Dotado de gran visión y capacidad organizadora, el Maestro de la Fuente coincidio en su tiempo con varios gigantes de la medicina mexicana de la segunda mitad del siglo pasado; alumno de unos y compañero de otros, les tocó concebir, diseñar y gestionar el sistema de salud mexicano, y entre muchos grandiosos proyectos, la fundación de los Institutos Nacionales de Salud. Instituciones de excelencia, hoy día reconocidas y sin distingos entre las mejores del mundo, hoy, a noventa, ochenta, cincuenta y veinte años, todos cumplen con creces su misión y tenemos resultados y un bien ganado prestigio entre la sociedad.

Una de las claves que explican este venturoso desarrollo fue la capacidad y visión de estos gigantes para construir las instituciones con cimientos y pilares sólidos, y luego, la construcción paulatina, constante y con líneas de continuidad muy claras de los edificios de la investigación, la atención especializada, llamada del tercer nivel, y la formación de recursos humanos altamente especializados. La otra clave que, a mi juicio, explica este desarrollo ha sido, sin duda, el apoyo necesario para la consolidación de nuestras instituciones por parte de las diferentes administraciones y gobiernos que atraviesan esta historia; y por supuesto, estas dos últimas administraciones no son la excepción.

También sabemos que en todas las épocas se proponen cambios: algunas administraciones promueven cambios para mejorar, algunas otras, como las actuales, proponen cambios más profundos, cambios para transformar.

Otra de las virtudes del Maestro de la Fuente y sus colegas fue el advertir a tiempo, entender, aceptar y adaptarse a los cambios diversos propuestos en cada ocasión, siempre bajo la premisa de defender las instituciones y sus tareas sustantivas, en beneficio de la población mexicana.

Pero hoy en día, cuando se trata de cambios transformadores como los que nos corresponde ejecutar a los responsables del presente, hemos de ser sinceros y confesar que a algunos nos genera angustia y nos cuesta un poco más de trabajo entender, a la primera, las medidas específicas que hemos de asimilar y los cambios que hemos de hacer para ajustarnos y coincidir, contribuyendo al gran proyecto transformador de la salud que se lleva a cabo en nuestro país.

No puede haber mejor proyecto para nuestro país que alcanzar la atención en salud universal y gratuita para toda la población.

Para ello, señora Presidenta; señor Secretario de Salud; señor Rector de la UNAM: hablo en nombre de mi Instituto, pero estoy seguro de contar con el aval y nombre de los demás, cuenten con nosotros; confíen en nosotros para cumplir esta anhelada meta, pues también recibimos del maestro y los demás gigantes el legado de su patriotismo y amor por México.

El Maestro Ramón de la Fuente Muñiz fue un hombre de valores: recto, de conducta intachable, pública y privada; creyente en el hombre, en su supremacía evolutiva y sus potencialidades. Fue un gran patriota que amó a México profundamente y que, a su paso por esta vida, trascendió con su acción y alcanzó la condición especial de las personas benefactoras de la humanidad entera. Que siga viviendo en nuestras memorias y, al imitar su ejemplo, honremos su legado acrecentándolo para el bien de nuestro México.

Dr. Eduardo A. Madrigal de León.
Director General del Instituto Nacional de Psiquiatría
Ramón de la Fuente Muñiz.
Ciudad de México, 27 marzo de 2026.