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Comparative study on the prevalence of traumatic events and post-traumatic stress disorder in non-refugee immigrants and native-born individuals with psychotic disorders, and its association with psychosis age of onset.

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To Losel for his constant support and to my siblings Hanan and Youcef my best life companions.

*"The migratory bird symbolizes the soul's journey—
a passage from one world to another, seeking a place
of rest and renewal."*

— *Mehmet Murat İldan*

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Esta ha sido la parte más difícil de escribir de esta tesis y la que más he procrastinado. Primero, porque lo emocional no es mi fuerte y segundo, porque, *interestingly*, tengo la retórica totalmente atrofiada de tanto leer artículos científicos.

Desde pequeña tenía claro que quería hacer la tesis incluso antes de saber a lo que me quería dedicar. En casa, cuando me aburría, hojeaba la tesis de mi padre, recuerdo que era muy pesada, tenía una tapa dura de piel y letras bordadas en dorado, todo muy "académico". A pesar de que me parecía aburridísima porque tenía mucho texto y pocos dibujos, había unas figuras geométricas similarmente distintas que me despertaban mucha curiosidad. Mi padre me explicó que esas figuras representaban cosas que había en la naturaleza. También me hacía gracia imaginarme a mi padre en Manchester, escribiendo esa tesis, con sus gafas ochenteras de científico loco, fumando compulsivamente Marlboro y escuchando Pink Floyd y música árabe. Tenía muchas preguntas en aquel entonces: ¿cómo pueden unas figuras geométricas representar la naturaleza? ¿Porque mi padre no podía usar más esa tesis? ¿De qué le sirvió? Con los años he ido pudiendo responder a las preguntas: entendí que esas figuras eran cuadriláteros de formulación química orgánica, también descubrí que el mundo no es justo y que la meritocracia no existe. Que existe una discriminación institucional y sistematizada hacia las personas migradas y racializadas que impide que partan de la misma casilla, y,

que a veces tienen suerte y sobrepasan estas barreras, pero muchas veces no. Respecto a la última pregunta, creo que no tiene respuesta, pero lo que tengo claro es que a mí me ha servido para inspirarme y para querer seguir el mismo camino. Así que gracias Papa por ser un referente académico y por haber despertado en mi la curiosidad y el interés científico.

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Abbreviations

AN	Adult Neurogenesis
AOP	Age of Onset in Psychosis
BDNF	Brain-Derived Neurotrophic Factor
CAR	Cortisol Awakening Response
COMT	Catechol-O-Methyltransferase
CRP	C-Reactive Protein
CTQ	Childhood Trauma Questionnaire
CTS	Cumulative Trauma Scale
DNA	Deoxyribonucleic Acid
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, 5th Edition
EGEP-5	Global Assessment of Posttraumatic Stress Questionnaire
eCB	Endocannabinoid
EU	European Union
FEP	First-Episode Psychosis
GxE	Gene-Environment Interaction
HPA	Hypothalamic-Pituitary-Adrenal
ICD-10	International Classification of Diseases, 10th Revision
IL-6	Interleukin-6
IOM	International Organization for Migration
IQ	Intelligence Quotient
MCP-1	Monocyte Chemoattractant Protein-1
MMSE	Mini-Mental State Examination
OLS	Ordinary Least Squares
PANSS	Positive and Negative Syndrome Scale
PTSD	Post-traumatic Stress Disorder
SAMHSA	Substance Abuse and Mental Health Services Administration
SPSS	Statistical Package for Social Sciences
TNF-α	Tumor Necrosis Factor-Alpha
t	t-student
UK	United Kingdom
UN	United Nations
US	United States
WHO	World Health Organization
X²	Chi-Square

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Prologue

This doctoral thesis was undertaken between 2018 and 2024 firstly during my psychiatric residency at the Institut de Salut Mental Hospital del Mar, followed by my role as a Psychiatrist in the Acute Hospitalization Unit and Early Psychosis Program at the same institution. Additionally, since my residency I have been a pre-doctoral researcher at the Hospital del Mar Medical Research Institute and a member of the Mental Health Networking Biomedical Research Centre (CIBERSAM). This thesis includes a 4-month international internship at the Trauma Center of the National Center for Mental Health, Seoul, South Korea.

The thesis is presented as a compendium of three research articles, with two articles having been published in peer-reviewed international journals and one currently being under review.

Study 1

Trabsa A, Redolar-Ripoll D, Vargas L, Llimona A, Hogg B, Valiente-Gómez A, Pérez V, Moreno-Alcázar A, Amann BL. A comparison of PTSD and traumatic event rates in a clinical sample of non-refugee immigrants and native-born individuals with a psychotic disorder: a case-control study. Eur J Psychotraumatol. 2023;14(2):2263151. doi: 10.1080/20008066.2023.2263151. Epub 2023 Oct 17. PMID: 37846737; PMCID: PMC10583634.

IMPACT FACTOR 2023: 4.2
QUARTILE 2023: Q1

Study 2

Trabsa A, Solanes A, Hogg B, Valiente-Gómez A, Mané A, Pérez V, Moreno-Alcázar A, Amann BL. A Comparative Analysis of Psychosis Age of Onset and its Association with Psychological Trauma in Non-Refugee Immigrants versus Native-Born Individuals. Currently under review, published as pre-print.

Study 3

Trabsa A, Casanovas F, Pérez V, Moreno A, Amann B, Mané A. Comparison of male and female non-refugee immigrants with psychosis: clinical, sociodemographic, and migration-related differences and impact on stress. Arch Womens Ment Health. 2024 Feb 19. doi: 10.1007/s00737-024-01431-7. Epub ahead of print. PMID: 38374484.

IMPACT FACTOR 2023: 3.2
QUARTILE 2024: Q2

In addition to the three main research articles, a 4-month internship at the National Center for Mental Health in Seoul, resulted in a fourth article, broadening the research scope:

Finally, throughout these years, the doctoral candidate has made dissemination of these studies in international mental health conferences:

Poster: Comparison of trauma exposure between immigrant and non-immigrant psychotic patients (33rd ECNP).

Poster: The incidence of posttraumatic stress symptoms and physical illness and social adjustment in disaster victims (28th EPA).

Poster: Comparison of developmental trauma between immigrant and non-immigrant psychotic patients (29th EPA).

Oral Communication: Cumulative trauma exposure comparison between non-refugee immigrants and locals with psychotic disorder (31st EPA).

Poster: The forgotten: Immigrant women with psychotic disorders. Comparison of traumatic burden between immigrant and local women with psychotic disorder, an intersectional approach (IV EMWMH).

Poster: Diferencias en la exposición a eventos estresantes en el último año entre personas migradas y personas locales con trastorno psicótico (XXVI CNP)

Abstract

Migration is a complex social process often linked to traumatic event exposure and an increased risk of psychosis. This research investigates the trauma burden, age of onset in psychosis (AOP), and gender-specific stress factors in non-refugee immigrants compared to native-born individuals, both affected by psychotic disorders.

A total of 198 participants (99 non-refugee immigrants and 99 native-born individuals) were assessed for sociodemographic, clinical, and migration data, along with trauma exposure, using validated scales. A multiple linear regression model was used to assess potential associations between AOP and these variables in both groups, as well as the association between stress and these variables in male and female non-refugee immigrants.

The findings reveal that 31% of the non-refugee immigrants, met diagnostic criteria for PTSD compared to 7.1% of the natives. Total scores in childhood trauma and last year stressful events were respectively 1.5 and 2 times higher in non-refugee immigrants, and cumulative lifetime trauma was 3 times higher in non-refugee immigrants.

Additionally, non-refugee immigrants experience psychosis onset at a younger age than native-born individuals (25.26 vs. 28.22 years), with unique associations between AOP and factors such as age at first migration, cumulative trauma distress, and stressful events. Finally, significant gender differences were found within the non-refugee immigrant group. Women were more likely to be married and divorced, had less access to welfare payments, and lower unemployment and homeless rates than men. The most common psychiatric diagnosis was psychosis not otherwise specified with more women being affected (61.5% in women vs. 45.2% in men), but the diagnosis of schizophrenia was more common in men (38.4% men vs 15.4% women). Although both groups exhibited very high levels of stress in the past year, in women, stress was significantly associated with age at first migration and be a racialized person while in men was associated with language barrier and comorbidity with a physical disorder.

Overall, the study emphasizes the profound impact of trauma, earlier age of psychosis onset, and gender-specific stressors on non-refugee immigrants with psychotic disorders, underscoring the need preventive interventions within migrant communities are warranted to improve prognosis for this population. These findings not only hold substantial clinical implications but provide valuable insights into underlying precipitating factors associated with psychosis.

Keywords

01
Introduction

1.1. Migration

1.1.1. Definition

Migration is the social process of people moving from their usual residence to a new place to live, either temporarily or permanently (IOM- United Nations. 2020). Migration encompasses three phases (Rousseau & Drapeau, 2004; J. L. Steel et al., 2016; Zimmerman et al., 2011):

— **Pre-migration phase** represents the period before migrants leave their place of origin. It includes factors such as decision-making processes, motivations for migration, planning, and preparation. During this phase, individuals or families may assess their options, gather information, and plan for travel and settlement in the destination country or location.

— **Peri-migration phase** includes the actual process of migration itself, from departure to arrival at the destination (journey, transit, and arrival). This phase involves physical travel, border crossings, immigration procedures, and temporary stays in transit countries or locations, if applicable.

— **Post-migration phase:** This is the time following the arrival in the destination location and includes settlement, adaptation, and integration into the new environment (finding house, employment, education, healthcare, social networks, language and adjusting to social expectations). ay also involve addressing legal matters related to residency, documentation, and citizenship status.

The term 'migrants' includes people who are forced to migrate searching for safety from conflict/persecution (**'refugees'**) and people who migrate by choice to improve their socioeconomic status (**'non-refugee immigrants'**). An important and global increase in the number of migrants has been described due to different humanitarian crises worldwide (IOM- United Nations, 2020). According to United Nations data, the number of international migrants in 2020 was **280.6 million** (IOM- United Nations. 2020).

1.1.2. Anthropological concepts

In this section, we explore key anthropological concepts that serve as navigational guides for this dissertation. These concepts offer analytical tools and insights into the cultural contexts shaping migration and trauma experiences, deepening our understanding of migrants' realities, the impact of trauma, processes of cultural adaptation and psychosis, that often transcends disciplinary boundaries.

Table 1: Key anthropological concepts for analyzing migration, trauma, cultural adaptation (Pérez-Sales, 2004).

Concept	Definition
Ethnicity	A group of people with a common cultural tradition symbolized by a name that identifies them, typically rooted in **a shared history, language, and territory.** From a contemporary socio-cognitive perspective, ethnicity is defined by the **collective awareness** of belonging to the same group.
Race	A social construct used to categorize and differentiate individuals and groups, often linked to historical, cultural, and socio-political contexts*.
Racialized person	Is someone affected by racism or discrimination due to being perceived or categorized as a member of a group subject to the racialization process. In societal structures where White European/North American identities are considered the **hegemonic race**, individuals who do **not fit** into this category are often classified as "racialized people." This term recognizes that race is a social construct rather than a biological reality. The Human Rights Commission emphasizes the use of "racialized person" or "racialized group" instead of outdated and inaccurate terms like "racial minority," "visible minority," "person of color," or "non-White."
Discrimination	Unjust or **prejudicial treatment** of individuals or groups based on certain social characteristics. This treatment can manifest in various forms, including unequal opportunities, differential access to resources or services, harassment, or exclusion, and it can occur in both interpersonal interactions and institutional practices. Discrimination often perpetuates existing inequalities and reinforces power imbalances within society.
Minority	Individuals distinguished by their physical or cultural attributes, who face differential and unjust treatment within the society they inhabit. Thus, leads them to be subjects of **systematic discrimination** and be **subordinate** to a more dominant group. It's important to note that numerical minority status does not solely determine minority group classification; larger groups can also be categorized as minorities based on their lack of influence or power within the societal structure.
Intersectionality	This term is used to describe the impact and **complex interconnection** of multiple identities (sex, class, disability...) and forms of oppression on experiences of inequality that lead to unique forms of oppression (Choo & Ferree, 2010).
Culture	Culture is a learned set of traditions and ways of life, socially acquired by the members of a society, including certain patterned and shared ways of **thinking, feeling, and acting**. Those who belong to this culture constitute an ethnicity, as previously mentioned.
Enculturation	Is the process through which individuals absorb the norms, values, and practices of their culture. It occurs partly **automatically and unconsciously**, and partly by parental decision. In the context of xenophobia or ethnocentrism, it is possible that if individuals were raised within a different cultural group, their perceptions of what is "savage," "inhuman," or "irrational" would be different.
Ethnocentricity	Ethnocentricity refers to the tendency to evaluate other cultures according to the standards and values of one's own culture, often resulting in a belief in the **inherent superiority** of one's own culture over others. This perspective can lead to biased judgments, stereotypes, and the dismissal or devaluation of other cultural practices and beliefs.
Acculturation	Acculturation is the **adjustment** to a new cultural environment, resulting from exposure to or immersion in a different culture. It involves adopting and adapting to the norms and practices of the prevailing culture, whether through encountering a new culture or having another culture introduced.
Nation	A **political entity** comprising individuals with a shared historical background, potentially encompassing one or multiple ethnicities. It may exist with or without a recognized state, contingent upon international acknowledgment and the establishment of agreed-upon border limits.
State	A **political organization** with defined territorial boundaries, governing a population within its jurisdiction.
Genocide	Genocide is the **deliberate extermination** of a particular group of people, typically targeted based on ethnicity, nationality, religion, or other identifying characteristics.
Ethnocide	Ethnocide (cultural crime) refers to the systematic disassembling of an ethnic group's cultural identity through the forced **imposition of another culture.**

*Note that the definition of race has changed significantly over time. Previously, race was defined based on different morphological and phenotypic variations, but this perspective was discarded due to several reasons, including (Pérez-Sales, 2004):

— The biochemical and biomechanical differences between individuals of the same "race" are often more significant than the differences between individuals of different "races."

— There is increasing evidence of a common origin in a few ancestral lineages followed by subsequent migratory advances.
— There seem to have been no pure races at any point in history.

— Race as a purely biological entity is difficult to objectify, as humans have a psychological component resulting from complex interactions.

— It has been strongly associated with racism, prejudice, and discrimination throughout history. The misuse of racial classifications to justify social hierarchies, colonialism, slavery, and other forms of oppression has led to the rejection of race as a valid scientific category by many anthropologists.

For all the above mentioned, contemporary anthropology emphasizes the cultural, social, and historical factors that shape human diversity, rather than relying on outdated notions of race (Pérez-Sales, 2004). In this study, information on race was gathered within the evaluation on trauma and stress as an important factor associated with discrimination experience.

1.1.3. Socio-political migration context in Spain.

In a recent review, Finotelli and Sebastian (2023) highlight that Spain has experienced substantial immigration over recent decades, with foreign-born individuals comprising an important portion of its population compared to major destination countries like the UK and the US. With Spain now hosting a high percentage of foreign-born residents, the demographic landscape has changed significantly from its traditional emigration pattern. In the mid-20th century, there was a noticeable shift in immigrant population, which surged during the early 21st century economic boom, although the subsequent financial crisis did not drastically reduce it. Yet, Spain's demographic change has been remarkable, going from a country of emigration to one of the largest immigrant-receiving nations in Europe. The influx of immigrants has significantly influenced Spain's population growth, accounting for nearly 16% of its total population, which grew from approximately 40 million in 1998 to about 47.5 million in 2022.

Regarding the composition of the immigrant populations, in recent years, while the proportion of immigrants from Africa remained relatively stable, the presence of Latin Americans and Asians has nearly doubled. The share of immigrants from other European countries has diminished compared to 25 years ago. In 2022, the largest groups of immigrants were from Morocco, Colombia, Romania, Venezuela, Ecuador, and Argentina. Notably, the Chinese immigrant population in Spain surpassed that from many EU Member States. Regarding migration patterns, the immigrants arrived primarily for family

reunification, employment, retirement (especially from Northern Europe), and, in recent years, asylum-seeking.

To prevent irregular status from becoming an ongoing cycle, the Spanish government takes measures to stabilize the administrative system. To integrate immigrants into the regular employment market and society, policies like the 'Padrón' system (municipal census of residents) are implemented. However, immigrants need to show 3 years of "padrón" to access regularity. The evolution of Spain's immigration laws has moved towards a predictable path for regularization, distinguishing it from models in other countries, and recognizes the contributions of immigrants to the economy while integrating them gradually into society and offering pathways to citizenship. Additionally, it is important to note that sometimes the reality is that it is difficult to obtain a "padrón" because individuals need a physical address, and those with illegal status face challenges in securing housing and, subsequently, obtaining residency after three years. Furthermore, having a "padrón" is essential for accessing the healthcare system (except for urgent care), which presents another obstacle. While there are some associations that assist immigrants in obtaining a "padrón" without a fixed address, these resources may not be sufficient to meet the needs of all immigrants.

This demographic landscape in Spain, reflects how immigrants from diverse origins shape the country's cultural diversity and contribute to Spanish economy and society.

1.2. Trauma and migration

1.2.1. Definitions

According to the APA (American Psychiatric Association, 2013), psychological **trauma** includes "any direct exposure to or witnessing of disturbing experiences that results in significant fear, helplessness, dissociation, confusion, or other disruptive feelings intense enough to have a long-lasting negative effect on a person's attitudes, behavior, spiritual well-being and other aspects of functioning". On the contrary, **stress** is recognized as a multifaceted process wherein and external factor (stressor) triggers both psychological and physical reactions that requires adaptation by the individual (Bustamante et al., 2018; Rahe et al., 1970). During this process individual's cognitive, emotional, behavior, and physiological responses continually change to align with the new environment (Bustamante et al., 2018; Costas-Carrera et al., 2023).

Trauma can impact individuals from diverse backgrounds, regardless of race, ethnicity, age, sexual orientation, gender, socio-economic status, or geographical location (SAMHSA, 2014). It may arise from a single event, a sequence of events, or a chronic exposure to adverse events. Its effects can extend beyond the individual to families, communities, and even entire cultural or generational groups (SAMHSA, 2014). Typically, psychological trauma overwhelms an individual's or community's methods to cope, often triggering instinctual responses as **"fight, flight, or freeze"** during the traumatic exposure (SAMHSA, 2014).

1.2.2 Trauma characteristics

Understanding the characteristics of psychological trauma or traumatic events is crucial for the comprehension of its impact on individuals and communities (SAMHSA, 2014). Traumatic events manifest in various forms and affect individuals across diverse backgrounds. It often arises unexpectedly and the experience of a traumatic event can occur through direct exposure, witnessing it, or by hearing about it impacting others. They are usually human-caused (= of interpersonal nature) such as childhood trauma, loss of beloved ones, separations, bullying or mobbing, but can be also more single events such as accidents, terrorism, assaults or crimes. Furthermore, they can also stem from natural phenomena like floods, earthquakes, hurricanes, wars or pandemias. Of note, traumatic events can be experienced at any age or developmental stage. However, events occurring during infancy-adolescence, and particularly if of repetitive or chronic nature, can be extremely distressing with severe health consequences due to the exposure of the traumatic events on the developing brain.

In the following graph we present an adapted figure illustrating a proposed classification of trauma based on various trauma characteristics (SAMHSA, 2014).

*** indicate higher health risks.*
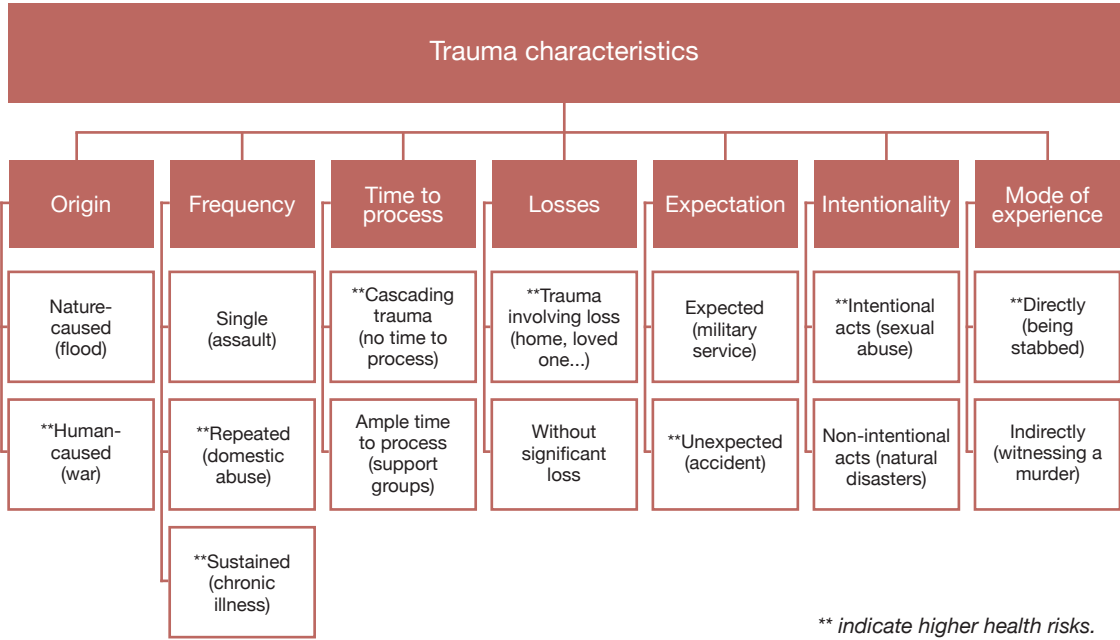
Beside the characteristics of the traumatic event itself, it is important to consider individuals perception of the event. Two individuals exposed to the same event can present a completely different experience and interpretation of the exposure. Numerous biopsychosocial and cultural factors play hereby a role in the individual's immediate response and long-term consequences of trauma (SAMHSA, 2014).

Some individuals may experience time-limited reactions to a traumatic event with a diagnosis of an adjustment disorder or acute stress disorder, while others may endure prolonged responses that progress from initial psychological distress to more severe mental health consequences such PTSD, anxiety disorders, psychosis, mood

disorders or personality disorders (Hogg et al., 2023). Parallelly, some individuals may not meet the diagnostic criteria for trauma-related disorders but still exhibit significant trauma-related symptoms or culturally expressed symptoms of trauma in form of somatization (Giammusso et al., 2018). Thus, it is crucial to acknowledge that trauma may have profound effects on an individual's life, independently of diagnostic criteria (Hogg et al., 2023).

1.2.3. Stress and trauma related disorders.

Experiencing traumatic events could lead to significant trauma symptoms, which are categorized into five main types (American

Psychiatric Association, 2013):

— **Intrusion:** These symptoms include flashbacks, nightmares, intrusive thoughts, and severe distress upon reminders of the trauma.

— **Avoidance:** These involve efforts to avoid thoughts, feelings, conversations, or situations that trigger memories of the trauma.

— **Negative changes in cognition and mood:** Symptoms can include memory lapses about the traumatic event, distrust of others, persistent negative emotions, inability to experience positive emotions.

— **Alterations in arousal and activity:** These symptoms involve irritability, engaging in risky behavior, hypervigilance, and difficulties with concentration or sleep.

— **Dissociative symptoms:** These include amnesia, derealization (feeling disconnected from one's surroundings), and depersonalization (feeling detached from oneself) (American Psychiatric Association, 2013).

A PTSD diagnosis, according to DSM-5 criteria, requires exposure to severe traumatic events and a specific set of symptoms that impair psychosocial functioning for over a month (American Psychiatric Association, 2013). If these symptoms occur between three days and one-month post-trauma, the diagnosis is Acute Stress Disorder. Dissociative symptoms may be present but are not necessary for a PTSD diagnosis (American Psychiatric Association, 2013).

In the U.S., the lifetime prevalence of PTSD is estimated at 8.3%, while globally, it is about 3.9%, though this figure may be higher in conflict-affected areas (Koenen et al., 2017). PTSD is more prevalent in women (10-12%) than men (5-6%) due to higher exposure to severe trauma like sexual abuse and differences in neurodevelopment and stress responses (Olff, 2017).

The ICD-11 has introduced a new diagnosis called Complex PTSD (CPTSD), which involves exposure to prolonged, severe trauma and includes additional symptoms such as significant problems in emotional regulation and interpersonal relationships. CPTSD affects approximately 1% to 8% of the general population (Cloitre et al., 2019; Maercker et al., 2022).

1.2.4 Culture and trauma

To understand the impact of psychological trauma on individuals and communities, it is essential to understand their life perspectives and cultural backgrounds as pivotal contextual factors. Culture is one of the most determinant factors shaping both the experience and response to trauma (Krüger, 2020). Various intersecting factors within a culture, subculture, or ethnic group can directly or indirectly play a crucial role in how traumatic events are understood, influencing interpretations, beliefs about personal responsibility for the trauma and subsequent reactions, as well as the meaning and acceptance of symptoms, support systems, and help-seeking behaviors (SAMHSA, 2014) (figure 2). For instance, a traumatic event involving shame might carry deeper implications for an individual from an Asian cultural background compared to someone from a European culture. Similarly, depending on their Tribal heritage, an Alaska Native individual or community might perceive the traumatic experience as a form of retribution (SAMHSA, 2014). Moreover, cultures with strong beliefs in a positive afterlife may view the sudden death of a loved one as less traumatic (Pérez-Sales, 2004). Thus, counselors must refrain from imposing personal value systems onto other individuals and to approach everyone's beliefs with respect and cultural sensitivity (P.Pérez Sales, 2011; SAMHSA, 2014) (figure 3).

Figure 2: Cross-cutting factors influencing attitudes, beliefs, behaviors, resources and opportunities within ethnic groups (adapted from SAMHSA, 2014).

Cultural Identity & Acculturation
The extent of cultural integration and identity preservation.

Heritage & History
Cultural strengths, traditions, generational knowledge, and historical experiences.

Religion & Spirituality
Traditions, spiritual beliefs, and practices.

Language & Communication Styles
Verbal and nonverbal methods of communication.

Geographic Location
Rural, urban, and regional influences.

Values & Traditions
Ceremonies, subsistence lifestyles, and the balance between collective and individualistic values.

Socio-economic & education
Access to healthcare, education, employment, and neighborhood factors.

Gender Roles & Sexuality
Norms related to gender, attitudes towards sexuality, and sexual expression.

Family & Kinship
Family roles, hierarchies, traditions.

Health Perspectives
Beliefs and practices related to health, illness, and healing.

Immigration & Migration History
Refugee status, legal status, and generational presence in the country.

Figure 3: The role of culture in traumatic events: key considerations and implications (adapted from SAMHSA, 2014).

— Certain populations and cultural groups have a higher likelihood to experience traumatic events or specific types of trauma (e.g. Palestinians).

— Communities facing military conflicts and political violence typically exhibit elevated rates of traumatic stress.

— Cultural background not only influences whether certain events are perceived as traumatic but also shapes an individual's interpretation and understanding of trauma.

— Some traumas may have a more profound impact on a particular culture due to their significance within that culture or their disruption of cultural norms and practices.

— Cultural norms dictate acceptable responses to trauma and influence how distress is expressed. This includes immediate and long-term reactions through behavior, emotions, and thoughts following a traumatic event.

— The manifestation of symptoms caused by traumatic events varies depending on the type of trauma within a given culture.

— Cultural beliefs influence what is considered a valid health concern, and which symptoms are accepted for seeking assistance.

— Beyond influencing attitudes toward seeking help and healing practices, culture can also provide sources of resilience, unique coping mechanisms, and specific support networks.

1.2.5. Migration and trauma

Migration, which is widely recognized as a chronic environmental stressor, requires continuous adjustment to new surroundings (Bustamante et al., 2018). This could lead to stress exposure and traumatic events (Bustamante et al., 2018; Sangalang et al., 2018). This exposure could occur within pre-, peri-, and post-migration stages (Table 2) (Bustamante et al., 2018; Fortuna et al., 2008; Gong et al., 2011; Rasmussen et al., 2012; Sangalang et al., 2018).

Regarding the nature of traumatic experiences, torture, warfare, and other life-threatening circumstances are commonly linked with but not limited to refugee communities (Bustamante et al., 2018; Fortuna et al., 2008; Gong et al., 2011; Rasmussen et al., 2012; Sangalang et al., 2018; Wilson et al., 2013). Further traumatic events for refugees include… However, non-refugee immigrants frequently endure conditions marked also by mass violence and traumatic occurrences before and during migration, but do not qualify for legal status as a refugee (Perreira & Ornelas, 2013; Rousseau & Drapeau, 2004). In this context, various research works emphasize the existence of pre-migration trauma among Latino immigrants who escape from state-based, individual and institutional violence (Fortuna et al., 2008), and among Asian immigrants who seek refuge from daily violence associated with oppressive regimes in their countries of origin (Chu et al., 2013; Rousseau & Drapeau, 2004). Thus, non-refugee immigrants can also be exposed to substantial traumatic events such as political violence, physical and verbal assaults, detention, and other human rights abuses (Eisenman et al., 2003; Gong et al., 2011; Rasmussen et al., 2012). Furthermore, upon reaching their destination, non-refugee immigrants may face the risk of deportation, disqualification from government assistance programs, and exposure to anti-immigrant discrimination (Chu et al., 2013; Infante et al., 2012), which can heighten effects of post-migration trauma on mental health.

Table 2: Examples of traumatic events exposed by immigrants during the different phases of migration process, independently of their migrant status.

Pre-migration	Peri-migration	Post-migration
Imprisonment	Detention	Ethnic discrimination
War	Physical abuse	Labor exploitation
Torture	Sexual abuse	Deportation
Political violence	Police violence	Police violence
Life-threatening situations	Life-threatening situations	Social class deterioration
Witness death of loved ones	Witness death of loved ones	Unfulfilled expectations
Extreme poverty	Police violence	Homeless situation

Note that each traumatic event it is not exclusive of each phase. (Bustamante et al., 2018; Fortuna et al., 2008; Gong et al., 2011; Rasmussen et al., 2012; Sangalang et al., 2018).

For both groups (refugees and non-refugees) traumatic factors and stressful life events associated with migration experience can potentially have an impact on migrants' mental health (Gatt et al., 2019; J. L. Steel et al., 2017), as trauma exposure is frequently multiple and persisting, leading to a cumulative effect (H. F. Myers et al., 2015). Pre- and peri-migration trauma e.g. in the context of war and political violence can lead to important negative mental health consequences (Fortuna et al., 2008; Perreira & Ornelas, 2013; Rousseau & Drapeau, 2004). Furthermore, several studies indicate that traumatic events during the pre-migration process represent the factor most associated with psychiatric symptoms later on (Sangalang et al., 2019). Furthermore, individuals frequently migrate in order to gain freedom and improve economic opportunities, aspiring to create better lives for themselves and their families, and arriving with a sense of optimism for their future (Sangalang et al., 2019). However, once they arrive in the new country, frequently, immigrants encounter discrimination mainly due to ethnic or religious differences, alongside with negative social and political narratives surrounding migrants (Sangalang et al., 2019). Discrimination consistently predicted hereby negative psychological and somatic? health consequences (Pascoe & Smart Richman, 2009; Schmitt et al., 2014).

In this sense, immigrants, when compared to native born populations, present higher prevalence of mental disorders such as anxiety, PTSD, and depression, according to the reports from World Health Organization (WHO) (World Health Organization, 2021). A recent meta-analysis estimated that PTSD prevalence in migrants was 25% (Amiri, 2022), which is significantly higher than the general population prevalence data of 0.2% to 3.8% (Shalev et al., 2017). Furthermore, migrants have higher overall trauma exposure rates compared to the general population (Bustamante et al., 2018; Garcini et al., 2017; Kieseppä et al., 2021; Sangalang et al., 2018). Evidence suggests that 71.3% of migrants have experienced at least one lifetime trauma and 70.3% of them have two or more traumatic events (Wilson et al., 2013).

Overall, this data underscores the importance of comprehensively examining the impact of trauma on migrant communities, including those who may not be identified by refugee status. Although the proportion of non-refugee migration is higher, trauma migration literature to date has focused mainly on refugees and asylum seekers (Rasmussen et al., 2012; Wilson et al., 2013). This lack of research is even more pronounced in non-refugee immigrants with psychotic disorders (Wilson et al., 2013).

1.3. Migration and psychosis

A growing body of literature describes an alarming incidence of psychosis in immigrants in different countries worldwide (François Bourque et al., 2012; Brandt et al., 2019; Cantor-graae et al., 2005; McGrath et al., 2004; O'Donoghue et al., 2021; J. P. Selten et al., 2019). The risk of psychosis in immigrants and their descendants is estimated by several meta-analyses to be 2.5 times higher compared to the host population (F Bourque et al., 2011; Cantor-Graae et al., 2005; J. P. Selten et al., 2019).

Despite adjusting for age, sex, and socioeconomic status, elevated rates of psychosis in immigrant populations remain unexplained (Termorshuizen et al., 2020). Given the consistent global incidence for psychosis (0.7-1%) (McGrath et al., 2008), the assumption of a higher incidence of psychosis in their native countries also lacks support (Hoek, 2008; Jablensky et al., 1992; Mahy et al., 1999). In align, studies from India (Baxter et al., 2016), Surinam (Jean-Paul Selten et al., 2005), Caribbean (Bhugra et al., 1997) and China (Baxter et al., 2016) reported similar incidence and prevalence rates for psychosis (J. P. Selten et al., 2019).
An alternative hypothesis for the higher rates of psychosis among immigrants is the lack of knowledge by Western psychiatrists about cultural differences with their native countries increasing artificially the diagnosis of psychosis by diagnosis biases (Zandi et al., 2010). Interestingly, most studies examining clinical presentation and long-term outcomes do not support the existence of significant diagnostic bias (Hickling et al., 1999; J-P Selten & Cantor-Graae, 2010). Additionally, the lack of variation in psychosis risk ratios between male and female migrants, despite the higher prevalence of substance abuse among men in the general population, suggests that substance abuse may not play a significant role in the increased incidence observed either (Jean-Paul Selten et al., 2020). Finally, the negative selection hypothesis, which postulates that individuals with genetic vulnerability for psychosis are more likely to migrate was also not supported by evidence (E van der Ven et al., 2015).

There are, however, variations in the psychosis risk magnitude depending on the immigrant's country of origin and destination, suggesting environmental factors may play a role (F Bourque et al., 2011; Cantor-graae et al., 2005). For example, research indicates a higher risk among migrants with African background (Black African)(F Bourque et al., 2011; Cantor-graae et al., 2005). Notably, increased exposure to environmental adversities, is suggested as a potential contributor to the elevated risk among immigrant populations (Tarricone, D'Andrea, Storbini, et al., 2021). Extreme adversity conditions during migration (such as illegal status or involuntary migration) significantly elevate the risk of psychosis, contribute to a more complex clinical presentation, and reduce recovery likelihood (Golay et al., 2019).

1.3.1. Age of Onset in Psychosis (AOP)

The age of onset in psychosis (AOP) has been of particular interest in research since it has been associated with the prognosis and expression for psychotic disorders (Clemmensen et al., 2012; Immonen et al., 2017). An early AOP is associated with a more severe illness course, a higher relapse rate, more hospitalizations (Langeveld et al., 2012; Vinokur et al., 2014), a lower level of social functioning, a greater degree of cognitive impairment (Rajji et al., 2009), more premorbid personality changes (Skokou et al., 2012), and structural brain changes (Burke et al., 2008).

Figure 4: Consequences of earlier age of psychosis onset: Impacts on illness course, social and cognitive functioning.
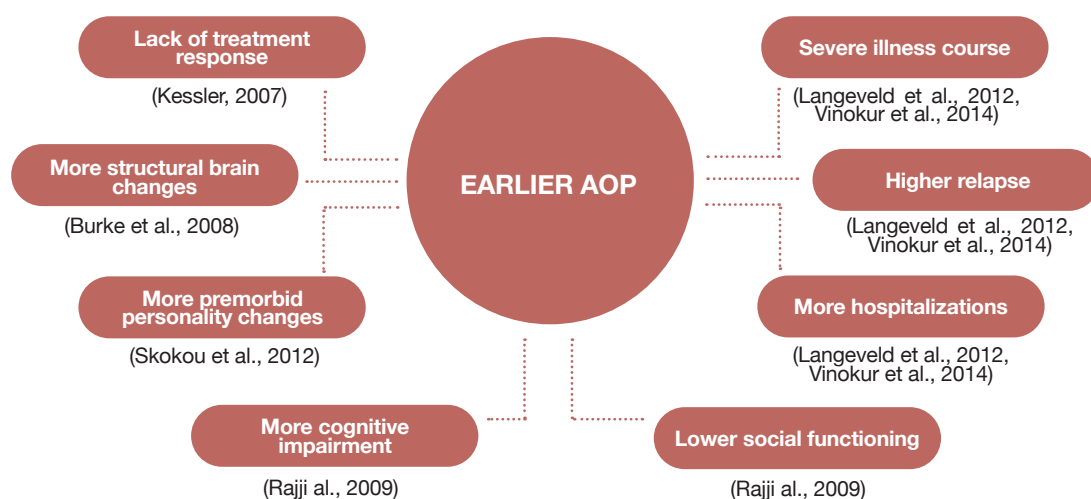
Earlier AOP has consistently been associated with male gender (Neill et al., 2020b; Ochoa et al., 2012; Selvendra et al., 2022), a family history of psychosis (Esterberg et al., 2010), obstetric complications (O'Donoghue et al., 2015; Rubio-Abadal et al., 2015,) and cannabis use (González-Pinto et al., 2008; Mané et al., 2017; O'Donoghue et al., 2015). Surprisingly, there is a notable lack of research concerning the influence of other environmental factors such, stressful life events or traumatic events exposure (Butjosa et al., 2016; O'Donoghue et al., 2015) despite the strong association between psychological trauma and psychosis (Ayesa-Arriola et al., 2020; Freedman, 2017; Galletly et al., 2011; Hogg et al., 2023; Rosenfield et al., 2021; Schalinski et al., 2019; Sideli et al., 2020; Stanton et al., 2020; Varese et al., 2012). This dearth of literature is even more accentuated in non-refugee immigrants.

1.4. Gender perspective as an intersectional approach: stress, migration, and psychosis.

According to data from the United Nations, a total of 280.6 million people migrated worldwide in the year 2020, with women constituting 48.1% of this population, which underscores the pronounced gender dimension within this intricate landscape (IOM- United Nations 2020).

Compared to men, female immigrants with psychotic disorders are exposed to several further unique stressors due to various minority identities (Gea-Sánchez et al., 2017). Hereby, the concept of intersectionality can help to understand the interaction between those. This term, stemmed from sociology, is used to describe the impact and complex interconnection of multiple identities and forms of oppression on experiences of inequality (Choo & Ferree, 2010). Female immigrants with psychotic disorders experience a complex interweaving of different social factors such as gender role demands, social stigma related to ethnicity and the psychosis diagnosis, and isolation. These factors increase potentially the risk of poorer mental and somatic health (Brodish et al., 2011; Gea-Sánchez et al., 2017). Although it seems clear that female immigrants face a unique combination of stressors, there is an important gap in the literature when it comes to identifying factors linked to stress in immigrant women (Perry et al., 2013; Ryan et al., 2021). This issue is especially significant given that vulnerable population groups, who commonly require more healthcare attention, often receive the least support (Fiscella & Shin, 2005). The lack of research is particularly notable in immigrant populations with psychotic disorders (Mazza et al., 2021).

Thus, we decide to address the end of this research focusing on stress levels and associated factors specifically within women. This sub-analysis aims to provide insights into the stress faced by immigrant women with psychotic disorders due the intersectionality of their multiple minority identities.

02
Objectives and hypothesis

2.1. Objectives

01	To describe and compare PTSD diagnosis rates and traumatic event exposure between non-refugee immigrants and native-born individuals with psychotic disorders **(addressed in study 1).**
02	To investigate the differences in the AOP between non-refugee immigrants and native-born individuals **(addressed in study 2).**
03	To determine and compare if there is an association between AOP and traumatic exposure among non-refugee immigrants and native-born individuals with psychotic disorders **(addressed in study 2).**
04	To describe and compare the social, clinical, and migration-related variables in female and male non-refugee immigrants with psychosis **(addressed in study 3).**
05	To compare potential associations between social, clinical, and migration-related variables and stress in the last year in female and male non-refugee immigrants with psychosis **(addressed in study 3).**

2.2. Hypothesis

H1	Trauma exposure and PTSD are more prevalent in non-refugee immigrants with psychotic disorders compared to the native-born individuals with psychotic disorders. **(Addressed in study 1).**
H2	Non-refugee immigrants will have an earlier AOP compared to native-born individuals. **(Addressed in study 2).**
H3	AOP is associated to traumatic exposure in non-refugee immigrant group. **(Addressed in study 2).**
H4	Non-refugee immigrant women with psychotic disorders will exhibit distinct social, clinical, and migration-related variables compared to men. **(Addressed in study 3).**
H5	Stress in the last year will exhibit differential associations with social, clinical, and migration-related variables among female and male non-refugee immigrants with psychosis. **(Addressed in study 3).**

03
Methods

3.1. Participants and setting

A cross-sectional descriptive study was performed at the inpatient and outpatient psychiatric units of Institute of Mental Health Hospital del Mar, Barcelona, Spain. The Hospital del Mar catchment area covers around 40% of Barcelona (305,000 inhabitants) and comprises three hospitals and multiple outpatient clinics and includes the neighborhoods with the highest proportion of immigrants in Barcelona.

198 participants (99 non-refugee immigrants and 99 native-born people) were recruited between June 2020 and July 2021. The participants in our project were recruited through convenience sampling. We used various institutional resources to identify and approach potential participants, including referrals from the acute and subacute psychiatric inpatient wards of the three hospitals, referrals from our outpatient clinics, and admissions and discharge lists. Although this sampling method has some limitations in representativeness, it allowed us to gather data from naturalistic clinical populations, enhancing the generalizability of our findings within similar settings.

Inclusion and exclusion criteria were:

Inclusion criteria	Exclusion criteria
1) Age between 18–65 years.	1) A psychotic disorder due to an organic cause or substance-induced acute intoxication according to ICD-10 criteria.
2) Diagnosis of psychotic disorders according to the International Classification of Diseases 10th revision (ICD-10), including F.29 non- specific psychosis, F.20 schizophrenia, F.25 schizoaffective disorders, and F.22 delusional disorder.	2) Cognitive impairment according to a Mini-Mental State Examination (MMSE) score < 15.
	3) Currently in an acute psychotic episode.
	4) Inability to communicate in neither Spanish nor English).

3.2. Instruments

Interviews were conducted in Spanish (163 individuals) or English (35 individuals), depending on patient language preference. Sociodemographic data and clinical and migration history were collected through a specifically designed questionnaire and complemented by information from medical records. Data for clinical and trauma variables were gathered through validated scales available and validated in both English and Spanish. Where English was necessary, bilingual evaluators who had been trained in cultural competence applied the scales and specifically designed questionnaires in English.

3.2.1. Sociodemographic data and medical history.

Age, sex, country of origin, race, religion, marital status, descendants, employment status, and education level were included as sociodemographic variables. Clinical variables included the main psychiatric diagnosis following ICD-10 criteria, comorbid psychiatric and somatic diagnoses, the family psychiatric history, and current and past substance use.

3.2.2. Evaluation of the migration process

In the group of the non-refugee immigrants, the following variables were obtained: the first-generation immigrant status, refugee status, total number of migrations, age at first migration, transportation method during the migration to Spain, main reason for emigration, level of accompaniment during the migration, current legal status in Spain, and other acculturation issues (past and current language barrier and job status).

3.2.3. Trauma assessment

Trauma assessment was performed using the following instruments:

(1) The Global Assessment of Posttraumatic Stress Questionnaire (EGEP-5) is a Spanish scale determining a PTSD diagnosis according to the DSM-5 criteria (Crespo & Gómez, 2012). This clinician applied scale comprises three areas with a total of 55 items: (1) traumatic events; (2) PTSD symptoms (avoidance, intrusion, cognition, mood, arousal, and reactivity alterations); and (3) impact on functioning, or social or occupational impairment. For 35 English only speaking individuals this scale was translated into English, which was then used by a bilingual evaluator.

(2) The Holmes-Rahe Life Stress Inventory (Holmes & Rahe, 1967) with its validated version in Spanish (González de Rivera JL., 1983) is a 43-item scale used to assess exposure to stressful life events in the last year. Each stressful event is related to a standardized impact score. The total scores are presented in two measures: total number of stressful events and total impact score. Scores <150 suggest low stress, 150–299 scores suggest moderate stress (50% risk of near future illness) and >300 scores suggest high level of stress (80% risk of near future illness) (Blasco-Fontecilla et al., 2012).

(3) The Childhood Trauma Questionnaire (CTQ) (Bernstein et al., 1994) with its validated version in Spanish (Hernandez et al., 2013) is a 28-item scale used to measure severe trauma during childhood. Each item is rated on a 5-point Likert scale (from 'never' to 'very often'). This instrument evaluates emotional, physical, sexual abuse, and emotional and physical neglect.

(4) The Cumulative Trauma Scale (CTS) (Taxonomy et al., 2008) with its validated version in Spanish (Robles et al., 2009) assesses the exposure to 33 traumatic events in populations such as prisoners, refugees, or patients with mental illness. The type of experience and level of distress are both assessed for each item on a 7-point Likert scale (from 1 "extremely positive" to 7 "extremely negative"). Events that score a positive or neutral experience are excluded from the total scores used for the analyses. Specifically for our analysis, we clustered the traumatic events in nine domains: disasters, accidents, war and torture, social stress, loss of loved ones, violence, sexual trauma, negligence, and discrimination (Taxonomy et al., 2008).

3.2.4. Further clinical assessment

(1) The Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987) and its validated version in Spanish (Peralta Martín & Cuesta Zorita, 1994) is a 30-item scale used to measure positive and negative psychotic symptoms and general psycho- pathology symptoms. Each item is scored on a 7-point scale according to symptom severity.

(2) The Mini-Mental State Examination (MMSE) (Folstein et al., 1975) and its validated version in Spanish (Llamas-Velasco et al., 2015) is an 11-item scale used to detect cognitive impairment. Total scores <15 indicate the presence of moderate cognitive impairment, which was an exclusion criterion in our study, considering that significant cognitive impairment could affect their capacity to understand the questionnaires or interfere in the capability to recall traumatic events.

3.3. Ethical approval

The local ethics committee approval was obtained for this study from the "Comité Ético de Investigación Clínica del Parc de Salut Mar", Barcelona (No. 2019/8398/I) in accordance with the principles stated in the Declaration of Helsinki ("WMA Declaration of Helsinki" - 2022). The participation in the study was voluntary, and informed written consent was obtained from all participants. Where necessary, informed consent was also offered in English. The study protocol was registered at ClinicalTrials.gov (ID: NCT04867447).

3.4. Data analyses

3.4.1. Sample size calculation.

Facing the impossibility of obtaining valid data about the prevalence of PTSD in this population, a correlation test was carried out to determine the sample size using the GRANMO Sample Size Calculator (Jaume Marrugat, Joan Vila, 2012). The sample size was calculated to detect low correlations (R = 0.30) with a statistical power of 80% and a type I error rate of 0.05, resulting in a sample size of n = 198.

3.4.2. Statistical analysis

Study 1: "A comparison of posttraumatic stress disorder and traumatic event rates in a clinical sample of non-refugee immigrants and native-born individuals with a psychotic disorder: a case-control study". STATA Statistics software, version 16.1 (StataCorp LLC, Texas, USA) was used to perform the analysis. For each variable, fitness to parametric assumptions were reviewed. To ensure random sampling from nor- mal populations with equal variance, we used Shapiro–Wilk and Levane tests, and to check sphericity assumption, we used the Mauchly test. The aim of this study is to describe and compare PTSD diagnosis rates and traumatic events exposure between non-refugee immigrants and native-born individuals with a diagnosis of a psychotic disorder. We hypothesized hereby that trauma exposure and PTSD are more prevalent in non-refugee immigrants with a psychotic disorder compared to the native- born group. For the descriptive analysis of migration process,

clinical, sociodemographic, and trauma data, we utilized the arithmetic mean (quantitative variables) and proportions (categorical variables). We also calculated the standard error and 95% confidence interval for both types of variables. We have also conducted a sub-analysis to investigate the relationship between PANSS scores and trauma symptoms reported in the supplementary materials (Tables 1 and 2 in supplementary materials). Finally, multivariable analysis was conducted to test the potential moderating impacts of variables that revealed significant differences between the groups. Logistic regression models were used to examine categorical variables whereas linear regression models were used to analyze quantitative variables. Concretely, the independent or exposure variable was migration status (immigrant/native-born), while the dependent or response variables were trauma exposure variables: diagnosis of PTSD (measured by EGEP-5), childhood trauma (measured by CTQ total score), stressful events in the previous year (measured by the Holmes-Rahe Life Stress Inventory total events score) and lifetime cumulative trauma (measured by CTS total score). Additionally, as mentioned above, we analyzed whether the relationship between exposure and response could be modulated by the variables that revealed significant differences between the groups: age, job status, comorbid psychiatric diagnosis, and total negative PANSS score.

Study 2: "A Comparative Analysis of Psychosis Age of Onset and its Association with Psychological Trauma in Non-Refugee Immigrants versus Native-Born Individuals". A cross-sectional descriptive analysis was conducted using R statistical software [4.3.2]. To compare the AOP between non-refugee immigrants and the native-born group, a t-test was employed. Subsequently, binary logistic regression was used to assess the potential association between AOP and trauma exposure in both groups (supplementary material 2). Missing data regarding obstetric complications led to this variable being excluded from the logistic regression model. Finally, a multivariable analysis was performed to control for potential confounders. For this analysis we used Ordinary Least Squares (OLS) regression modeling to investigate the relationships between AOP (dependent variable) and sociodemographic, clinical, and migration-related variables (independent variables). The selection of independent variables was guided by a comprehensive review of existing literature on factors associated with psychosis and AOP (Cantor-Graae et al., 2003; Neill et al., 2020a; O'Donoghue et al., 2015; Stepniak et al., 2014). The OLS model was implemented using the sm.OLS function from the Statsmodels library in Python. This method determines the best-fitting line by minimizing the sum of the squared distances between observed data points and the fitted regression line. We assessed model assumptions, such as linearity, normality of residuals, and homoscedasticity, to ensure that the OLS approach was appropriate for our data.

Study 3: "Comparison of male and female non-refugee immigrants with psychosis: clinical, sociodemographic, and migration-related differences and impact on stress". A cross-sectional descriptive analysis was conducted. Two separate groups (women and men) were constructed for the univariate analyses. Comparative analyses were performed using the χ 2 test and Student's t test. Next, Pearson's correlation coefficients and Student's t test were determined to examine potential associations between stressful events in the past year and sociodemographic, clinical, and migration-related variables. Nominal variables with more than two categories were dichotomized. A multivariable analysis was performed using a linear regression model (step-wise method). In this model, the total number of events score from the Holmes and Rahe scale was used as the dependent variable. For this analysis, the independent variables, selected based on previous reports (Bustamante et al., 2018; Erving, 2022; Sangalang et al., 2018) were as follows: age; education (years); number of migrations; age at first migration; PANSS total positive/ negative/general symptoms; racialized; origin; single; living alone; descendants(children); jobless; homeless; non-affective psychosis; comorbid psychiatric history; family psychiatric history; substance use; illegal status; irregular migration transportation; solo migration; and language barrier. P values≤0.05 were considered statistically significant. The IBM Statistical Package for Social Sciences (SPSS) (IBM Corp.; Armonk, NY, USA) was used to perform all statistical analyses.

04
Results

4.1. Study 1 (hypothesis 1):

A comparison of PTSD and traumatic event rates in a clinical sample of non-refugee immigrants and native-born individuals with a psychotic disorder: a case-control study.

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A comparison of PTSD and traumatic event rates in a clinical sample of non-refugee immigrants and native-born individuals with a psychotic disorder: a case-control study

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ABSTRACT

Background: Migration is a multi-stage social process linked to traumatic event exposure and a notably increased risk of psychosis. Although these conditions affect refugee and non-refugee immigrants, prior trauma research has focused mainly on the refugee population.

Objective: To compare and describe the rate and the clinical characterization of PTSD and traumatic events between non-refugee immigrants and native-born individuals with psychotic disorder.

Methods: 99 immigrants and 99 native-born individuals (*n* = 198) with at least one psychotic episode according to DSM-5 criteria were compared on the rate of PTSD diagnosis and traumatic events, using standardized and validated trauma scales.

Results: In the non-refugee immigrant group, 31% met diagnostic criteria for PTSD compared to only 7.1% in the native-born group. Total scores in childhood trauma and last year stressful events were 1.5 and 2 times higher in non-refugee immigrants, respectively. Likewise, cumulative lifetime trauma was three times higher in non-refugee immigrants. Finally, non-refugee immigrants reported more violent and life-threatening traumatic events than native-born individuals.

Conclusions: These results are relevant since they highlight that non-refugee immigrants with psychotic disorders are highly trauma-exposed, meaning a routine trauma assessment and a trauma-focused intervention for this population should be included in individualized treatment plans.

Comparación entre las tasas de trastorno de estrés postraumático y eventos traumáticos en una muestra clínica de inmigrantes no refugiados e individuos nativos con Trastornos psicóticos: un estudio de casos y controles

Antecedentes: La migración es un proceso social de múltiples etapas asociado con la exposición a eventos traumáticos y con un riesgo notablemente mayor de psicosis. Aunque estas condiciones afectan a inmigrantes refugiados y no refugiados, investigaciones anteriores sobre trauma se han centrado principalmente en la población de refugiados.

Objetivos: Comparar y describir la tasa y la caracterización clínica del trastorno de estrés postraumático y los eventos traumáticos entre inmigrantes no refugiados e individuos nativos con trastornos psicóticos.

Métodos: Se compararon 99 inmigrantes y 99 individuos nativos (*n* = 198) con al menos un episodio psicótico según los criterios del DSM-5 en cuanto a la tasa de diagnóstico de TEPT y eventos traumáticos, utilizando escalas de trauma estandarizadas y validadas.

Resultados: En el grupo de inmigrantes no refugiados, el 31% cumplió con los criterios diagnósticos del trastorno de estrés postraumático comparado con solo el 7,1% en el grupo de nativos. Las puntuaciones totales en trauma infantil y eventos estresantes en el último año fueron 1,5 y 2 veces más altas, respectivamente, en los inmigrantes no refugiados. Asimismo, el trauma acumulado a lo largo de la vida fue tres veces mayor en inmigrantes no refugiados. Finalmente, los inmigrantes no refugiados reportaron más eventos traumáticos violentos y potencialmente mortales que los individuos nativos.

HIGHLIGHTS
- Traumatic events and PTSD rates in the non-refugee immigrant population with psychotic disorder have previously received scant attention.
- This study found that in a psychotic population, 31% of the non-refugee immigrants presented a PTSD diagnosis compared to only 7.1% of the native-born individuals.
- Compared to native-born individuals with psychosis, non-refugee immigrants with psychosis have 1.5 times more childhood trauma exposure, 2 times more stressful events in the past year and 3 times more cumulative trauma over their lifetime.

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Conclusiones: Estos resultados son relevantes ya que resaltan que los inmigrantes no refugiados con trastornos psicóticos están altamente expuestos al trauma, lo que significa que para esta población debe incluirse en los planes de tratamiento individualizado, una evaluación de rutina del trauma y una intervención centrada en el trauma.

非难民移民和本土出生的精神障碍患者临床样本中 PTSD 和创伤事件发生率的比较：病例对照研究

背景：移民是一个多阶段的社会过程，与创伤事件暴露和精神病风险显著增加有关。 尽管这些情况影响难民和非难民移民，但之前的创伤研究主要集中在难民群体上。

目的：比较和描述非难民移民和本土出生的精神病患者的 PTSD 和创伤事件的发生率和临床特征。

方法：使用标准化和经过验证的创伤量表，对根据 DSM-5 标准患有至少一次精神病发作的 99 名移民和 99 名本土出生的个体（*n* = 198）进行 PTSD 诊断率和创伤事件的比较。

结果：在非难民移民群体中，31% 的人符合 PTSD 的诊断标准，而本土出生群体中只有 7.1% 符合 PTSD 的诊断标准。非难民移民的童年期创伤和去年压力事件的总分分别高出 1.5倍和 2倍。同样，非难民移民的终身累积创伤要高出三倍。 最后，非难民移民比本地出生的人报告了更多的暴力和危及生命的创伤事件。

结论：这些结果是相关的，因为它们强调患有精神障碍的非难民移民高度遭受创伤，意味着针对该人群的常规创伤评估和以创伤为重点的干预措施应纳入个体化治疗计划中。

1. Introduction

Migration is the social process of people moving from their usual residence to a new place to live, either temporarily or permanently. The term 'migrants' includes people who are forced to migrate searching for safety from conflict/persecution ('refugees') and people who migrate by choice to improve their socioeconomic status ('non-refugee immigrants'). An important and global increase in the number of migrants has been described due to different humanitarian crises worldwide (The International Organization for Migration (IOM)-United Nations, 2020). According to United Nations data, the number of international migrants in 2020 was 280.6 million (United Nations, 2020). Furthermore, according to the UN Refugee Agency (UNHCR-The UN Refugee Agency, 2020), in 2022, about 11 million people from Ukraine left their country and fled to neighbouring and European countries. Migration is a social process associated with multiple stress factors that can increase the likelihood of migrants being exposed to traumatic events (Busta-mante et al., 2018; Sangalang et al., 2018), within the pre-, peri-, and post-migration stages (Busta-mante et al., 2018; Fortuna et al., 2008; Gong et al., 2011; Rasmussen et al., 2012; Sangalang et al., 2018). In terms of the type of trauma experienced, imprisonment, war, torture, and other life-threatening situations are usually associated with but not limited to the refugee population (Bustamante et al., 2018; Fortuna et al., 2008; Gong et al., 2011; Rasmussen et al., 2012; Sangalang et al., 2018; Wilson et al., 2013). However, non-refugee immigrants can also be exposed to substantial traumatic events such as political violence, physical and verbal assaults, detention

and other human rights abuses (Eisenman et al., 2003; Gong et al., 2011; Rasmussen et al., 2012). For both groups traumatic factors and stressful life events associated with migration experience can potentially have an impact on migrants' mental health (Gatt et al., 2019; Steel et al., 2017), as trauma exposure is frequently multiple and persisting, leading to a cumulative effect (Myers et al., 2015). In this sense, immigrants, when compared to native-born populations, present higher prevalence of mental disorders such as anxiety, post-traumatic stress disorder (PTSD), and depression, according to the reports from World Health Organization (WHO) (World Health Organization, 2021). A recent meta-analysis estimated that PTSD prevalence in migrants was 25% (Amiri, 2022), which is significantly higher than the general population prevalence data (0.2% to 3.8%) (Shalev et al., 2017). Furthermore, migrants have higher overall trauma exposure rates compared to the general population (Bustamante et al., 2018; Garcini et al., 2017; Kieseppä et al., 2021; Sangalang et al., 2018). Evidence suggests that 71.3% of migrants have experienced at least one lifetime trauma and 70.3% of them have two or more traumatic events (Wilson et al., 2013). It is well established in the general population that experiencing multiple traumatic events leads to poorer functioning compared to a single event exposure (Boykin et al., 2020; Cougle et al., 2009; Stuart & Nowosad, 2020; Trabsa et al., 2022).

Of note, meta-analyses have shown that migrants are at more than double the risk of experiencing a non-affective psychotic disorder (Bourque et al., 2011; Cantor-Graae & Selten, 2005; Selten et al., 2019). Furthermore, individuals with psychosis and a comorbid PTSD diagnosis present more severe

psychotic symptoms, greater distress, and reduced quality of life (Fan et al., 2008; Steel et al., 2011).

Even though the proportion of non-refugee migration is higher, trauma migration literature has to date focused mainly on refugees and asylum seekers (Rasmussen et al., 2012; Wilson et al., 2013). This lack of research is even more pronounced in non-refugee immigrants with psychotic disorders within mental health services (Wilson et al., 2013). This is particularly important considering that individuals who present psychotic disorders report, independently of migrant status, higher rates of trauma exposure compared to the general population (Kilcommons & Morrison, 2005; Mueser et al., 1998). Additionally, a previous meta-analysis has estimated rates of PTSD in individuals with psychotic disorders at 12.4% (Achim et al., 2011). However, other studies reported rates around 30%, which highlights the considerable variability across previous research (Lu et al., 2011; Resnick et al., 2003; Steel et al., 2011).

Accordingly, the aim of this study is to describe and compare PTSD diagnosis rates and traumatic event exposure between non-refugee immigrants and native-born individuals, in all cases, with a diagnosis of a psychotic disorder. We hypothesized hereby that trauma exposure and PTSD are more prevalent in non-refugee immigrants with a psychotic disorder compared to the native-born group.

2. Methods

2.1. Participants and procedures

A cross-sectional descriptive study was performed at the inpatient and outpatient psychiatric units of Hospital del Mar, Barcelona, Spain. The Hospital del Mar catchment area covers around 40% of Barcelona (305,000 inhabitants) and comprises three hospitals and multiple outpatient clinics and includes the neighbourhoods with the highest proportion of immigrants in Barcelona. 198 participants (99 non-refugee immigrants and 99 native-born people) were recruited between June 2020 and July 2021. The participants in our project were recruited through convenience sampling. We used various institutional resources to identify and approach potential participants, including referrals from the acute and subacute psychiatric inpatient wards of the three hospitals, referrals from our outpatient clinics, and admissions and discharge lists. Although this sampling method has some limitations in representativeness, it allowed us to gather data from naturalistic clinical populations, enhancing the generalizability of our findings within similar settings.

Inclusion criteria were: (1) aged between 18–65 years; and (2) diagnosed with psychotic disorders according to the International Classification of Diseases 10th revision (ICD-10), including F.29 non-specific psychosis, F.20 schizophrenia, F.25 schizoaffective disorders, and F.22 delusional disorder. Exclusion criteria were: (1) a psychotic disorder due to an organic cause or substance-induced acute intoxication according to ICD-10 criteria; (2) cognitive impairment according to a Mini-Mental State Examination (MMSE) score < 24; (3) currently in an acute psychotic episode; or (4) presence of a relevant language barrier (unable to communicate in either Spanish or English).

Local ethics committee approval was obtained for this study from the *Comité Ético de Investigación Clínica del Parc de Salut Mar*, Barcelona (No. 2019/8398/I) in accordance with the principles stated in the Declaration of Helsinki (WMA, 2022). Participation in the study was voluntary, and informed written consent was obtained from all participants. Where necessary, informed consent was also offered in English. The study protocol was registered at *ClinicalTrials.gov* (ID: NCT04867447).

2.2. Instruments

Interviews were conducted in Spanish (163 individuals) or English (35 individuals), depending on patient language preference. Sociodemographic data and clinical and migration history were collected through a specifically designed questionnaire and complemented by information from medical records. Data for clinical and trauma variables were gathered through validated scales available in both English and Spanish. Where English was necessary, bilingual evaluators who had been trained in cultural competence applied the scales and specifically designed questionnaires in English.

2.2.1. Sociodemographic data and medical history

Age, sex, country of origin, race, religion, marital status, descendants, employment status, and education level were included as sociodemographic variables. Clinical variables included: main psychiatric diagnosis following ICD-10 criteria, comorbid psychiatric and somatic diagnoses, family psychiatric history, and current and past substance use.

2.2.2. Migration process

In the group of non-refugee immigrants, the following variables were obtained: first-generation immigrant status, refugee status, total number of migrations, age at first migration, transportation method during the migration to Spain, main reason for emigration, level of accompaniment during the migration, current legal status in Spain, and other acculturation issues (past and current language barrier and job status).

2.2.3. Trauma assessment

Trauma assessment was performed using the following instruments:

(1) *Global Assessment of Posttraumatic Stress Questionnaire in Spanish (EGEP-5)* (Crespo & Gómez, 2012): This scale determines a PTSD diagnosis according to DSM-5 criteria. This clinician-applied scale comprises three areas with a total of 55 items: (1) traumatic events; (2) PTSD symptoms (avoidance, intrusion, cognition, mood, arousal, and reactivity alterations); and (3) impact on functioning, or social or occupational impairment. For 35 individuals, an evaluation was required in English. As this scale is validated only in Spanish, we translated this scale into English, which was then used by a bilingual evaluator.
(2) *The Holmes-Rahe Life Stress Inventory English* (Holmes & Rahe, 1967) with its validated version in Spanish (de Rivera et al., 1983): 43-item scale used to assess exposure to stressful life events in the last year. Each stressful event is related to a standardized impact score. The total scores are presented in two measures: total number of stressful events and total impact score. Scores <150 suggest low stress, 150–299 scores suggest moderate stress (50% risk of near future illness) and >300 scores suggest high level of stress (80% risk of near future illness) (Blasco-Fontecilla et al., 2012; Rahe et al., 1970).
(3) *Childhood Trauma Questionnaire English (CTQ)* (Bernstein et al., 1994) with its validated version in Spanish (Hernandez et al., 2013): The CTQ is a 28-item scale used to measure abuse and neglect during childhood. Each item is rated on a 5-point Likert scale (from 'never' to 'very often'). This instrument presents five subscales for trauma measurement: emotional/physical/sexual abuse, and emotional/physical neglect.
(4) *Cumulative Trauma Scale English (CTS)* (Kira et al., 2008) with its validated version in Spanish (Robles et al., 2009): This scale assesses exposure to 33 traumatic events in populations such as prisoners, refugees, or mental health patients. Type of experience and level of distress are both assessed for each item on a 7-point Likert scale (from '1-extremely positive to 7-extremely negative'). Events that score a positive or neutral experience were excluded from the total scores used for the analyses. Specifically for our analysis, we clustered the traumatic events in nine domains: disasters, accidents, war and torture, social stress, loss of loved ones, violence, sexual trauma, negligence, and discrimination (Kira et al., 2008).

2.2.4. Further clinical assessment

(1) *Positive and Negative Syndrome Scale (PANSS)* (Kay et al., 1987) and its validated version in Spanish (Martín & Zorita, 1994): The PANSS is a 30-item scale used to measure positive and negative psychotic symptoms and general psychopathology symptoms. Each item is scored on a 7-point scale according to symptom severity.
(2) *Mini-Mental State Examination (MMSE)* (Folstein et al., 1975) and its validated version in Spanish (Llamas-Velasco et al., 2015): The MMSE is an 11-item scale used to detect cognitive impairment. Total scores <15 indicate the presence of moderate cognitive impairment, which was an exclusion criterion in our study, considering that significant cognitive impairment could affect their capacity to understand the questionnaires or interfere in the capability to recall traumatic events.

2.3. Data analysis

2.3.1. Sample size calculation

Facing the impossibility of obtaining valid data about the prevalence of PTSD in this population, a correlation test was carried out to determine the sample size using the GRANMO Sample Size Calculator (Marrugat & Vila, 2012). The sample size was calculated to detect low correlations ($R = 0.30$) with a statistical power of 80% and a type I error rate of 0.05, resulting in a sample size of $n = 198$.

2.3.2. Statistical analysis

STATA Statistics software, version 16.1 (StataCorp LLC, Texas, USA) was used to perform the analysis. For each variable, fitness to parametric assumptions were reviewed. To ensure random sampling from normal populations with equal variance, we used Shapiro–Wilk and Levene tests, and to check sphericity assumption, we used the Mauchly test.

The aim of this study is to describe and compare PTSD diagnosis rates and traumatic events exposure between non-refugee immigrants and native-born individuals with a diagnosis of a psychotic disorder. We hypothesized hereby that trauma exposure and PTSD are more prevalent in non-refugee immigrants with a psychotic disorder compared to the native-born group.

For the descriptive analysis of migration process, clinical, sociodemographic, and trauma data, we utilized the arithmetic mean (quantitative variables) and proportions (categorical variables). We also calculated the standard error and 95% confidence interval for both types of variables. We have also conducted the sub-analysis to investigate the relationship between PANSS scores and trauma symptoms

reported in the supplementary materials (Tables 1 and 2 in supplementary materials).

Finally, multivariable analysis was conducted to test the potential moderating impacts of variables that revealed significant differences between the groups. Logistic regression models were used to examine categorical variables whereas linear regression models were used to analyse quantitative variables.

Concretely, the independent or exposure variable was migration status (immigrant/native-born), while the dependent or response variables were trauma exposure variables: diagnosis of PTSD (measured by EGEP-5), childhood trauma (measured by CTQ total score), stressful events in the previous year (measured by the Holmes-Rahe Life Stress Inventory total events score) and lifetime cumulative trauma (measured by CTS total score). Additionally, as mentioned above, we analysed whether the relationship between exposure and response could be modulated by the variables that revealed significant differences between the groups: age, job status, comorbid psychiatric diagnosis, and total negative PANSS score.

3. Results

3.1. Sociodemographic data of the whole sample

The mean age of the non-refugee immigrant group (33.3 years) was significantly lower than the native-born group (40.1 years) $(F_{190} = 3.8, p = .00)$. Although no significant differences in sex proportion were found between groups, both had a higher proportion of men (73.7% in the non-refugee immigrants, 71.1% in the native-born group). The majority of the sample was single in both groups (70.7% of non-refugee immigrants and 79.8% of locals). Education, measured by average number of years studied, was similar in both groups: 9.81 years in non-refugee immigrants and 9.8 years in native-born individuals. In contrast, differences in employment status were found $(F_8 = 64.2, p = .00)$: 71.7% of psychotic non-refugee immigrants were unemployed, which was only true for 30.3% of the native-born group. In addition, 5.1% of the non-refugee migrant group had an illegal work status, whereas none of the native-born patients were in this situation. Finally, 53.5% of patients in the native-born group received a welfare allowance for mental impairment, whereas only 7.1% of the non-refugee immigrants received this sort of allowance (see Table 1).

3.2. Cultural characteristics and migration data of the non-refugee immigrants

In our sample, non-refugee immigrants originated from 36 diverse countries. Most of them were originally from North Africa (25.3%) and South America (23.2%). The dominant race was Caucasian (52.5%) followed by Black African (18.5%). Regarding their religious beliefs, the predominant religious group were Muslims (37.4%) followed by Christians (29.3%). The mean number of total non-refugee migrations was 1.73 migrations, the mean age at first migration was 20.5 years, and the mean number of years since first migration was 12.8 years. An illegal transportation method (e.g. arriving in small boats or under trucks) was used by 24.2% of the individuals to enter Spain and 32.3% still maintain an illegal status (undocumented). Most individuals had an economical reason for migration (64.6%) and 50.5% of the individuals migrated unaccompanied. Lastly, 70.7% of the individuals presented a language barrier on arrival to Spain, which is still present in 35.4% (see Table 2).

3.3. Clinical and medical history data comparison between groups

From the total sample, 93.9% of the individuals were recruited from inpatient units. No significant differences were found in the inpatient rate between immigrants (97.0%) and native-born individuals (90.9%) $(F_1 = 3.19, p = .074)$. Likewise, no significant differences were found between groups in terms of the main diagnosis. The most frequent main diagnosis in the non-refugee immigrants was psychotic disorder not otherwise specified (NOS) (49.5%). In the native-born group the most frequent main diagnosis was jointly schizophrenia (37.4%) and psychotic disorder not otherwise specified (37.4%). These diagnostic differences could be influenced by: (1) cultural barriers that contribute to the use of more generalized diagnoses (Bhui et al., 2007; Díez & Sobradiel, 2010); (2) the younger average age of the participants from the non-refugee immigrant group, which may mean a shorter disease duration at time of study entry and consequently psychotic disorder NOS diagnosis; and (3) poorer adherence to mental health services described in immigrant populations that may increase difficulties in establishing a chronic diagnosis such as schizophrenia (Betancourt et al., 2003). The native-born group showed a significantly higher proportion of patients who had another comorbid psychiatric disorder (18.2%) compared to the non-refugee group (4%) $(F_1 = 10.0, p = .00)$. No significant differences were found between groups in relation to somatic comorbidities, family history of psychosis, psychoactive substance use, or suicide attempts. Finally, in the PANSS scores, significant differences between groups were only found in the negative symptom subscale, which was higher in the native-born group (18.3) compared to the non-refugee immigrant group (14.2), $(F_{195} = 0.86, p = .001)$ (see Table 3).

Table 1. Comparison of sociodemographic characteristics between non-refugee immigrants (cases) and native-born individuals (controls). Data are presented as mean (SD) or number (%).

Variable		Group	Obs/ Freq	Mean (SD)/ Percentage*	Contrast statistics
Gender	Female	Case	26	26.3%	$F_1 = 0.1$
		Control	28	28.3%	$p = .75$
	Male	Case	73	73.7%	
		Control	71	71.7%	
Age		Case	99	33.3 (10.2)	$F_{190} = 3.8$
		Control	99	40.1 (12.2)	$p = .00$
Education (years of studies)		Case	99	9.8 (3.2)	$F_{196} = 4.5$
		Control	99	9.8 (3.9)	$p = .91$
Relationship status	Single	Case	70	70.7%	$F_3 = 3.8$
		Control	79	79.8%	$p = .15$
	Married/in a couple	Case	21	21.2%	
		Control	18	18.2%	
	Divorced	Case	7	7.1%	
		Control	1	1.0%	
	Widowed	Case	1	1.0%	
		Control	1	1.0%	
Employment status	Student	Case	4	4.0%	$F_8 = 64.2$
		Control	2	2.0%	$p = .00$
	Full-time employment	Case	6	6.1%	
		Control	3	3.0%	
	Part-time employment	Case	3	3.0%	
		Control	4	4.0%	
	Sick leave	Case	3	3.0%	
		Control	7	7.1%	
	Unable to work and receiving welfare allowance for health problems	Case	7	7.1%	
		Control	53	53.5%	
	Unemployed without welfare allowance	Case	71	71.7%	
		Control	30	30.3%	
	Illegal work	Case	5	5.1%	
		Control	0	0%	

Notes: Obs/Freq: Number of cases observed/Frequency; SD: Standard Deviation.
*Age and education data are presented as means. The rest of the variables are presented as percentages.

3.4. Trauma exposure and PTSD rates comparison between groups

According to the *EGEP-5*, a total of 39 patients (19.69%) fulfilled criteria for a current PTSD diagnosis, and 32.3% of the non-refugee immigrants met criteria for PTSD, compared to only 7.1% of the native-born group $(F_1 = 19.9, p = .00)$. Traumatic events most associated with PTSD diagnosis in the non-refugee immigrant group were 'violent death of loved ones' (33.1%), 'physical violence' (21.9%) and 'terrorism and torture' (15.6%), while in the native-born group it was 'physical violence' (28.6%). Both groups showed similar average intensity scores across all PTSD criteria symptoms except for avoidance, where native-born scored higher (5.1 compared to 3.5 for non-refugee immigrants). Significant differences were detected in the number of areas where functioning was impacted, with non-refugee immigrants presenting one more affected area (5.1) than the native-born group (4.3) $(F_7 = 3.9, p = .05)$ (see Table 4).

Concerning stressful life events exposure in the past year, significant differences were found in the Holmes and Rahe scale between groups. The non-refugee immigrants presented approximately twice as many events (10.9) as the native-born group (5.1) $(F_{189} = 5.5, p = .02)$. In addition, the total score was significantly higher in the immigrant group, with a mean of 356.1 compared to 165.9 in the native-born group $(F_{193} = 2.9, p = .00)$ (see also Table 4).

Regarding childhood trauma, important differences in the CTQ scores were also detected. The mean CTQ total score was 56.7 in the non-refugee immigrants and 39.4 in the native-born group $(F_{188} = 5.2, p = .02)$. The mean total score in each of the CTQ subscales was significantly higher in the non-refugee group, except for sexual abuse, where no significant difference was found (see Table 4).

Next, remarkable differences in lifetime cumulative trauma exposure were detected using the CTS. The mean total number of events participants were exposed to was three times higher in the non-refugee immigrants (16.1) compared to the native-born group (5.4) $(F_{177} = 12.8, p = .00)$. In addition, these differences were more pronounced when total traumatic distress was compared between groups, with a mean of 97.1 in the immigrants and 27.2 in the native-born group $(F_{150} = 48.9, p = .00)$ (see Table 4). The most prevalent traumatic event categories in each group are presented in Table 5. When the traumatic events assessed by CTS were grouped by clusters and compared between groups, significant differences between groups were found in all domains except in social stress cluster (see Table 6).

Lastly, after adjusting for sociodemographic and clinical variables that displayed significant differences between immigrants and locals (age, job status, comorbid psychiatric diagnosis, and total negative PANSS score) in relation to differences in trauma

Table 2. Cultural characteristics and migration process in the non-refugee immigrant group. Data are presented as mean (SD) or number (%).

Variable		Obs/Freq	Mean (SD)/Percentage*
Age at first migration		99	20.5 (8.9)
Total number of migrations		99	1.3 (1.7)
Years since migration		99	12.8(11.2)
Origin	North Africa	25	25.3%
	Africa	12	12.1%
	South America	23	23.2%
	Central America	1	1.0%
	North America	1	1.0%
	Eastern Asia	8	8.1%
	Southeast Asia	7	7.1%
	Middle East	8	8.1%
	Western Europe	12	12.1%
	Eastern Europe	7	7.1%
Race	Caucasian	52	52.5%
	Black African	18	18.2%
	Asian	5	5.1%
	Southeast Asian	7	7.1%
	American	17	17.2%
Religion	Christianism	29	29.3%
	Islam	37	37.4%
	Buddhism	3	3.0%
	Atheism	22	22.2%
	Others	8	8.1%
Legal status	Documented	67	67.7%
	Undocumented	32	32.3%
Transportation during migration	Legal	74	74.7%
	Illegal	25	24.2%
Main reason for migration	Economical	65	64.6%
	Political	1	1%
	Both	9	9.1%
	Studies	8	8.1%
	Others	14	14.1%
Accompaniment during migration	Alone	50	50.5%
	With family	45	45.5%
	With friends	4	4%
Language barrier on arrival	Yes	70	70.7%
	No	29	29.3%
Current language barrier	Yes	35	35.4%
	No	64	64.6%

outcomes, only the age and job status variables exhibited a minor modulating effect on the association between groups and trauma exposure rates (Table 3, supplementary material).

4. Discussion

To our knowledge, this is the first study to investigate differences in PTSD, trauma exposure, and trauma-related symptoms between non-refugee immigrants and native-born patients diagnosed with a psychotic disorder. This study reveals an alarming difference in PTSD rates between non-refugee immigrants and native-born people with a psychotic disorder. According to the EGEP-5 results, 32.2% of the non-refugee immigrants meet criteria for PTSD, compared to just 7.1% of the native-born group. Furthermore, the rates of stressful life events and childhood trauma were found to be significantly higher in the non-refugee immigrants than native-born group. This is noteworthy considering that psychological trauma is *per se* considered to be a transdiagnostic risk for psychiatric disorders, including psychosis, regardless of whether migrant status is considered or not (Hogg et al., 2022; Kilcommons & Morrison, 2005; Mueser et al., 1998).

Our findings align with a previous study from Ireland (Wilson et al., 2013), where PTSD prevalence was assessed in a psychiatric population with heterogeneous diagnoses, showing similar PTSD rates to our study, with 31.2% in immigrants versus 6.1% in the native-born group. Another work assessed PTSD specifically in patients with a psychotic disorder and found PTSD rates of around 30%, but they did not differentiate prevalence rates according to their migrant status (Lu et al., 2011; Resnick et al., 2003; Steel et al., 2011). In our non-refugee immigrant group, traumatic events most associated with PTSD were 'violent death of loved ones' followed by 'physical violence' and 'terrorism and torture'. This is of interest, as war-related trauma is frequently associated with refugees or forced immigrants (Rasmussen et al., 2012; Stuart & Nowosad, 2020), but these severe trauma forms also occur in voluntary immigrants. Within individuals with a PTSD diagnosis, immigrants showed similar intensity scores across all PTSD symptoms, except for avoidance, which was higher in natives. We hypothesize that this could be explained by the stressful context of migration resettlement (Bustamante et al., 2018; Sangalang et al., 2018), which forces individuals into 'survival mode', leading individuals to show less avoidance.

Moreover, the PTSD scale showed non-refugee immigrants were, on average, affected in one more area of functionality than the native-born group. Our results are consistent with previous research in the general population exposed to disasters, that shows that post-traumatic stress symptoms cause worse social and work adjustment, even when compared to post-disaster physical illness conditions (Cougle et al., 2009; Trabsa et al., 2022).

We also found remarkable differences in stressful events experienced during the last year. The group of immigrants had experienced during the previous year an average of 10.9 stressful events with an average distress score of 356.1. Impact scores above 300 suggest high levels of stress, resulting in an 80% risk of physical and mental illness in the near future (Blasco-Fontecilla et al., 2012; Rahe et al., 1970). Considering that, in our immigrant sample, an average of 12.8 years had occurred since migration, we assume that these scores are correlated mostly with post-migration adversities. Robust evidence describes migrants' exposure to social adversities during all phases, including post-migration stage (Rasmussen et al., 2012; Sangalang et al., 2018). Interestingly, there is emerging evidence that describes an association between adversities during different migration stages and increased risk of psychosis (Stilo et al., 2017; Tarricone et al., 2022).

Table 3. Comparison of clinical characteristics between non-refugee immigrants (cases) and native-born individuals (controls). Data are presented as mean (SD) and/or number (%).

Variable		Groups	Obs/Freq	Mean (SD), Conf/Percentage*	Contrast statistics
Main diagnosis	Schizophrenia	Case	32	32.3%	$F_3 = 6.0$
		Control	37	37.4%	$p = .11$
	Schizoaffective disorder	Case	16	16.2%	
		Control	25	25.3%	
	Psychosis NOS	Case	49	49.5%	
		Control	37	37.4%	
	Delusional disorder	Case	2	2.0%	
		Control	0	0.0%	
Comorbid psychiatric diagnosis	Yes	Case	4	4.0%	$F_1 = 10.0$
		Control	18	18.2%	$p = .00$
	No	Case	95	96.0%	
		Control	81	81.8%	
Organic comorbidity	Yes	Case	4	4.0%	$F_1 = 0.9$
		Control	7	7.1%	$p = .35$
	No	Case	95	96.0%	
		Control	92	92.9%	
Family psychiatric history	Yes	Case	38	38.4%	$F_1 = 0.3$
		Control	42	42.4%	$p = .56$
	No	Case	61	61.6%	
		Control	57	57.6%	
Suicide attempts	Yes	Case	15	15.2%	$F_1 = 2.1$
		Control	23	23.2%	$p = .15$
	No	Case	84	84.8%	
		Control	76	76.8%	
Current psychoactive substance use	Yes	Case	36	36.4%	$F_1 = 0.2$,
		Control	39	39.4%	$p = .66$
	No	Case	63	63.6%	
		Control	60	60.6%	
Past psychoactive substance use	Yes	Case	52	52.5%	$F_1 = 0.3$,
		Control	56	56.6%	$p = .57$
	No	Case	47	47.5%	
		Control	43	43.4%	
PANSS	Positive symptoms	Case	99	13.1 (5.4), −1.67–1.73	$F_{196} = 2.8$,
		Control	99	13.1 (6.7), −1.67–1.73	$p = .97$
	Negative symptoms	Case	99	14.2 (8.4), 1.7–6.5	$F_{195} = 0.86$,
		Control	99	18.3 (8.6), 1.7–6.5	$p = .001$
	General symptoms	Case	99	28.5 (9.9), −1.4–4.3	$F_{196} = 0.01$,
		Control	99	29.98 (10.3), −1.4–4.3	$p = .302$

Notes: Obs/Freq: Number of cases observed/Frequency; SD: Standard Deviation; Conf.: Confidence; Psychosis NOS: Psychosis Not Other Specified, PANSS: Positive and Negative Syndrome Scale.
*Scales data are presented as means. The rest of the variables are presented as percentages.

We found that a high number of the total sample experienced childhood trauma. Again, the sample of non-refugee immigrants showed statistically significantly higher scores in the CTQ total and subscales scores for physical and emotional abuse and neglect. This is also in line with previous research that suggested that individuals with psychotic disorders, and independent of their migration status, had a higher exposure to childhood trauma (Morgan et al., 2020; Rosenfield et al., 2022; Sideli et al., 2020; Varese et al., 2012). These results have relevant clinical implications, since in individuals with psychotic disorders, comorbid childhood trauma has been associated with a more severe disease course and a greater number of hospitalizations (Aas et al., 2016; Levine et al., 2014).

Contrary to expectations, no significant differences were found in levels of childhood sexual abuse. These results might be explained by the fact that women, who are more exposed to sexual abuse (Oram et al., 2017), were underrepresented in the total sample (27.3%). Another possibility is that this information was withheld by participants due to stigma.

Finally, we found further evidence of a high global trauma burden in non-refugee immigrants, as they were three times more likely than the native-born patients to be exposed to lifetime trauma. These findings highlight the significant burden of cumulative trauma among non-refugee immigrants throughout their lifetime. This is consistent with previous research describing how the trauma exposure associated with the experience of migration is usually multiple, accumulated, and life-long (Myers et al., 2015; Tarricone et al., 2022). These findings of accumulated and repetitive traumatic events may support the concept of re-traumatization, which means that a previous trauma may enhance reaction to subsequent stressful events and later trauma exposure may amplify responses to less stressful previous events (Cougle et al., 2009; Stuart & Nowosad, 2020; Trabsa et al., 2022).

Regarding the nature of traumatic events in both groups, we found more severe and life-threatening traumatic events or traumatic events related to migrant status, such as ethnic discrimination or uprooting in the non-refugee immigrant group. On the contrary, the native-born group revealed more

Table 4. Comparison of clinical variables of psychological trauma between non-refugee immigrants(cases) and native-born individuals (controls).

	Variable	Group	Obs/Freq	Mean/Proportion	Std. Err.	[95% Conf. Interval]	Contrast statistics
EGEP-5	PTSD	Case	32	32.3%			$F_1 = 19.96$
		Control	7	7.1%			$p = .00$
	No PTSD	Case	92	67.7%			
		Control	67	92.9%			
Holmes & Rahe	Number of events	Case	99	10.91 (4.51)	0.45	−6.93−(−4.61)	$F_{189} = 5.54$
		Control	99	5.14 (3.74)	0.38		$p = .02$
	Total score	Case	99	356.06(142.48)	14.32	−227.72−(−152.56)	$F_{193} = 2.93$
		Control	99	165.92(125.04)	12.57		$p = .00$
CTQ	Total	Case	99	56.70 (18.28)	1.84	−22.01−(−12.64)	$F_{188} = 5.19$
		Control	99	39.37(15.0)	1.51		$p = .02$
	Emotional Abuse	Case	99	13.39(5.64)	0.57	−5.91−(−3.00)	$F_{189} = 7.91$
		Control	99	8.94(4.67)	0.47		$p = .005$
	Physical Abuse	Case	99	12.33(7.07)	0.71	−7.04−(−3.75)	$F_{163} = 44.85$
		Control	99	6.94(3.93)	0.44		$p = .000$
	Sexual Abuse	Case	99	7.34(5.35)	0.43	−1.93−(−0.36)	$F_{196} = 3.56$
		Control	99	6.56(4.97)	0.39		$p = .061$
	Emotional Neglect	Case	99	13.72(4.63)	0.4	−4.59−(−1.70)	$F_{194} = 20.70$
		Control	99	10.57(4.97)	0.50		$p = .000$
	Physical Negelect	Case	99	10.49(4.63)	0.46	−4.64−(−2.47)	$F_{165} = 5.19$
		Control	99	6.94(2.93)	0.29		$p = .024$
CTS	Number of events	Case	99	16.12(5.08)	0.51	−11.96−(−9.49)	$F_{177} = 12.80$
		Control	99	5.39(3.61)	0.36		$p = .00$
	Total distress	Case	99	97.13(39.85)	4.00	−78.87−(−60.91)	$F_{150} = 48.99$
		Control	99	27.24(21.37)	2.14		$p = .00$

Notes: Obs/Freq: Number of cases observed/Frequency; Std. Error: Standard Error; Conf.: Confidence; EGEP-5: Global Assessment of Post-traumatic Stress Questionnaire-5; PTSD: Post-traumatic Stress Disorder; CTQ: Childhood Trauma Questionnaire; Holmes & Rahe: Holmes & Rahe Social Readjustment Scale; CTS: Cumulative Trauma Scale.

psychosocial adverse events, such as school failure, serious disease, and interpersonal relationship rejection, which might also be related to the illness itself. These findings highlight that not only refugees, but non-refugee immigrants could also be exposed to substantial violent traumatic events.

When traumatic lifetime events were clustered in nine domains, we found significant differences in all clusters except for social stress. These results can be explained by the fact that, as mentioned above, social stress could be related to the psychosis diagnosis, which is a condition that both groups share.

Finally, after conducting multivariate analyses, a slight modulation was observed between age, job status, and the rates of trauma among groups. This could be explained by, respectively, older individuals

Table 5. Comparison of the five traumatic lifetime events most frequently presented in each group according to the CTS, and the proportion of exposure in each group.

	Non-refugee immigrants	Native-born individuals
1st	Uprooting (82.8% immigrants, 4% native-born group)	School failure (42.4% native-born group, 70.7% immigrants)
2nd	Physical abuse (76.8% immigrants, 36.4% native-born group)	Serious disease (38.4% native-born group, 69.7% immigrants)
3rd	Ethnic discrimination (74.7% immigrants, 4% native-born group)	Accidents (36.4% native-born group, 66.7% immigrants)
4th	Threat of death (74.7% immigrants, 15.2% native-born group)	Physical abuse (36.4% native-born group, 76.8% immigrants)
5th	Life-threatening or disabled close friend (72.2% immigrants, 19.2% native-born group)	Interpersonal relationship rejection (36.4% native-born group, 71.7% immigrants)

Note: CTS: Cumulative Trauma Scale. Variables are presented as percentages.

having had more time for trauma exposure, and worse job opportunities often being linked to greater social adversity and potentially more trauma exposure. Nonetheless, this modulation was minimal and did not have an important impact on the differences of trauma exposure between immigrants and locals.

There are several hypotheses that support the association between psychological trauma and psychosis. The neurobiological explanation suggests that the hyperactivity and sensitization of hypothalamic–pituitary–adrenal (HPA) axis may result in an increase in dopamine neurotransmission mediated by stress-related glucocorticoids (Ayesa-Arriola et al., 2020; Rosenfield et al., 2022; Ruby et al., 2014). On the other hand, a psychological hypothesis supports the idea that dissociation, emotional dysregulation, cognitive negative schemata, and PTSD symptoms such as avoidance, numbing and hyperarousal, may be psychological pathways linking developmental trauma with psychotic symptoms (Bloomfield et al., 2021). Recent meta-analysis results reveal that dissociation may contribute to the development of hallucinations through impairing an individual's ability to differentiate internal experiences from reality (Bloomfield et al., 2021). Similarly, emotional dysregulation plays a mediating role in hallucinations and paranoia, aligning with the threat anticipation model (Berry et al., 2018; Bloomfield et al., 2021). Negative cognitive schemata, on the other hand, can foster negative beliefs about others which may lead to paranoia and delusions (Bloomfield et al., 2021; Freeman, 2016). Lastly, PTSD symptoms have been associated with hallucinations, explained by disruption of the normal encoding of emotional and perceptual information due to

Table 6. Comparison of the proportion of traumatic events, grouped by clusters according to the CTS, in non-refugee immigrants and native-born individuals.

Trauma CTS cluster	Group	Mean (SD)	Std. Err.	[95% Conf. Interval]	Contrast statistics
Disasters	Case	0.43 (0.49)	0.03	−0.48− (−0.25)	$F_{147} = 241.07$
	Control	0.07 (0.26)	0.05		$p = .00$
Accidents	Case	1.36 (0.79)	0.08	−0.82− (−0.40)	$F_{194} = 3.11$
	Control	0.75 (0.72)	0.72		$p = .00$
War and torture	Case	0.84 (1.06)	0.11	−0.88− (−0.43)	$F_{127} = 106.28$
	Control	0.18 (0.41)	0.42		$p = .00$
Social stress	Case	3.97 (1.31)	0.13	−2.72− (−1.98)	$F_{196} = 0.24$
	Control	1.61 (1.30)	0.13		$p = .62$
Physical violence	Case	4.14 (2.10)	0.21	−3.43− (−2.43)	$F_{171} = 7.62$
	Control	1.21 (1.42)	0.14		$p = .00$
Discrimination	Case	2.65 (1.54)	0.16	−2.30− (−1.57)	$F_{162} = 6.04$
	Control	0.71 (0.96)	0.96		$p = .00$
Sexual trauma	Case	0.67 (0.96)	0.96	−0.54− (−0.49)	$F_{186} = 16.31$
	Control	0.37 (0.76)	0.77		$p = .00$
Negligence	Case	0.47 (0.73)	0.74	−0.54− (−0.21)	$F_{143} = 85.91$
	Control	0.10 (0.36)	0.37		$p = .00$
Lost of loved one	Case	1.50 (0.80)	0.80	−1.32− (−0.90)	$F_{191} = 6.45$
	Control	0.38 (0.68)	0.68		$p = .00$

Notes: SD: Standard Deviation, Std. Error: Standard Error; Conf.: Confidence; CTS: Cumulative Trauma Scale.

traumatic experiences, resulting in unprocessed, fragmented memories that are susceptible to involuntary retrieval and lead to hallucinatory symptoms (Bloomfield et al., 2021; Hardy, 2017).

Considering these hypotheses and our study results, it is crucial to assess the effectiveness of psychotherapies such as cognitive–behavioral therapy (CBT), dialectical-behavioral therapy, or mentalization-based therapy addressed at improving emotional regulation or dissociative symptoms (Pearce et al., 2017), and pharmacological treatments targeting negative emotional processing biases (Cipriani et al., 2018), to understand whether these treatments are effective in reducing psychotic symptoms in individuals with psychosis and severe trauma exposure.

Several study limitations need to be considered. Firstly, traumatic events were retrospectively assessed, which could lead to recall bias. Moreover, due to reluctance or forgetfulness, the validity and accuracy of reporting by individuals with psychotic disorders has been questioned (Susser & Widom, 2012). Likewise, due to the sensitive nature of some traumatic events, this information could be repressed or withheld. Nevertheless, we used reliable and valid self-report questionnaires long used in trauma research, which measure not only the variety but also the frequency of traumatic events. Secondly, recruitment of the sample was performed by convenience. Furthermore, instruments are typically standardized for western populations and could have limitations when applied to non-western populations due to ethnocultural diversity. We performed the assessments in English and Spanish, depending on the background of our patients. Therefore, evaluators were trained in cultural competence to amend this limitation. For the EGEP-5 scale, which does not have a validated English version, bilingual evaluators were used for translation, which could result in some internal validity limitations. However, only 35 individuals from the total sample

required this translation. Next, although our sample includes individuals from diverse cultures, it is essential to consider cultural factors when interpreting and extrapolating our findings to other populations. Further research is warranted to study the generalizability of these outcomes in different cultural and migration contexts thus, avoid research ethnocentrism. Lastly, we must consider that this study is susceptible to reverse causality due to its cross-sectional design; longitudinal studies are needed to elucidate this causality.

5. Conclusions

This work highlights the high current and past trauma load of non-refugee immigrants with psychotic disorders. According to our results, when compared to native-born patients, non-refugee immigrants presented significantly higher levels of PTSD, childhood trauma, stressful events in the last year, and lifetime cumulative trauma. Our results contribute to current research by providing empirical evidence to identify trauma burden in immigrants with psychotic disorders. This study has clinically relevant implications, considering the important increase in immigrants due to different worldwide humanitarian crises and the alarming risk of psychosis described in this population. Therefore, trauma-informed interventions based on cultural understanding and sensitivity, as well as humane immigration policies, are imperative to minimize distress among migrants with psychotic disorder and to ensure more accurate assessments and treatments for this population.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

The data that support the findings of this study are available on request from the corresponding author, [A.M.], upon reasonable request. The data are not publicly available due to containing information that could compromise the privacy of research participants.

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Supplementary material:

Supplementary material, table 1: Correlation (r) between trauma exposure (independent variable) and PANSS total scores (dependent variable) in total sample (198 individuals).

Variable	Total positive PANSS score	Total negative PANSS score	Total general PANSS score	Holmes AVE	CTQ total	CTS
Total positive PANSS score	.231**					
Total negative PANSS score	.556**					
Total general PANSS score	.039	.491**				
Holmes AVE	.031	-.188**	-.075			
CTQ total	.165*	.051	.110	.473**		
CTS	.032	-.168*	-.067	.674**	.624**	

EGEP-5: Global Assessment of Post-traumatic Stress Questionnaire-5; CTQ: Childhood Trauma Questionnaire; Holmes & Rahe: Holmes & Rahe Social Readjustment Scale, CTS: Cumulative Trauma Scale.   PANSS: Positive and Negative Syndrome Scale.

Supplementary material, table 2: Correlation (r) between PTSD symptoms (independent variable) and PANSS total scores (dependent variable) in individuals who presented PTSD diagnosis according to EGEP-5 (39 individuals).

Variable	Total positive PANSS score	Total negative PANSS score	Total general PANSS score	Int. Symp	Avoid. Symp.	Cog. Symp.	Hyper. symp.	Funct.
Total positive PANSS score								
Total negative PANSS score	.209							
Total general PANSS score	.544**	.589**						
Int. Symp	-.346*	.005	-.154					
Avoid. Symp.	.146	-.038	-.153	-.110				
Cog. Symp.	-.186	.205	-.024	.459**	.192			
Hyper. symp.	.040	.223	.063	.193	-.266	.282		
Funct.	-.003	.070	-.173	.459**	.153	.452**	.397*	

EGEP-5: Global Assessment of Post-traumatic Stress Questionnaire-5; PANSS: Positive and Negative Syndrome Scale, Int. Symp: Intrusive symptoms EGEP-5 total score. Avoid. symp: Avoidance symptoms EGEP-5 total score. Cog. Symp: Cognitive symptoms EGEP-5 total score. Hyper. symp: Hyperarousal symptoms EGEP-5 total score. Funct.: Functionality affected areas according to EGEP-5.

Supplementary material, table 3: Modulation effect of sociodemographic and clinical data in the association between groups (independent variable) and trauma exposure (dependent variable).

	EGEP-5		CTQ		Holmes&Rahe		CTS	
	Contrast statistics	p	Contrast statistics	p	Contrast statistics	p	Contrast statistics	p
Age	Z=-2.49	0.013	t=-2.37	0.019	t=-1.90	0.058	t=-0.19	0.848
Job Status	Z=-0.66	2.88	t=-1.96	0.051	t=-0.29	0.770	t=-2.06	0.041
Comorbid psychiatric diagnosis	Z=-0.32	0.747	t=-0.74	0.459	t=-1.45	0.148	t=-1.45	0.149
Total negative PANSS score	Z=-0.56	0.57	t=-0.94	0.349	t=-0.94	0.347	t=-0.41	0.681

EGEP-5: Global Assessment of Post-traumatic Stress Questionnaire-5; CTQ: Childhood Trauma Questionnaire; Holmes & Rahe: Holmes & Rahe Social Readjustment Scale, CTS: Cumulative Trauma Scale. PANSS: Positive and Negative Syndrome Scale.

4.2. Study 2 (hypothesis 2 and 3):

A Comparative Analysis of Psychosis Age of Onset and its Association with Psychological Trauma in Non-Refugee Immigrants versus Native-Born Individuals.

Preprint published at PsyArXiv Preprints

A Comparative Analysis of Age of Onset and Associated Factors in Non-Refugee Immigrants versus Native-Born Individuals with psychotic disorders.

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Abstract

The age of onset in psychosis (AOP) has been of particular interest in research due to its association with the prognosis and expression of psychotic disorders. There is a lack of research concerning the influence of environmental factors such as stressful life events or exposure to traumatic events on AOP, especially among non-refugee immigrants. This study investigates the AOP among non-refugee immigrants as compared to native-born individuals and explores the associations of AOP with trauma burden. A total of 198 participants (99 non-refugee immigrants and 99 native-born individuals) diagnosed with psychotic disorders were assessed for sociodemographic, clinical, and migration data, along with trauma exposure, using validated scales. A multiple linear regression model was used to assess potential associations between AOP and these variables. Results indicate that non-refugee immigrants experience psychosis at an earlier age (25.26 vs. 28.22 years) and exhibit unique associations between AOP and factors such as age at first migration, cumulative trauma distress, stressful events, and comorbid psychiatric diagnosis. Conversely, native-born individuals show associations with sex, age, job status, and comorbid psychiatric diagnoses. These findings emphasize the significance of considering migration-related factors and trauma in understanding AOP among non-refugee immigrants, providing valuable insights for tailored preventive interventions in this population.

Key words

Psychosis
Immigration
Trauma, Psychological
PTSD
Mental Health of Ethnic Groups

Highlights

- *Non-refugee immigrants experience psychosis onset earlier (25.26 vs. 28.22 years) than native-born individuals.*
- *Younger age at first migration among non-refugee immigrants correlates with earlier psychosis onset.*
- *Higher cumulative trauma exposure in non-refugee immigrants is associated with earlier psychosis onset.*
- *Our findings provide important clinical implications and valuable insights into underlying precipitating factors associated with psychosis, given the crucial role of AOP in the prognosis of psychotic disorders.*

1-Introduction

A growing body of literature describes an alarming incidence of psychosis in immigrants in different countries worldwide (F Bourque et al., 2011; Brandt et al., 2019; Cantor-Graae & Selten, 2005; O'Donoghue et al., 2021; Selten et al., 2019). The risk of psychosis in immigrants and their descendants is estimated by several meta-analyses to be 2.5 times higher than in the host population (F Bourque et al., 2011; Cantor-Graae & Selten, 2005; Selten et al., 2019).

Despite adjusting for age, sex, and socioeconomic status, elevated rates of psychosis in immigrant populations remain unexplained (Termorshuizen et al., 2020). The assumption of a higher incidence of psychosis in their native countries also lacks support (Hoek, 2008), given the uniform global incidence for psychosis (0.7-1%) (McGrath et al., 2004). Additionally, the negative selection hypothesis, which postulates that individuals with genetic vulnerability for psychosis are more likely to migrate, was also not supported by evidence (van der Ven et al., 2015).

There are, however, variations in psychosis risk magnitude depending on the immigrant's country of origin and destination, suggesting environmental factors may play a role (F Bourque et al., 2011; Cantor-Graae & Selten, 2005; Selten et al., 2019). Notably, increased exposure to environmental adversities is suggested as a potential contributor to the elevated psychosis risk among immigrant populations (Tarricone et al., 2021). Migrants experience various stressful or traumatic life events during the migration process (Fortuna et al., 2008; Sangalang et al., 2018; Trabsa et al., 2023), which may impact their mental well-being (Gatt et al., 2019; Steel et al., 2016).

The AOP has been of particular interest in research due to its association with the prognosis and expression of psychotic disorders (Clemmensen et al., 2012; Immonen et al., 2017). An early AOP is associated with a more severe illness course, a higher relapse rate, more hospitalizations (Langeveld et al., 2012), more premorbid personality changes (Skokou et al., 2012), a lower level of social functioning, a higher cognitive impairment (Rajji et al., 2009), and structural brain changes (Burke et al., 2008).

Earlier AOP has been consistently associated with male gender (Neill et al., 2020; Selvendra et al., 2022), a family history of psychosis (Esterberg et al., 2010), obstetric complications (O'Donoghue et al., 2015; Rubio-Abadal et al., 2015), and cannabis use (Mané et al., 2017; O'Donoghue et al., 2015). Surprisingly, there is a notable lack of research concerning the influence of other environmental factors such as stressful life events or exposure to traumatic events (Butjosa et al., 2016; O'Donoghue et al., 2015), despite the strong association between psychological trauma and psychosis (Ayesa-Arriola et al., 2020; Hogg et al., 2023; Rosenfield et al., 2021; Stanton et al., 2020; Varese, 2012). This dearth of literature is even more accentuated in immigrants; thus, the present study aims: 1) to investigate the differences in the AOP between non-refugee

immigrants and native-born individuals, and 2) to determine if there is an association between AOP and exposure to trauma among participants.

2-Methods

2.1-Participants and setting

The methodology employed in this study closely aligns with that of our previous publication (Trabsa et al., 2023), as this study constitutes a secondary analysis of the same dataset. 198 participants (99 non-refugee immigrants and 99 native-born people) were recruited between June 2020-July 2021 from the in/outpatient of mental health units of Hospital Del Mar, Barcelona. The Hospital del Mar catchment area covers around 40% of Barcelona and comprises the neighborhoods with the highest proportion of immigrants. The participants were recruited through convenience sampling. Inclusion criteria included: 1) aged between 18–65 years, and 2) diagnosed with a psychotic disorder according to the International Classification of Diseases 10th revision (ICD-10) including: F.29 nonspecific psychosis, F.20 schizophrenia, F.25 schizoaffective disorders, and F.22 delusional disorder. Exclusion criteria were: 1) a psychotic disorder due to an organic cause or substance-induced acute intoxication (ICD-10), 2) a moderate or severe cognitive impairment (Mini-Mental State Examination (MMSE) score <15) (Folstein et al., 1975), 3) currently experiencing an acute psychotic episode, or 4) presence of relevant language barrier (unable to communicate in either Spanish or English).

2.2-Ethical approval

This study received approval from the "Comité Ético de Investigación Clínica del Parc de Salut Mar," Barcelona (No. 2019/8398/I), following the principles outlined in the Declaration of Helsinki (*WMA Declaration of Helsinki, 2022*). Participation in the study was entirely voluntary, and all participants provided informed written consent (also offered in English). The study protocol was registered on ClinicalTrials.gov (ID: NCT04867447).

2.3-Instruments

According to the language preference of the patients, interviews were conducted in Spanish or in English. A specially designed questionnaire and medical records were used to collect sociodemographic data, clinical information, and migration history (supplementary materials: 1). Additionally, we collected data on clinical and trauma variables using validated scales in Spanish and English.

2.3.1-Trauma scales

Trauma exposure was assessed by specific validated scales. The presence of post-traumatic stress disorder(PTSD) and its symptoms were evaluated by the Global Assessment of Posttraumatic Stress Questionnaire in Spanish(EGEP-5) (Crespo & Gómez, 2012). Childhood trauma was examined with the Childhood Trauma Questionnaire English/Spanish (CTQ)(Bernstein et al., 1994; Hernandez et al., 2013).

Stressful life events within the last year and the distress caused by exposure to them were evaluated by The Holmes-Rahe Life Stress Inventory English/Spanish(González de Rivera JL., 1983; Holmes & Rahe, 1967). Lastly, to assess cumulative lifetime trauma and associated distress we used the Cumulative Trauma Scale(CTS) English/Spanish (Robles et al., 2009; Kira et al., 2008).

More detailed information on instruments can be found in a recent publication by our group (Trabsa et al., 2023).

2.4-Data analyses

Sample size was calculated by employing the GRANMO Sample Size Calculator (Jaume Marrugat, 2012). A sample size of 198 was determined to detect low correlations (R = 0.30) with 80% statistical power and a type I error rate of 0.05.

A cross-sectional descriptive analysis was conducted using R statistical software [4.3.2]. To compare the AOP between non-refugee immigrants and the native-born group, a t-test was employed. Subsequently, binary logistic regression was used to assess the potential association between AOP and trauma exposure in both groups (supplementary material 2). Missing data regarding obstetric complications led to this variable being excluded from the logistic regression model. Finally, a multivariate analysis was performed to control for potential confounders. For this analysis we used Ordinary Least Squares(OLS) regression modeling to investigate the relationships between AOP (dependent variable) and sociodemographic, clinical, and migration-related variables (independent variables). The selection of independent variables was guided by a comprehensive review of existing literature on factors associated with psychosis and AOP (Cantor-Graae et al., 2003; Neill et al., 2020; O'Donoghue et al., 2015; Stepniak et al., 2014). The OLS model was implemented using the *sm.OLS* function from the Statsmodels library in Python. This method determines the best-fitting line by minimizing the sum of the squared distances between observed data points and the fitted regression line. We assessed model assumptions, such as linearity, normality of residuals, and homoscedasticity, to ensure that the OLS approach was appropriate for our data.

3-Results

3.1-Sociodemographic and Clinical Differences Between Non-Refugee Immigrants and Native-Born Individuals with Psychotic Disorders

Non-refugee immigrants showed a younger mean age (33.3 vs. 40.1 years) (F190=8.8, *p=0.00*). Moreover, regarding employment status, immigrants exhibiting higher rates of unemployment (71.1% vs. 30.3%), illegal work status (5.1% vs. 0%), and lower rates of receiving mental impairment welfare allowances (7.1% vs. 53.5%) when compared to native-born individuals (F190=8.8, *p=0.00*)(See Table 1).

Regarding a comparison of clinical variables, non-refugee immigrants displayed an earlier AOP compared to native-born individuals (25.26 vs. 28.22 years) (F190=2.6, *p=0.04*). Additionally, immigrants exhibited a lower prevalence of diagnosed comorbid psychiatric conditions (mainly personality disorders and depressive

disorders) in contrast to native-born individuals (4.0% vs. 18.2%). Furthermore, non-refugee immigrants showed lower total scores only for negative symptoms in PANSS assessments compared to native-born (14.2 vs 18.3) (F195=0.86, *p=0.001*) (Table 1).

3.2-Migration and Cultural data Among Non-Refugee Immigrants with Psychotic Disorders

This sample included participants from 36 countries, indicating a remarkable cultural diversity. Most of the non-refugee immigrants were from North Africa (25.3%) followed by South America (23.2%), with the majority identifying as Caucasian (52.5%) or Black African (18.5%). Islam constituted the primary religious belief (37.4%). Non-refugee immigrants reported an average of 1.73 total migrations, starting migration at an average age of 20.5 years. On average, 12.8 years had passed since their first migration. 50.5% of the individuals reported performing their migration alone, while 24.2% acknowledged using illegal transportation to enter Spain, and 32.3% maintained undocumented status at the time of evaluation. The primary motivation for migration was economic (64.4%). Upon arrival, 70.7% faced language barriers, with 35.4% still experiencing it at the time of assessment(Table 2).

3.3-Differences in Stress and Trauma Burdens between groups

Significant differences were found in all trauma and stress scale total scores, with notably higher scores among the non-refugee immigrant group. EGEP-5 results reveal that 32.3% of the immigrants met criteria for PTSD, which was markedly higher than the 7.1% observed in natives (F1=19.9, *p=0.00*). Furthermore, non-refugee immigrants, when compared to the native group, exhibited twice the rate of stressful events in the past year (10.9 vs. 5.1) (F189=5.5, *p=0.02*) and higher total impact scores (356.1 vs 165.9) (F193=2.9, *p=0.00*). Childhood total trauma scores were 1.5 times higher in non-refugee immigrants (56.7 vs. 39.4) (F188=5.2, *p=0.02*); these differences were maintained across all subscales except for sexual abuse where differences were not significant. Lastly, non-refugee immigrants experienced a threefold increase in cumulative lifetime trauma burden (16.1 vs. 5.4) (F177=12.8, *p=0.00*), displaying a mean distress level of 97.1 compared to 27.2 among native group (F150=48.9, *p=0.00*) (Table 3).

3.4-Comparative Analysis: Association of AOP with Clinical, Stress/Trauma, and Sociodemographic Factors Between Groups

Our multivariate analysis revealed distinct models that best predicted AOP among non-refugee immigrants and among the native-born group:

In non-refugee immigrants the strongest model included comorbid psychiatric diagnosis, age at first migration, lifetime cumulative trauma distress, and stressful events in the past year, which achieved an adjusted R^2 of 0.69(figure 1).

In the native-born group the best-fitting model included sex, age, job status, and comorbid psychiatric diagnosis, which had a lower adjusted R^2 of 0.29(figure 2).

4-Discussion

Our results suggest that non-refugee immigrants display an earlier AOP, approximately 3 years younger on average than native-born individuals. Notably, among non-refugee immigrants, the AOP was significantly associated with factors such as age at first migration, cumulative trauma distress, stressful events, and comorbid psychiatric diagnoses. In contrast, among native-born individuals, the AOP was linked to factors including sex, age, job status, and comorbid psychiatric diagnosis.

There is some controversy in previous studies examining AOP in immigrants. Although robust evidence suggests an increased risk of psychosis among immigrants, some studies indicate that immigrant status may not substantially impact the AOP (Cantor-Graae et al., 2003; Stepniak et al., 2014), while others propose that immigration could potentially delay this onset, especially in females (Neill et al., 2020; Rabinowitz & Fennig, 2002). On the other hand, literature also suggests that instability in residence (an aspect implicit in the definition of migration), coupled with genetic and other environmental factors, contributes to earlier psychosis development (Butjosa et al., 2016; Ku et al., 2023; Price et al., 2018). These discrepancies in previous literature may be explained by a lack of generalizability of results, stemming from the diverse realities of migration (country of origin, refugee vs non-refugee etc.).

The associations between AOP and various variables in our study demonstrate distinct patterns between both groups. In non-refugee immigrants, we found an association between the AOP and age of first migration. This finding aligns with prior research (Veling et al., 2011). In this research *Veiling et al.* postulate several theories to explain this association. Firstly, younger migrants may be more familiar with local healthcare systems, potentially leading to greater help-seeking behaviors (Veling et al., 2011). Secondly, younger migrants often endure prolonged exposure to post-migration stressors such as discrimination which may contribute to this risk (François Bourque et al., 2012). Lastly, adverse experiences during early life have consistently been linked to higher risk of psychotic disorders, showing a dose-response relationship (Anderson & Edwards, 2020; Trotta et al., 2015; Varese, 2012)

Furthermore, the AOP and cumulative trauma was specifically linked to the total distress score rather than the total number of traumatic events. This highlights that subjective distress has a greater impact on the individual than the number of traumatic events (Danese & Widom, 2023). Explanation of the pathways which link psychological trauma and psychosis rely on several hypotheses. Neurobiological theories suggest that glucocorticoids elevate dopamine transmission via the hypothalamic–pituitary–adrenal(HPA) axis due to trauma exposure. (Ayesa-Arriola et al., 2020; Rosenfield et al., 2021; Ruby et al., 2014). Psychological hypotheses suggest that developmental trauma may lead to psychosis through pathways involving dissociation (hallucinations), emotional dysregulation (hallucinations and paranoia), negative cognitive patterns (paranoia and delusions), and PTSD symptoms (disrupted information encoding and memory processing) (Bloomfield et al., 2021; Hardy, 2017). Several studies have associated childhood trauma with early AOP, especially in females (Kocsis-Bogár et al., 2018; Neill et al., 2020). This is particularly

noteworthy, considering that immigrant populations often carry higher trauma burdens including childhood trauma (Trabsa et al., 2023; Wilson et al., 2013). Finally, a previous umbrella meta-analysis found that psychological trauma is a robust transdiagnostic factor, increasing the risk of psychopathology, including psychosis, by nearly threefold (Hogg B, 2022). Considering the previous findings alongside our results, it is plausible to hypothesize that trauma exposure might play a mediating role between migration and AOP. This potential association needs further investigation.

Finally, while stressful events within the past year also showed an association with AOP, considering that our sample had, on average, experienced more than one year of psychotic illness, we hypothesize that the recent stressful events may be a consequence rather than a cause of the AOP, as patients with earlier onset and consequently worse outcomes (Burke et al., 2008; Langeveld et al., 2012) might be exposed to a higher rate of stressful events within the past year.

In the native-born group, AOP was associated with sex, age, job status, and psychiatric comorbidity. The association of AOP and sex is consistent with existing literature highlighting gender as a significant factor contributing to the diversity within psychotic disorders (Butjosa et al., 2016). Several authors have postulated that neurofunctional mechanisms (Kaufman, 2007; Lejbak et al., 2011), alongside the neuroprotective effects of estrogens (Salem & Kring, 1998; Seeman, 1997), might explain the later onset in women (Häfner et al., 1998). The absence of this association among immigrant group may suggest that the neuroprotective effects of estrogen are insufficient to counteract the cumulative impact of stressors. Furthermore, job status was identified as being associated with AOP in this group, underscoring the relevance of environmental factors in psychosis onset, a concept well-established in existing literature (Butjosa et al., 2016). However, it is important to acknowledge the potential for an inverse association, where an earlier AOP leads to a worse prognosis and subsequently to a poorer job status. Age was also a variable associated with AOP; one plausible explanation for this finding is that as individuals age, they are exposed to cumulative stressors or environmental factors that could potentially influence the emergence of psychosis.

Immigrants and the native-born population also exhibited commonalities. In both studied groups, the presence of comorbid psychiatric diagnoses was associated with an earlier AOP. This connection suggests the possibility of shared underlying vulnerabilities or common risk factors contributing to the emergence of both psychosis and concurrent psychiatric conditions (Hogg et al., 2023). However, further studies are needed to clarify these connections.

Our study diverges from prior research findings as it did not establish an association between family history and cannabis use with an earlier AOP (Esterberg et al., 2010; Mané et al., 2017; O'Donoghue et al., 2015). Limited data and absence of external reporting sources due to socioeconomic and educational backgrounds of our sample might explain the lack of family history correlations. Similarly, assessment of cannabis use in this study was limited to subjective reporting, which may introduce biases related to memory and social desirability, which might impact in the cannabis-use findings.

4.1-Strengths and limitations

This study offers valuable insights by addressing a research gap, investigating the influence of environmental factors on the AOP among non-refugee immigrants. With a robust sample size and culturally diverse backgrounds, which enhance the generalizability of the results. The comprehensive assessment of trauma exposure adds depth to the study, and the results hold important clinical implications. However, several limitations warrant consideration. Firstly, the absence of family reporters due to socioeconomic factors resulted in lost data regarding obstetric complications, restricting including this variable in the analyses. Secondly, retrospective assessment of traumatic events may introduce recall bias due to the sensitive nature of the content. However, the use of multiple self-report questionnaires aimed to mitigate this limitation. Furthermore, previous studies have highlighted that associations between childhood maltreatment and poor emotional outcomes are particularly influenced by subjective experiences (Danese & Widom, 2023). Thirdly, the instruments employed in our study, primarily standardized for Western academia, may have limited cultural applicability. We used culturally competent professionals for assessments to amend this limitation. Fourthly, our study approached variables in isolation, potentially overlooking the cumulative effects of multiple factors. Finally, the cross-sectional design does not allow us to establish causality. Further longitudinal studies are warranted to elucidate the direction of causal relationships.

4.2-Conclusions

Our study revealed that non-refugee immigrants experience psychosis at an earlier age than native-born individuals. This earlier onset among immigrants was notably associated with age at first migration and lifetime cumulative trauma distress. Given the crucial role of AOP in understanding and prognosis of psychotic disorders, these findings not only hold substantial clinical implications but provide valuable insights into underlying precipitating factors associated with psychosis. Tailored preventive interventions within migrant communities are warranted to improve prognosis for this population.

Table 1. Comparison of sociodemographic and clinical characteristics between non-refugee immigrants and native-born individuals. Data are presented as mean (SD) or number (%).

Variable		Group	Obs/Freq	Mean(SD)/Percentage*	Contrast statistics
Sex	Female	Immigrant	26	26.3%	$F_1=0.1$ p=0.75
		Native-born	28	28.3%	
	Male	Immigrant	73	73.7%	
		Native-born	71	71.7%	
Age		Immigrant	99	33.3 (10.2)	$F_{190}=3.8$ p=0.00
		Native-born	99	40.1 (12.2)	
Education (years of study)		Immigrant	99	9.8 (3.2)	$F_{196}=4.5$ p=0.91
		Native-born	99	9.8 (3.9)	
Relationship status	Single	Immigrant	70	70.7%	$F_3=3.8$ p=0.15
		Native-born	79	79.8%	
	Married/in a couple	Immigrant	21	21.2%	
		Native-born	18	18.2%	
	Divorced	Immigrant	7	7.1%	
		Native-born	1	1.0%	
	Widowed	Immigrant	1	1.0%	
		Native-born	1	1.0%	
Employment status	Student	Immigrant	4	4.0%	$F_8=64.2$ p=0.00
		Native-born	2	2.0%	
	Full-time employment	Immigrant	6	6.1%	
		Native-born	3	3.0%	
	Part-time employment	Immigrant	3	3.0%	
		Native-born	4	4.0%	
	Sick leave	Immigrant	3	3.0%	
		Native-born	7	7.1%	
	Unable to work and receiving welfare allowance for health problems	Immigrant	7	7.1%	
		Native-born	53	53.5%	
	Unemployed without welfare allowance	Immigrant	71	71.7%	
		Native-born	30	30.3%	
	Working without a legal work permit	Immigrant	5	5.1%	
		Native-born	0	0%	
Main Diagnosis	Schizophrenia	Immigrant	32	32.3%	$F_3=6.0$ p=0.11
		Native-born	37	37.4%	
	Schizoaffective disorder	Immigrant	16	16.2%	
		Native-born	25	25.3%	
	Psychosis NOS	Immigrant	49	49.5%	
		Native-born	37	37.4%	
	Delusional disorder	Immigrant	2	2.0%	
		Native-born	0	0.0%	
Psychosis age of onset		Immigrant	99	26.1(7.5)	$F_{190}=2.6$ p=0.04
		Native-born	99	28.6 (8.7)	
Psychosis illness duration		Immigrant	99	4.69(7.08)	$F_{190}=50$ p=0.00
		Native-born	99	15.12(12.1)	
Comorbid psychiatric diagnosis: yes		Immigrant	4	4.0%	$F_1=10.0$ p=0.00
		Native-born	18	18.2%	
Organic comorbidity: yes		Immigrant	4	4.0%	$F_1=0.9$ p=0.35
		Native-born	7	7.1%	
Family psychiatric history: yes		Immigrant	38	38.4%	$F_1=0.3$ p=0.56
		Native-born	42	42.4%	
Suicide attempts:yes		Immigrant	15	15.2%	$F_1=2.1$ p=0.15
		Native-born	23	23.2%	
Current psychoactive substance use: yes		Immigrant	36	36.4%	$F_1=0.2$, p=0.66
		Native-born	39	39.4%	
Past psychoactive substance use:yes		Immigrant	52	52.5%	$F_1=0.3$, p=0.57
		Native-born	56	56.6%	
PANSS	Positive symptoms	Immigrant	99	13.1 (5.4), -1.67-1.73	$F_{196}=2.8$, p=0.97
		Native-born	99	13.1 (6.7), -1.67-1.73	
	Negative symptoms	Immigrant	99	14.2 (8.4), 1.7-6.5	$F_{195}=0.86$, p=0.001
		Native-born	99	18.3 (8.6), 1.7-6.5	
	General symptoms	Immigrant	99	28.5 (9.9), -1.4-4.3	$F_{196}=0.01$, p=0.302
		Native-born	99	29.98 (10.3), -1.4-4.3	

Obs/Freq: Number of cases observed/Frequency; SD: Standard Deviation; Conf.: Confidence; Psychosis NOS: Psychosis Not Other Specified, PANSS: Positive and Negative Syndrome Scale. *Scales data are presented as means. The rest of the variables are presented as percentages.

Table 2. Cultural characteristics and migration process in the non-refugee immigrant group. Data are presented as mean (SD) or number (%).

Variable		Obs/Freq	Mean(SD)/Percentage*
Age at first migration		99	20.5 (8.9)
Total number of migrations		99	1.3 (1.7)
Years since migration		99	12.8(11.2)
Origin	North Africa	25	25.3%
	Africa	12	12.1%
	South America	23	23.2%
	Central America	1	1.0%
	North America	1	1.0%
	Eastern Asia	8	8.1%
	Southeast Asia	7	7.1%
	Middle East	8	8.1%
	Western Europe	12	12.1%
	Eastern Europe	7	7.1%
Race	Caucasian	52	52.5%
	Black African	18	18.2%
	East Asian	5	5.1%
	Southeast Asian	7	7.1%
	Latin	17	17.2%
Religion	Christianity	29	29.3%
	Islam	37	37.4%
	Buddhism	3	3.0%

|				
	Atheism	22	22.2%	
	Others	8	8.1%	
Legal status	Documented	67	67.7%	
	Undocumented	32	32.3%	
Transportation during migration	Legal	74	74.7%	
	Illegal	25	24.2%	
Main reason for migration	Economical	65	64.6%	
	Political	1	1%	
	Both economical and political	9	9.1%	
	Studies	8	8.1%	
	Others	14	14.1%	
Level of companionship during migration	Alone	50	50.5%	
	With family	45	45.5%	
	With friends	4	4%	
Language barrier on arrival	Yes	70	70.7%	
	No	29	29.3%	
Current language barrier	Yes	35	35.4%	
	No	64	64.6%	

Table 3: Comparison of trauma burden between non-refugee immigrants and native-born individuals.

Variable		Group	Obs/Freq	Mean/Proportion	Std. Err.	[95% Conf. Interval]	Contrast statistics
EGEP-5	PTSD	Case	32	32.3%			$F_1=19.96$ p=0.00
		Control	7	7.1%			
	No PTSD	Case	92	67.7%			
		Control	67	92.9%			
Holmes & Rahe	Number of events	Case	99	10.91(4.51)	0.45	-6.93- (-4.61)	$F_{189}=5.54$ p=0.02
		Control	99	5.14(3.74)	0.38		
	Total score	Case	99	356.06(142.48)	14.32	-227.72-(-152.56)	$F_{193}=2.93$ p=0.00
		Control	99	165.92(125.04)	12.57		

| Variable		Group	Obs/Freq	Mean/Proportion	Std. Err.	[95% Conf. Interval]	Contrast statistics
CTQ	Total	Case	99	56.70 (18.28)	1.84	-22.01-(-12.64)	$F_{188}=5.19$ p=0.02
		Control	99	39.37(15.0)	1.51		
	Emotional Abuse	Case	99	13.39(5.64)	0.57	-5.91- (-3.00)	$F_{189}=7.91$ p=0.005
		Control	99	8.94(4.67)	0.47		
	Physical Abuse	Case	99	12.33(7.07)	0.71	-7.04- (-3.75)	$F_{163}=44.85$ p=0.000
		Control	99	6.94(3.93)	0.44		
	Sexual Abuse	Case	99	7.34(5.35)	0.43	-1.93- (-0.36)	$F_{196}=3.56$ p=0.061
		Control	99	6.56(4.97)	0.39		
	Emotional Neglect	Case	99	13.72(4.63)	0.4	-4.59- (-1.70)	$F_{194}=20.70$ p=0.000
		Control	99	10.57(4.97)	0.50		
	Physical Neglect	Case	99	10.49(4.63)	0.46	-4.64- (-2.47)	$F_{165}=5.19$ p=0.024
		Control	99	6.94(2.93)	0.29		
CTS	Number of events	Case	99	16.12(5.08)	0.51	-11.96- (-9.49)	$F_{177}=12.80$ p=0.00
		Control	99	5,39(3,61)	0.36		
	Total distress	Case	99	97.13(39.85)	4.00	-78.87- (-60.91)	$F_{150}=48.99$ p=0.00
		Control	99	27.24(21.37)	2.14		

Obs/Freq: Number of cases observed/Frequency; Std. Error: Standard Error; Conf.: Confidence; EGEP-5: Global Assessment of Post-traumatic Stress Questionnaire-5; PTSD: Post-traumatic Stress Disorder; CTQ: Childhood Trauma Questionnaire; Holmes & Rahe: Holmes & Rahe Social Readjustment Scale, CTS: Cumulative Trauma Scale.

Figure 1: Linear regression model for age of psychosis onset, measured by years, in non-refugee immigrant group (dependent variable).
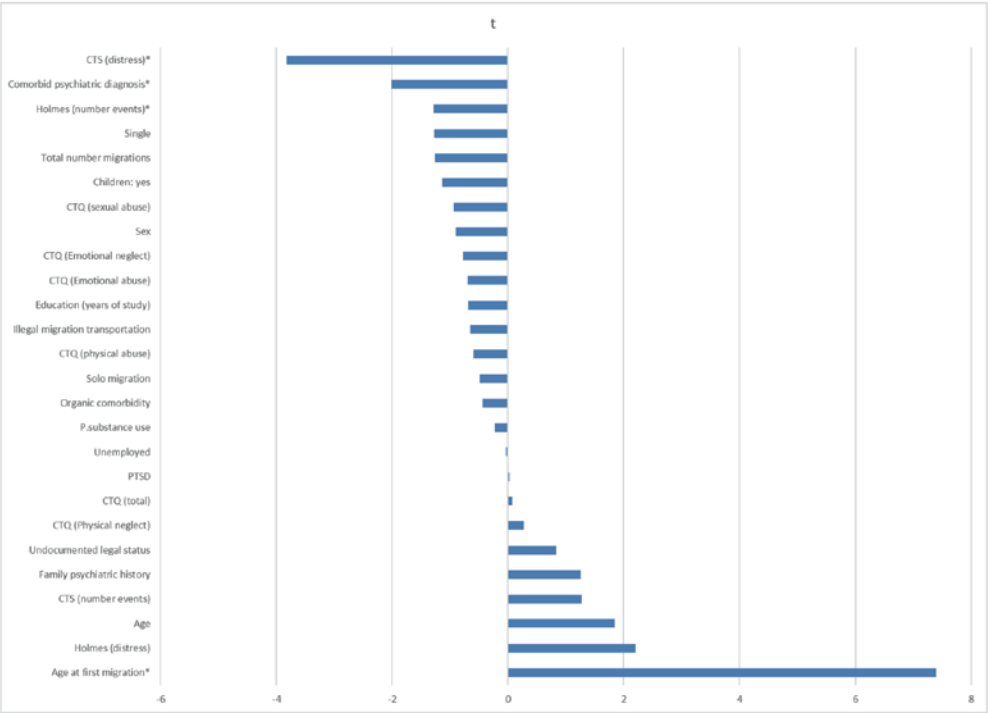
PTSD: Post-traumatic Stress Disorder; CTQ: Childhood Trauma Questionnaire; Holmes: Holmes & Rahe Social Readjustment Scale, CTS: Cumulative Trauma Scale. P.substance use: Psychoactive substance use.
Note: positive coefficients indicate a positive association between the independent variable and the AOP, suggesting a later AOP when those variables increase. Conversely, negative coefficients suggest an inverse association, indicating an earlier AOP when the independent variables increase.
*p<0.05

Figure 2: Linear regression model for age of psychosis onset measured by years in native-born group (dependent variable).
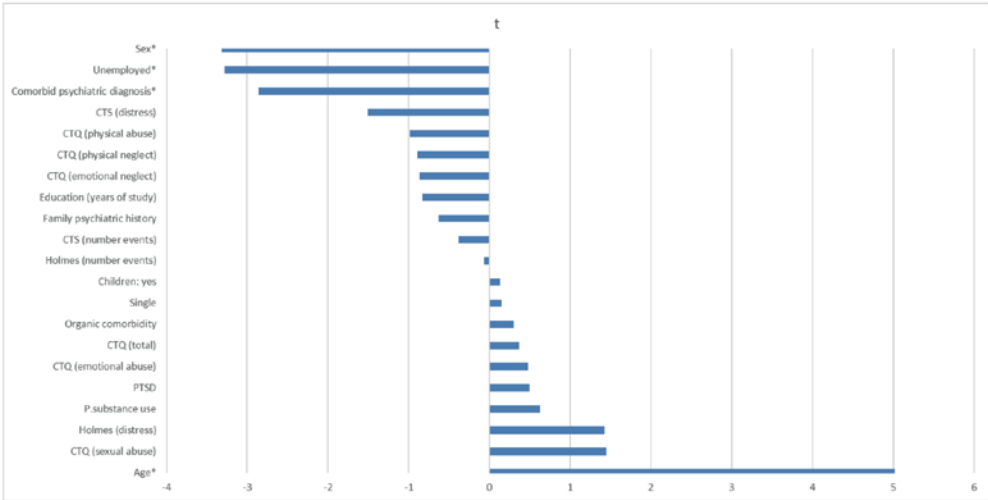
PTSD: Post-traumatic Stress Disorder; CTQ: Childhood Trauma Questionnaire; Holmes: Holmes & Rahe Social Readjustment Scale, CTS: Cumulative Trauma Scale. P.substance use: Psychoactive substance use.
Note: positive coefficients indicate a positive association between the independent variable and the AOP, suggesting a later AOP when those variables increase. Conversely, negative coefficients suggest an inverse association, indicating an earlier AOP when the independent variables increase.
*p<0.05

Supplementary materials 1: detailed description of sociodemographic, clinical, and migration process variables

Sociodemographic data, medical history, and migration process
Age, sex, race, country of origin, religion, descendants (indicating whether individuals have children), marital status, education level and employment status were included as sociodemographic variables. Clinical variables were: main psychiatric diagnosis according to ICD-10 criteria, comorbid somatic and psychiatric diagnoses, family psychiatric history, obstetric complications, and current and past substance use. Furthermore, psychotic symptoms were assessed with the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987; Peralta Martín & Cuesta Zorita, 1994).

To study factors related to the migration process in the non-refugee immigrant group, we included the following variables: refugee status, total number of migrations, transportation method during the migration to Spain, age at first migration, main reason for emigration, level at which the person was accompanied during the migration process, and other acculturation issues such as current legal status in Spain, past and current language barriers, and job status.

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Peralta Martín, V., & Cuesta Zorita, M. J. (1994). [Validation of positive and negative symptom scale (PANSS) in a sample of Spanish schizophrenic patients]. Actas luso-espanolas de neurologia, psiquiatria y ciencias afines, 22(4), 171–177. PMID: 7810373.

Supplementary materials 2: Association between psychosis age of onset (dependent variable) and sociodemographic, clinical, and migration variables (independent variables) in non-refugee immigrant and native-born individuals with psychotic disorder: bivariable analysis.

Independent variable	Contrast statistics (correlation r/Student's t-test)	
	Non-refugee immigrant	Native-born individuals

	r	t	r	t
Age	0.33**		0.32**	
Education, years	0.23*		0.27	
Total number of migrations	-0.145		0.154	
Age at first migration	0.616**		-	
Holmes & Rahe: total number events	-0.29**		0.15	
Holmes & Rahe; total number distress	-0.25*		0.17	
CTQ: emotional abuse	-0.35**		0.14	
CTQ: physical abuse	-0.42**		0.09	
CTQ: sexual abuse	-0.15		0.07	
CTQ: emotional neglect	-0.30**		-0.18	
CTQ: physical neglect	-0.31**		-0.16	
CTQ: total	-0.48**		-0.18	
CTS; total number events	-0.56**		-0.02	
CTS: total number distress	-0.67**		-0.06	
PTSD: yes		0.77*		0.48
Gender		2.98*		0.58*
Descendants: yes		6.47		0.01
Lives alone		0.51		0.77
Unemployed		3.70		3.75
Comorbid psychiatric disorder		0.55		2.81
Comorbid organic disorder		1.08		3.90
Family history of psychiatric disorder		0.005		0.50
Previous suicide attempts		0.12		0.07
Current psychoactive substance use		1.43		0.27
Illegal status		5.2*		-
Illegal transportation		7.5**		-
Migration undertaken alone		6.1*		-
Language barrier		0.51		-

Holmes & Rahe: Holmes & Rahe Social Readjustment Scale, CTQ: Childhood Trauma Questionnaire; CTS: Cumulative Trauma Scale, PTSD: Post-traumatic Stress Disorder;
*P<0.05 **p<0.01

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4.3. Study 3 (hypothesis 3 and 5):

Comparison of male and female non-refugee immigrants with psychosis: clinical, sociodemographic, and migration-related differences and impact on stress

Archives of Women's Mental Health

ORIGINAL ARTICLE

Comparison of male and female non-refugee immigrants with psychosis: clinical, sociodemographic, and migration-related differences and impact on stress

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Abstract

Purpose To compare social, clinical, and migration-related factors between male and female immigrants with psychotic disorders and to determine the association between these variables and stress in the last year.

Methods We administered the Holmes and Rahe Social Readjustment Scale to evaluate psychological stress in 99 non-refugee immigrants (26 women, 73 men) who presented ≥ one psychotic episode (ICD-10 criteria). We compared the two groups in terms of sociodemographic, clinical, cultural, and migration-related variables. A multivariable analysis using a linear regression model (stepwise method) was performed to evaluate potential associations between these variables and stress.

Results Women were more likely to be married and divorced, had less access to welfare payments, and lower unemployment and homeless rates than men. The most common psychiatric diagnosis was psychosis not otherwise specified with more women being affected (61.5% in women vs. 45.2% in men), but the diagnosis of schizophrenia was more common in men (38.4% vs 15.4%). Both groups exhibited very high levels of stress in the past year (mean total distress score > 300). In women, stress was significantly associated with age at first migration and be a racialized person. By contrast, among men stress was significantly associated with language barrier and comorbidity with a physical disorder.

Conclusions The results of this study reveal important differences between men and women immigrants. These findings underscore the importance of understanding how gender-specific roles and social expectations intersect with the timing and nature of migration to influence stress levels differently in immigrant women and men with psychotic disorders.

Keywords Women · Non-refugee immigrants · Psychosis · Psychological stress · Gender differences · Migration mental health

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Introduction

International migration is a major global trend. According to data from the United Nations, a total of 280.6 million people migrated worldwide in the year 2020, with women constituting 48.1% of this population, which underscores the pronounced gender dimension within this intricate landscape (IOM- United Nations 2020).

Migration, which is widely recognized as a chronic environmental stressor, requires continuous adjustment to new surroundings (Bustamante et al. 2018). This includes pre-migration trauma, loss of social support, displacement from home, and experiences of social or racial discrimination and so on (Bustamante et al. 2018; Fortuna et al. 2008). Stress is a multifaceted process in which environmental factors trigger physical/psychological responses, requiring individuals to adapt to the evolving environment (Rahe et al. 1970). When adaptation resources are overwhelmed, mental disorders can arise (Gatt et al. 2019; Steel et al. 2016; Rahe et al. 1970). Socioeconomic adversity, such as unemployment or homelessness, has consistently shown correlations with poorer psychotic disorder outcomes, including prolonged undetected psychosis (Hatzimanolis et al. 2020; Peralta et al. 2022; Samele et al. 2001).

Unsurprisingly, a worse mental health has been described in immigrants (WHO 2021). In fact, several meta-analyses have found that migrant populations present a higher incidence of psychotic disorders (RR > 2) (Bourque et al. 2011; Cantor-Graae and Selten 2005; Selten et al. 2019). Interestingly, recent studies have found an association between adverse experiences throughout the migration process and psychosis development (Stilo et al. 2017; Tarricone et al. 2021). Likewise, extreme adversity conditions during migration (such as illegal status or involuntary migration) significantly elevate the risk of psychosis, contribute to a more complex clinical presentation, and reduce recovery likelihood (Golay et al. 2019).

Compared to men, immigrant women with psychotic disorders could face several unique stressors related to their various minority identities (Gea-Sánchez et al. 2017). To understand this, an essential concept comes into play: intersectionality. This term, from sociology, is used to describe the impact and complex interconnection of multiple identities and forms of oppression on experiences of inequality (Choo and Ferree 2010). Immigrant women with psychotic disorders experience a complex interweaving of different social factors such as gender role demands, social stigma related to ethnicity and the psychosis diagnosis, and isolation. These factors could increase the risk of poorer health (Brodish et al. 2011; Gea-Sánchez et al. 2017).

Although it seems clear that women immigrants face a unique combination of stressors, there is an important gap in the literature when it comes to identifying factors linked to stress in immigrant women (Perry et al. 2013; Ryan et al. 2021). The lack of research is particularly notable in immigrant populations with psychotic disorders (Trabsa et al. 2023, Mazza et al. 2021). This issue is especially significant given that vulnerable population groups, who commonly require more healthcare attention, often receive the least support (Fiscella and Shin 2005).

In this context, the aims of this study were (1) to describe and compare the social, clinical, and migration-related variables in immigrant women and men with psychotic disorders and (2) to determine potential associations between those variables and stress in the last year in this population.

Methods

Participants

A total of 99 non-refugee immigrants (26 women, 73 men) were recruited between June 2020 and July 2021. Participants were recruited from inpatient and outpatient units at the mental health service at the Hospital Del Mar in Barcelona, Spain. This hospital has a high proportion of immigrants in its catchment area: 41%, without considering undocumented immigrants.

The participants were recruited by convenience sampling. Inclusion criteria were as follows: (1) age 18 to 65 years; (2) confirmed diagnosis of a psychotic disorder according to the International Classification of Diseases 10th revision (ICD-10) (World Health Organization 2004), including any of the following: F.29 nonspecific (not otherwise specified; NOS) psychosis, F.22 delusional disorder, F.25 schizoaffective disorders, or F.20 schizophrenia. Exclusion criteria include: (1) current acute psychotic episode, (2) psychosis secondary to acute intoxication or organic condition, (3) moderate cognitive impairment, (4) existence of significant language barrier (inability to understand English/Spanish/French).

Data and instruments

Migration process details, along with sociodemographic and clinical data, were obtained using a custom questionnaire and medical records. Validated scales were used to assess clinical and stress-related variables. All interviews were conducted in one of three languages (Spanish, English, or French) in accordance with the participant's preference. When necessary, the interviews were conducted by a bilingual evaluator trained in cultural competence.

The Holmes and Rahe Social Readjustment Scale (Holmes and Rahe 1967) was used to assess stressful events in the last year, along with Spanish (González de Rivera JL.

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1983) and French (Harmon et al. 1970) validated versions. This 43-item scale measures a range of different stressful events, with each event given an impact score. Two measures are used to divide the overall scores: the count of total stressful events and the global impact score. Total impact scores are interpreted as follows: < 150: low stress levels; 150 to 299: moderate stress (with a 50% risk of developing an illness in the near future); and > 300: high stress (illness risk of 80% risk in the near future) (Blasco-Fontecilla et al. 2012; Rahe et al. 1970). For the Spanish version, Gerst et al. (1978) assessed the reliability of the Holmes and Rahe Social Readjustment Scale, reporting high consistency in rank ordering for both healthy adults (ranging from 0.96 to 0.89) and patients (ranging from 0.91 to 0.70). In terms of validity, Holmes and Rahe (1967) identified a positive correlation (+ 0.118) between Life Change scores and illness scores. Furthermore, the scale has been validated and utilized within Spanish populations (Roca et al. 2013). Regarding the French version, Harmon et al. administered the Holmes and Rahe Social Readjustment Scale to French, Belgian, and Swiss samples in a French language translation. Their findings indicated a high concordance among all European samples, with Rho's of 0.93, 0.94, and 0.96. Additionally, a composite European sample ($n = 139$) compared to a corresponding American sample ($n = 195$) showed a high correlation in relative rank ordering of readjustment required by life events (rho = 0.89) (Harmon et al. 1970). However, all these validations were studied primarily within western context, comparing Europeans and Americans.

The Positive and Negative Syndrome Scale (PANSS), Spanish (Peralta Martín and Cuesta Zorita 1994), English (Kay et al. 1987), and French (Lançon et al. 1999) versions were administered to assess psychotic symptoms. The Spanish version demonstrated good interrater reliability (ICC = 0.72 to 0.80) and moderate internal consistency ($\alpha = 0.62$ to 0.92) (Peralta Martín and Cuesta Zorita 1994). Next, the English version displayed internal consistency ranging from $\alpha = 0.73$ to 0.83 (Kay et al. 1987) and interrater reliability between 0.83 and 0.87 (Kay et al. 1988). Lastly, the French version (Lançon et al. 1999) exhibited Cronbach's alpha coefficients exceeding 0.65 across the five studied factors: negative, positive, hostility, disorganization, and anxiety/depression. Accordingly, the PANSS can be used to reliably measure schizophrenia symptoms in patients from different cultural and linguistic backgrounds. However, it is not specifically validated for migrant populations, which might influence the accuracy of symptom assessment. The Mini-Mental State Examination (MMSE) (Folstein et al. 1975) was administered to detect individuals with a moderate cognitive impairment (MMSE > 15) as this constituted one of the exclusion criteria.

Ethics

This study was approved by the *Clinical Research Ethics Committee at the Parc de Salut Mar*, Barcelona (ID:2019/8398/I) under the principles laid out in the Declaration of Helsinki (WMA Declaration of Helsinki 2022). Participation was entirely voluntary. All participants were required to provide signed informed consent (available in Spanish/English/French) prior to participation. The study protocol was registered at ClinicalTrials.gov (NCT04867447).

Data analyses

A cross-sectional descriptive analysis was conducted. Two separate groups (women and men) were constructed for the univariate analyses. Comparative analyses were performed using the $\chi 2$ test and Student's t test. Next, Pearson's correlation coefficients and Student's t test were determined to examine potential associations between stressful events in the past year and sociodemographic, clinical, and migration-related variables. Nominal variables with more than two categories were dichotomized.

A multivariable analysis was performed using a linear regression model (step-wise method). In this model, the total number of events score from the Holmes and Rahe scale was used as the dependent variable. For this analysis, the independent variables, selected based on previous reports (Bustamante et al. 2018; Erving 2022; Sangalang et al. 2018), were as follows: age; education (years); number of migrations; age at first migration; PANSS total positive/negative/general symptoms; racialized; origin; single; living alone; descendants(children); jobless; homeless; non-affective psychosis; comorbid psychiatric history; family psychiatric history; substance use; illegal status; irregular migration transportation; solo migration; and language barrier. P values ≤ 0.05 were considered statistically significant. The IBM Statistical Package for Social Sciences (SPSS) (IBM Corp.; Armonk, NY, USA) was used to perform all statistical analyses.

Results

Comparison of sociodemographic between women and men

There was a significant between-group (women vs. men) difference in relationship status ($\chi^2{}_3 = 8.2, p = 0.04$). While most of the sample (70.7%) were single, a significantly higher percentage of women were married (26.9% vs. 19.2%). Similarly, the percentage of divorced women was also higher (15.4% vs. 4.1%). A higher proportion of women

had children (46.2% vs. 21.9%) ($\chi^2{}_{96} = 9.8, p = 0.003$). Nearly one in four men (24.7%) were homeless vs. 6.8% of women ($\chi^2{}_8 = 20.21, p = 0.02$). Significant between-group differences were also found in employment status ($\chi^2{}_7 = 18.1, p = 0.02$), with a higher proportion of women employed part-time (3.8% vs. 2.7%) or full-time (15.4% vs. 2.7%). By contrast, a higher percentage of the men were receiving a welfare allowance for health-related problems (8.2% vs. 3.8%) (Table 1).

Migration process and cultural variables

A total of 36 countries were represented in the sample, indicating substantial diversity in this group. However, there were significant between-group differences in the country of origin ($\chi^2{}_8 = 17.4, p = 0.04$), with most of the women from South America (30.8%) or Western Europe (23.1%) and most of the men from North Africa (31.5%) or South America (20.5%). Significant differences were also observed in terms of race ($\chi^2{}_3 = 11.6, p = 0.02$), with a substantially higher percentage of men classified as black (20.5% vs. 11.5%) and a higher proportion of women classified as Asian (15.4% vs. 1.4%). Significant differences were also observed in terms of the method of transportation, with 32.9% of men entering the country illegally versus only 3.8% of women ($\chi^2{}_3 = 8.5, p = 0.002$). In terms of the legal status, 42.5% of the men were illegal immigrants vs. 3.8% of the women ($\chi^2{}_3 = 13.1, p = 0.00$) (Table 2).

Clinical data and stress comparison between women and men

Significant between-group differences were observed in the main psychiatric diagnosis ($\chi^2{}_3 = 9.8, p = 0.02$). The most common primary psychiatric diagnosis in both groups was psychosis NOS (61.5% in women vs. 45.2% in men). However, 38.4% of the men with a psychotic disorder were diagnosed with schizophrenia compared to only 15.4% of the women (Table 3).

Significant differences were also observed on the Holmes-Rahe Life Stress Inventory. Although stress levels were high in both groups, they were significantly higher in men, as evidenced by the mean total distress score of 375.6 in men vs. 301.2 in women ($t_{96} = 0.02, p = 0.02$) and an average of 11.6 stressful events in the last year in men vs. 9.1 events in women ($t_{96} = 0.6, p = 0.02$) (Table 3).

Associations between stress in the past year and sociodemographic, clinical, and migration variables

On the bivariate analysis, women show association with age at first migration and stress in the past year. In men this

association was seen with comorbid diagnosis, illegal status, illegal transportation, migration solo, and language barrier (Supplementary material 1).

On the multivariate analysis, the model that best predicted stress in the past year in women was a two-variable model (age at first migration and be a racialized person), with an adjusted R^2 of 0.186. By contrast, in men the best predictor of stress was a four-variable model (PANSS total score, comorbidity with a physical disorder, irregular transportation, and language barrier), with adjusted R^2 of 0.182. For women, a lower age at first migration and be a racialized person were significantly associated with higher stress levels in the past year (see Table 4). In men group, comorbid a physical diagnosis and language barrier were significantly associated with stress. Irregular transportation and general PANSS symptoms presented an important association tendency (Table 4).

Discussion

The results of this study reveal significant differences between immigrant women and men with psychotic disorders in terms of sociodemographic, clinical, and migration process-related variables. Significant between-group differences were also observed in terms of the association between these variables and stress levels over the past year.

Comparison of sociodemographic between women and men

First, while the predominant origin among men aligns with the main source of migration to Spain (11.49% of migrants in Spain are from Morocco) (IOM- United Nations 2020), most women in our study are from South America. Although current evidence suggests a slightly higher prevalence of psychosis in men compared to women (Jongsma et al. 2019), the incidence of psychosis appears to remain consistent worldwide (0.7–1%) (Jauhar et al. 2022; McGrath et al. 2008). Given these data, it becomes evident that there is an under-representation of North African women in our sample, which prompts next question: why are these women not accessing our services? It has been well described, that immigrants, due to different barriers, have less access to specialized, primary and mental healthcare when compared to locals (Fiscella and Shin 2005; Pérez-Urdiales 2021). These differences are even more pronounced among immigrant women (Gea-Sánchez et al. 2017). In this regard—and in line with our results—a previous study carried out in Spain found that Latin women accessed the healthcare system more frequently than African women, mainly due to cultural and linguistic similarities with the host culture (Pérez-Urdiales 2021).

Table 1 Comparison of sociodemographic characteristics between immigrant women and immigrant men with psychotic disorders. Data are presented as means (SD) or number (%)

Variable		Group	Obs/Freq	Mean (SD), conf/percentage*	Contrast statistics
Age		Women	26	38.3 (12.7)	$t_{96}=9.8$ $p=0.003$
		Men	73	31.6 (8.5)	
		Total	99	33.3 (10.2)	
Education, years		Women	26	10.6 (3.1)	$t_{96}=2.4$ $p=0.2$
		Men	73	9.5 (4.2)	
		Total	99	9.8 (3.9)	
Relationship status	Single	Women	14	53.8%	$X^2_3=8.2$ $p=0.04$
		Men	56	76.7%	
		Total	70	69.3%	
	Married/in a couple	Women	7	26.9%	
		Men	14	19.2%	
		Total	21	20.8%	
	Widowed	Women	1	3.8%	
		Men	0	0%	
		Total	1	0.99%	
	Divorced/separated	Women	4	15.4%	
		Men	3	4.1%	
		Total	7	6.9%	
Descendants (children)	Yes	Women	12	46.2%	$X^2_1=5.6$ $p=0.02$
		Men	16	21.9%	
		Total	28	27.7%	
	No	Women	14	53.8%	
		Men	57	78.1%	
		Total	71	70.3%	
Household	Alone	Women	4	4.0%	$X^2_8=20.21$ $p=0.02$
		Men	9	7.1%	
		Total	13	12.9%	
	Family/friends/couple	Women	19	76.7%	
		Men	65	63.5%	
		Total	84	83.2%	
	Mental health residence	Women	1	3.8%	
		Men	1	1.4%	
		Total	2	1.98%	
	Homeless	Women	1	3.8%	
		Men	18	24.7%	
		Total	19	18.8%	

Table 1 (continued)

Variable		Group	Obs/Freq	Mean (SD), conf/percentage*	Contrast statistics
Employment status	Student	Women	2	7.7%	$X^2_7=18.1$, $p=0.02$
		Men	2	2.7%	
		Total	4	3.9%	
	Full-time employment	Women	4	15.4%	
		Men	3	2.7%	
		Total	7	6.9%	
	Part-time employment	Women	1	3.8%	
		Men	2	2.7%	
		Total	3	2.9%	
	Sick leave	Women	2	7.7%	
		Men	1	1.4%	
		Total	3	2.9%	
	Unable to work and receiving welfare allowance for health problems	Women	1	3.8%	
		Men	6	8.2%	
		Total	7	6.9%	
	Unemployed	Women	14	53.8%	
		Men	55	75.3%	
		Total	69	68.3%	
	Homemaker	Women	2	7.7%	
		Men	0	0%	
		Total	2	1.98%	

Abbreviations: Obs/Freq, number of cases observed/frequency, *SD* standard deviation

*Age and education data are presented as means. The other variables are given as percentages

In our sample, 46.2% of the women had children versus only 21.9% of men. Interestingly, more than half of these women were single (53.8%). These findings shed light into a critical factor that have been described to influence psychosis risk among immigrants (Dykxhoorn et al. 2019). Previous research describe that women immigrating alone appear to have a higher risk of psychosis than those immigrating with their families (Dykxhoorn et al. 2019). Conversely, among men, those immigrating to join a family and those immigrating with their dependent children had an increased risk of psychosis (Dykxhoorn et al. 2019). Thus, sex-specific differences in how family networks are perceived during the migration process and the association with psychosis risk must be considered.

Another notable gender-related difference was that the divorce/separation rate was nearly three times higher in women than in men. This finding is consistent with previous research showing that women facing serious medical illness are more likely to be abandoned by their partners (Glantz et al. 2009). Furthermore, when partner separation occurs it leads to a negative impact on life's quality (Glantz et al. 2009). While previous research did not focus on psychosis, it is well known that women who live with psychosis deal with important social stigma (Chernomas et al. 2017). Another concerning finding was the relatively low percentage of women receiving a welfare allowance compared to men (3.8% vs. 8.2%). The increased welfare allowances among immigrant men cannot be solely explained by worse symptomatology according to PANSS scores. The reason for this difference is not clear, but this finding warrants more study to prevent gender discrimination.

Even though intersectional factors create a more challenging situation for female immigrants, women had a substantially higher employment rate than men (15.4% vs. 2.7%). This finding—considered together with the lack of between-group differences in terms of education and PANSS scores—is consistent with the findings from other studies describing the "feminization of survival", in which female immigrants

Table 2 Comparison of migration and cultural variables between immigrant women and men with psychotic disorder. Data are presented as means (SD) or number (%)

Variable		Group	Obs/Freq	Mean (SD), conf/percentage*	Contrast statistics
Age at first migration		Women	26	21.9 (10.5)	$t_{96}=0.8$
		Men	73	19.9 (8.3)	$p=0.4$
		Total	99	20.4 (8.8)	
Total number of migrations		Women	26	1.5 (1.5)	$t_{96}=1.8$
		Men	73	1.8 (1.4)	$p=0.4$
		Total	99	1.7 (1.4)	
Total years since first migration		Women	26	16.4 (15.5)	$t_{96}=3.17$
		Men	73	11.6 (11.1)	$p.=0.09$
		Total	99	12.8 (12.5)	
Origin	North Africa	Women	1	3.8%	$X^2_8=17.4,$
		Men	23	31.5%	$p=0.04$
		Total	24	23.7%	
	Africa	Women	2	7.7%	
		Men	10	13.7%	
		Total	12	11.8%	
	South America	Women	8	30.8%	
		Men	15	20.5%	
		Total	23	22.8%	
	Central America	Women	1	3.8%	
		Men	0	0%	
		Total	1	0.99%	
	North America	Women	0	0%	
		Men	1	1.4%	
		Total	1	0.99%	
	Eastern Asia	Women	2	7.7%	
		Men	6	1.4%	
		Total	8	7.9%	
	Southeast Asia	Women	3	11.5%	
		Men	4	5.5%	
		Total	7	6.9%	
	Middle East	Women	2	7.7%	
		Men	6	8.2%	
		Total	8	7.92%	
	Eastern Europe	Women	1	3.8%	
		Men	6	8.2%	
		Total	7	6.9%	
	Western Europe	Women	6	23.1%	
		Men	7	9.6%	
		Total	13	12.9%	

Table 2 (continued)

Variable		Group	Obs/Freq	Mean (SD), conf/percentage*	Contrast statistics
Race	Caucasian	Women	10	38.5%	$X^2_3=11.6,$
		Men	42	57.5%	$p=0.02$
		Total	52	51.5%	
	Black African	Women	3	11.5%	
		Men	15	20.5%	
		Total	18	17.8%	
	Asian	Women	4	15.4%	
		Men	1	1.4%	
		Total	5	4.9%	
	Southeast Asian	Women	2	7.7%	
		Men	5	6.8%	
		Total	7	6.9%	
	American	Women	7	26.9%	
		Men	10	13.7%	
		Total	17	16.8%	
Religion	Christianism	Women	12	46.2%	$X^2_3=10.9,$
		Men	17	23.3%	$p=0.03$
		Total	29	28.7%	
	Islam	Women	3	11.5%	
		Men	34	46.6%	
		Total	37	36.6%	
	Buddhism	Women	1	3.8%	
		Men	2	2.7%	
		Total	3	2.9%	
	Atheism	Women	8	30.8%	
		Men	14	19.2%	
		Total	22	21.8%	
	Others	Women	2	7.7%	
		Men	6	8.2%	
		Total	8	7.9%	
Legal status: Undocumented		Women	1	3.8%	$X^2_3=13.1,$
		Men	31	42.5%	$p=0.00$
		Total	32	31.7%	
Transportation during migration: Illegal		Women	1	3.8%	$X^2_3=8.5,$
		Men	24	32.9%	$p=0.002$
		Total	25	24.7%	
Companions during migration process	Alone/solo	Women	10	38.5%	$X^2_1=2.6,$
		Men	40	54.8%	$p=0.27$
		Total	50	49.5%	
	With family or friends	Women	16	61.5%	
		Men	32	43.8%	
		Total	48	47.5%	

Table 2 (continued)

Variable		Group	Obs/Freq	Mean (SD), conf/percentage*	Contrast statistics
Reason for migration	Economical	Women	23	88.5%	$X^2_1 = 10.9$, $p = 0.05$
		Men	58	79.5%	
		Total	81	81.8%	
	Political	Women	1	3.8%	
		Men	9	12.3%	
		Total	10	10.1%	
	Studies	Women	2	7.7%	
		Men	6	8.2%	
		Total	8	8.08%	
Language barrier on arrival: yes		Women	15	57.7%	$X^2_1 = 2.9$, $p = 0.07$
		Men	55	75.3%	
		Total	70	69.3%	
Current language barrier: yes		Women	6	23.1%	$X^2_1 = 2.3$, $p = 0.12$
		Men	29	39.7%	
		Total	35	34.65%	

Abbreviations: Obs/Freq number of cases observed/frequency, *SD* standard deviation

*Age and education data are presented as means. The rest of the variables are presented as percentages

take on a larger role than men in providing for their families (González-Juárez et al. 2014). However, it is important to note that a higher proportion of men present an illegal status, which may also contribute to these lower job rates.

Clinical data and stress comparison between women and men

Regarding clinical variables, women, compared to men, were diagnosed more frequently with psychosis NOS and less with Schizophrenia. This finding may be explained by insights from prior research studies. First, cultural barriers, together with insufficient cultural competence in healthcare services, could lead to a less precise diagnosis (Alda Díez et al. 2010; Bhui et al. 2007). In this regard, some studies suggest that the underrepresentation of minority perspectives in academia may lead to the development of ethnocentric mental health assessment protocols (Aggarwal et al. 2016; Dein 2007). Moreover, the clinical characteristics of psychosis in women (more mood symptoms, better functioning, etc.) could lead—independently of migrant status—to misdiagnosis and treatment delays in this population (Ferrara and Srihari 2020; Mazza et al. 2021). Finally, immigrants present worse adherence to mental health services, which might explain lower diagnostic rates for chronic illnesses such as schizophrenia (Betancourt et al. 2003; Betancourt et al. 2017; Pérez-Urdiales 2021).

When comparing Holmes and Rahe scores, although men presented more distress secondary to stressful events in the past year (impact scores of 375.6 among men vs 302.2 women) both groups presented exceptionally high impact scores. Previous literature have described that impact scores above 300 could result in an upcoming illness risk (physical or mental) of 80% (Blasco-Fontecilla et al. 2012; Rahe et al. 1970). Plus, stress, as measured by Holmes and Rahe scores, significantly influences psychotic symptoms and risk (Butjosa et al. 2016; Myin-Germeys et al. 2005).

Associations between stress in the past year and sociodemographic, clinical, and migration variables

We performed a multivariable analysis to determine whether any sociodemographic, migration, or clinical variables associated with stressful events or distress in the past year. In women, stress levels were significantly associated with age at first migration (that is, younger migrants report more stress) and be a racialized person (racialized migrants report more stress). By contrast, in men, stress was associated with factors related to the migration process (language barrier) and clinical burden (physical disorder). A potential explanation for these differences could be that stress levels are influenced by traditional gender roles and expectations (Alexander et al. 2021), in which the responsibility of taking care of the family falls mainly on women (Luo and Sato 2021;

Table 3 Comparison of clinical data and stress levels in the past year between immigrant women and men with psychotic disorder. Data are presented as means (SD) or number (%)

Variable		Groups	Obs/Freq	Mean(SD), conf/percentage*	Contrast statistics
Main diagnosis	Schizophrenia	Women	4	15.4%	$X^2_3 = 9.8$ $p = 0.02$
		Men	28	38.4%	
	Schizoaffective disorder	Women	4	15.4%	
		Men	12	16.4%	
	Psychosis NOS	Women	16	61.5%	
		Men	33	45.2%	
	Delusional disorder	Women	2	7.7%	
		Men	0	0.0%	
Comorbid psychiatric diagnosis: yes		Women	2	7.7%	$X^2_1 = 1.2$ $p = 0.271$
		Men	2	2.7%	
Physical comorbidity: yes		Women	1	3.8%	$X^2_1 = 0.003$ $p = 0.9$
		Men	3	4.1%	
Family psychiatric history: yes		Women	9	34.6%	$X^2_1 = 0.21$ $p = 0.7$
		Men	29	39.7%	
Suicide attempts: yes		Women	1	3.8%	$X^2_1 = 3.5$ $p = 0.06$
		Men	14	19.2%	
Current psychoactive substance use: yes		Women	5	19.2%	$X^2_1 = 4.8$ $p = 0.03$
		Men	31	42.5%	
Past psychoactive substance use: yes		Women	9	34.6%	$X^2_1 = 4.5$ $p = 0.03$
		Men	43	58.9%	
Holmes and Rahe	Number of events	Women	26	9.1 (4.2), −4.5–0.5	$t_{96} = 0.6$, $p = 0.02$
		Men	73	11.6 (4.4), −4.5–0.5	
	Total distress score	Women	26	301.2 (4.2), −137.6–11.6	$t_{96} = 0.02$, $p = 0.02$
		Men	73	375.6 (139.1), −137.6–11.6	
PANSS	Positive symptoms	Women	26	14.2 (7.4), −1.01–3.84	$t_{96} = 12.9$, $p = 0.13$
		Man	73	12.7 (4.4), −1.73–4.5	
	Negative symptoms	Women	26	13.2 (6.7), −5.2–2.4	$t_{96} = 1.27$, $p = 0.24$
		Man	73	14.6 (8.9), 4.7–1.9	
	General symptoms	Women	26	28.9(11.1), −3.8–5.1	$t_{96} = 1.06$, $p = 0.39$
		Man	73	28.3 (9.4), −4.3–5.6	

Abbreviations: Conf. confidence, Psychosis, *NOS* Psychosis Not Other Specified, *PANSS* Positive and Negative Syndrome Scale. Holmes and Rahe Holmes and Rahe Social Readjustment Scale

*Scale data are presented as means. The other variables are presented as percentages

Wu et al. 2021). As a result, when women migrate to a new country, they may face challenges adapting to a new environment while simultaneously upholding these traditional family roles (Alexander et al. 2021; Luo and Sato 2021). This dual pressure can lead to increased stress, especially when migration occurs at a critical time in their life, such as early adulthood or young motherhood when they have young children (Wu et al. 2021). This is particularly relevant given the findings recently reported by Wu et al., who found post-migration stress has time-varying effects on mental health (Wu et al. 2021). Moreover, several studies have shown that racism and sexism are interconnected, and individuals with multiple disadvantages face a higher exposure to discrimination, leading to more stress and worse mental health (Denise

2012; Perry et al. 2013; Thomas et al. 2008). This could explain our results, in which being a racialized person was associated with stress only in women.

In contrast, men, face challenges related to migration and adaptation within the framework of their provider and protector roles (Abdullah and Brown 2011; Assari and Lankarani 2017; Gelfer 2014; Wu et al. 2021), resulting in stress that is less influenced by their age at first migration but more in factors that endure migration process itself. For instance, physical illness comorbidity, which could exacerbate disability, burden, and diminish quality of life in individuals with psychosis (Šimunović Filipčić and Filipčić, 2018).

There is, however, a need to move beyond stereotypical and overly simplistic gender models to better understand

Table 4 Linear regression model for stress in the past year measured by total number of events reported on the Holmes and Rahe scale (dependent variable)

Women				
	B	t	p	Confidence interval
Age at first migration	−0.14	−1.9	0.05	−0.29–0.01
Racialized	2.9	1.9	0.06	−0.17–6.15
Men				
	B	t	p	Confidence interval
PANNS general symptoms	−0.01	−1.88	0.06	−0.19–0.01
Comorbid physical diagnosis	2.48	1.98	0.05	0.01–4.98
Illegal transportation	−2.08	−1.88	0.06	−4.29–0.12
Language barrier	2.09	1.99	0.05	0.00–4.19

PANSS positive and negative syndrome Scale, Holmes and Rahe Holmes and Rahe Social Readjustment Scale

a highly complex gendered reality (Alexander et al. 2021; Lokot 2018). The explanations underlaying these differences need to be corroborated and studied further.

Limitations

This study has several limitations. First, recruitment was based on convenience sampling, which could limit the generalizability of the results. Second, there was a notable difference in the number of male and female participants in the study (26 women vs. 73 men), which could limit the statistical power. Third, we employed instruments that are typically standardized for western academia; this may introduce limitations in the cultural applicability. While these tools might demonstrate high validity and reliability within certain cultural contexts, their transferability to diverse cultural settings, such as those represented by immigrants from various regions, might require further validation and adaptation. However, we mitigated this limitation by ensuring that professionals trained in cultural competence performed the evaluations. Fourth, despite the cultural diversity of this sample, the results may not be universally applicable. Our study involved migrants from 36 countries, so we acknowledge the potential influence of migration experiences across regions, contributing to considerable variability among the diverse migrant participants in this study. The adjusted R^2 of 0.186 denotes a low effect size, likely influenced by this diversity, which may have contributed to the modest explanatory power of the model. Fifth, we did not assess resilience, which could be a confounding factor for the impact of stress on the individual. Finally, the cross-sectional design does not allow us to establish causality. Given these limitations, it is important to approach the interpretation of our findings with caution. Further research should focus on cross-cultural validation of assessment tools, investigations

across diverse regions, and longitudinal studies to elucidate causal relationships and long-term implications.

Conclusions

This study reveals significant sociodemographic, clinical, and migration-related differences between male and female immigrants with psychotic disorders. Our findings suggest that the impact of migration-related variables on past year stress differs between male and female immigrants. These findings highlight the high stress burden present in immigrants with psychotic disorders. Immigrant women with psychotic disorders face complex challenges due to the intersectionality of their multiple minority status.

Our findings, considered together with previous reports, indicate that gender-specific roles and social expectations intersect with the timing and nature of migration to influence stress levels differently in male and female immigrants. It is important to develop new policies and interventions that include a gender perspective to mitigate psychological distress in immigrant women with psychotic disorders.

Declarations

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Supplementary materials:

Supplementary materials 1: Association between stress in the past year measured by scores on the Holmes-Rahe scale* and sociodemographic, clinical, and migration variables in immigrant women and men with psychotic disorder (bivariable analysis).

Independent variable	Dependent variable (Homes & Rahe scores)	Women		Man	
		r	t	r	t
Age	Total number of events	-0.14		-0.12	
	Total distress score	-0.35		-0.61	
Education, years	Total number of events	0.05		-0.08	
	Total distress score	0.05		-0.14	
Total number of migrations	Total number of events	0.03		0.17	
	Total distress score	0.05		0.22	
Age at first migration	Total number of events	-0.36		-0.12	
	Total distress score	-0.40*		-0.13	
PANSS positive symptoms	Total number of events	-0.13		-0.12	
	Total distress score	-0.14		-0.09	
PANSS negative symptoms	Total number of events	-0.13		0.05	
	Total distress score	-0.12		0.04	
PANSS general symptoms	Total number of events	-0.25		-0.14	
	Total distress score	-0.28		-0.15	
Racialized	Total number of events	2.80		2.65	
	Total distress score	1.05		5.92	
Single	Total number of events	1.13		4.78	
	Total distress score	1.36		1.00	
Descendants: yes	Total number of events	1.57		2.82	
	Total distress score	2.23		4.10	
Lives alone	Total number of events	0.03		4.48	
	Total distress score	0.06		3.76	
Jobless	Total number of events	0.57		0.09	
	Total distress score	0.40		0.42	
Non-affective psychosis	Total number of events	2.38		0.26	
	Total distress score	2.75		0.77	
Comorbid psychiatric disorder	Total number of events	5.43		2.89	
	Total distress score	1.57		1.57	
Comorbid organic disorder	Total number of events	2.03		1.19*	
	Total distress score	6.98		2.91*	
Family history of psychiatric disorder	Total number of events	0.083		0.94	
	Total distress score	0.012		1.01	
Previous suicide attempts	Total number of events	-		0.057	
	Total distress score	-		0.05	
Current psychoactive substance use	Total number of events	1.39		0.90	
	Total distress score	0.92		0.32	

Illegal status	Total number of events	-		0.46	
	Total distress score	-		0.41*	
Illegal transportation	Total number of events	-		2.50*	
	Total distress score	-		1.46*	
Migration alone	Total number of events	0.11		2.40*	
	Total distress score	0.29		2.98*	
Language barrier	Total number of events	0.44		1.93*	
	Total distress score	0.11		2.99*	

05
Discussion

This discussion section aims to analyze the key findings of our study on trauma burden and its associations among non-refugee immigrants and locals with psychotic disorders. We first compare the rates of trauma exposure and PTSD between these two groups (Hypothesis 1) and then we investigate the AOP and associated factors (Hypotheses 2 and 3). Furthermore, we adopt a gender perspective to examine stress, migration, and psychosis, with detailed comparisons of sociodemographic and clinical data between immigrant women and men (Hypotheses 4 and 5). Lastly, we explore the pathways linking trauma to psychosis, integrating both neurobiological and psychological processes.

5.1 Comparison on trauma exposure and PTSD rates between non-refugee immigrants and locals with psychotic disorders (hypothesis 1).

To our knowledge, this is the first study to investigate differences in PTSD, trauma exposure, and trauma-related symptoms between non-refugee immigrants and native-born patients diagnosed with a psychotic disorder. This study reveals an alarming difference in PTSD rates between non-refugee immigrants and native-born people with a psychotic disorder. According to the EGEP-5 results, 32.2% of the non-refugee immigrants meet criteria for PTSD, compared to just 7.1% of the native-born group. Furthermore, the rates of stressful life events and childhood trauma were found to be significantly higher in the non-refugee immigrants than native-born group. This is note- worthy considering that psychological trauma is per se considered to be a transdiagnostic risk for psychiatric disorders, including psychosis, regardless of whether migrant status is considered or not (Hogg et al., 2023; Kilcommons & Morrison, 2005; Mueser et al., 1998).

Our findings align with a previous study from Ireland (Wilson et al., 2013), where PTSD prevalence was assessed in a psychiatric population with heterogeneous diagnoses, showing similar PTSD rates to our study, with 31.2% in immigrants versus 6.1% in the native-born group. Another work assessed PTSD specifically in patients with a psychotic disorder and found PTSD rates of around 30%, but they did not differentiate prevalence rates according to their migrant status (Lu et al., 2011; Resnick et al., 2003; C. Steel et al., 2011). In our non-refugee immigrant group, traumatic events most associated

with PTSD were 'violent death of loved ones' followed by 'physical violence' and 'terrorism and torture'. This is of interest, as war-related trauma is frequently associated with refugees or forced immigrants (Rasmussen et al., 2012; Stuart & Nowosad, 2020), but these severe trauma forms also occur in voluntary immigrants. Within individuals with a PTSD diagnosis, immigrants showed similar intensity scores across all PTSD symptoms, except for avoidance, which was higher in natives. We hypothesize that this could be explained by the stressful context of migration resettlement (Bustamante et al., 2018; Sangalang et al., 2018), which forces individuals into 'survival mode', leading individuals to show less avoidance.

Moreover, the PTSD scale showed non-refugee immigrants were, on average, affected in one more area of functionality than the native-born group. Our results are consistent with previous research in the general population exposed to disasters, that shows that post-traumatic stress symptoms cause worse social and work adjustment, even when com- pared to post-disaster physical illness conditions (Cougle et al., 2009; Trabsa et al., 2022).

We also found remarkable differences in stressful events experienced during the last year. The group of immigrants had experienced during the previous year an average of 10.9 stressful events with an average distress score of 356.1. Impact scores above 300 suggest high levels of stress, resulting in an 80% risk of physical and mental illness in the near future (Blasco-Fontecilla et al., 2012; Rahe et al., 1970). Considering that, in our immigrant sample, an average of 12.8

years had occurred since migration, we assume that these scores are correlated mostly with postmigration adversities. Robust evidence describes migrants' exposure to social adversities during all phases, including post-migration stage (Rasmussen et al., 2012; Sangalang et al., 2018). Interestingly, there is emerging evidence that describes an association between adversities during different migration stages and increased risk of psychosis (S A Stilo et al., 2017; Tarricone, D'Andrea, Storbini, et al., 2021). We found that a high number of the total sample experienced childhood trauma. Again, the sample of non-refugee immigrants showed statistically significantly higher scores in the CTQ total and subscales scores for physical and emotional abuse and neglect. This is also in line with previous research that suggested that individuals with psychotic disorders, and independent of their migration status, had a higher exposure to childhood trauma (Morgan et al., 2020; Rosenfield et al., 2021; Sideli et al., 2020; Varese, 2012). These results have relevant clinical implications, since in individuals with psychotic disorders, comorbid childhood trauma has been associated with a more severe disease course and a greater number of hospitalizations (Aas et al., 2016; Levine et al., 2014).

Contrary to expectations, no significant differences were found in levels of childhood sexual abuse. These results might be explained by the fact that women, who are more exposed to sexual abuse (Oram et al., 2017), were underrepresented in the total sample (27.3%). Another possibility is that this information was withheld by participants due to stigma.

Finally, we found further evidence of a high global trauma burden in non-refugee immigrants, as they were three times more likely than the native-born patients to be exposed to lifetime trauma. These findings highlight the significant burden of cumulative trauma among non-refugee immigrants throughout their lifetime. This is consistent with previous research describing how the trauma exposure associated with the experience of migration is usually multiple, accumulated, and life-long (H. F. Myers et al., 2015; Tarricone, D'Andrea, Jongsma, et al., 2021). These findings of accumulated and repetitive traumatic events may support the concept of re-traumatization, which means that a previous trauma may enhance reaction to subsequent stressful events and later trauma exposure may amplify responses to less stressful previous events (Cougle et al., 2009; Stuart & Nowosad, 2020).

Regarding the nature of traumatic events in both groups, we found more severe and life-threatening traumatic events or traumatic events related to migrant status, such as ethnic discrimination or uprooting in the non-refugee immigrant group. On the contrary, the native-born group revealed more psychosocial adverse events, such as school failure, serious disease, and interpersonal relationship rejection, which might also be related to the illness itself. These findings highlight that not only refugees, but non-refugee immigrants could also be exposed to substantial violent traumatic events.

When traumatic lifetime events were clustered in nine domains, we found significant differences in all clusters except for social stress. These results can be explained by the fact that, as

mentioned above, social stress could be related to the psychosis diagnosis, which is a condition that both groups share.

Finally, after conducting multivariate analyses, a slight modulation was observed between age, job status, and the rates of trauma among groups. This could be explained by, respectively, older individuals having had more time for trauma exposure, and worse job opportunities often being linked to greater social adversity and potentially more trauma exposure. Nonetheless, this modulation was minimal and did not have an important impact on the differences of trauma exposure between immigrants and locals.

5.2 Comparison on AOP and associated factors between non-refugee immigrants and locals with psychotic disorders (hypothesis 2 and 3).

Our results suggest that non-refugee immigrants display an earlier AOP, approximately 3 years younger on average than native-born individuals. Notably, among non-refugee immigrants, the AOP was significantly associated with factors such as age at first migration, cumulative trauma distress, stressful events, and comorbid psychiatric diagnoses. In contrast, among native-born individuals, the onset of psychosis was linked to factors including sex, age, job status, and comorbid psychiatric diagnosis.

There is some controversy in previous studies examining AOP in immigrants. Although robust evidence suggests an increased risk of psychosis among immigrants, some studies indicate that immigrant status may not substantially impact the AOP (Cantor-Graae et al., 2003; Harrison et al., 1997; Stepniak et al., 2014), while others propose that immigration could potentially delay this onset, especially in females (Neill et al., 2020a; Rabinowitz & Fennig, 2002). On the other hand, literature also suggests that instability in residence (an aspect implicit in

the definition of migration), coupled with genetic and other environmental factors, contributes to earlier psychosis development (Butjosa et al., 2016; Ku et al., 2023; Oishi & Schimmack, 2010; Paksarian et al., 2015; Price et al., 2018). These discrepancies in previous literature may be explained by a lack of generalizability of results, stemming from the diverse realities of migration. Factors such as differences in country of origin, migration context, distinctions between refugee and non-refugee immigrants, among others, contribute to this complexity.

The associations between AOP and various variables in our study demonstrate distinct patterns between both groups. In non-refugee immigrants, we found an association between the AOP and age of first migration. This finding aligns with prior research, such as the study conducted by Veling and colleagues (Veling et al., 2011), which established a correlation between a lower age at first migration and an increased occurrence of psychosis among immigrants. Several theories aim to elucidate this association. Firstly, the

increased risk of psychotic disorders among those migrating at a younger age might partly stem from differences in help-seeking behaviors and greater familiarity with the local healthcare system (Veling et al., 2011): individuals migrating during childhood tend to have longer residency in the host country, potentially being more acquainted with available healthcare services and thus more likely to seek formal help (Veling et al., 2011). Secondly, younger migrants often endure prolonged exposure to post-migration stressors such as discrimination or racism, which might favor the development of psychotic disorders (François Bourque et al., 2012). Lastly, exposure to adverse experiences during early life has consistently been shown to increase the risk of psychotic experiences and psychotic disorders, showing a dose-response relationship (Anderson & Edwards, 2020; Matheson et al., 2013; A Trotta et al., 2015; Varese, 2012; Zimmerman et al., 2011).

Furthermore, the AOP and cumulative trauma was specifically linked to the total distress score rather than the total number of traumatic events. This highlights the importance of how trauma affects the individual, emphasizing the impact of distress rather than solely the number of traumatic events experienced throughout one's lifetime. Furthermore, several studies have associated previous trauma with early psychosis onset (Kocsis-Bogár et al., 2018; Neill et al., 2020a). This research highlighted the impact of early childhood trauma, such as parental divorce or physical abuse, on the earlier onset of schizophrenia, with recent findings

suggesting that the loss of a significant family member predicts earlier AOP in females. This is particularly noteworthy, considering that immigrant populations often carry higher trauma burdens including childhood trauma (Trabsa et al., 2023; Wilson et al., 2013). Finally, a previous umbrella meta-analysis found that psychological trauma is a robust transdiagnostic factor, increasing the risk of psychopathology, including psychosis, by nearly threefold (Hogg B, 2022). Considering the previous findings alongside our results, it is plausible to hypothesize that trauma exposure might play a mediating role between migration and AOP. This potential association is worth further investigation.

Finally, while stressful events within the past year also showed an association with AOP, considering that our sample had, on average, experienced more than one year of psychotic illness, we hypothesize that the recent stressful events may be a consequence rather than a cause of the AOP, as patients with earlier onset and consequently worse outcomes (Burke et al., 2008; Langeveld et al., 2012) might be exposed to a higher rate of stressful events within the past year.

In the native-born group, AOP was associated with sex, age, job status, and psychiatric comorbidity. The association of AOP and sex is consistent with existing literature highlighting gender as a significant factor contributing to the diversity within psychotic disorders (Butjosa et al., 2016). Research indicates an approximate 5-year earlier onset in

men compared to women (Häfner et al., 1998). Several authors have postulated that neurofunctional mechanisms (Kaufman, 2007; Lejbak et al., 2011), alongside the neuroprotective effects of estrogens (Salem & Kring, 1998; Seeman, 1997), might explain these differences. The absence of this association among immigrant group may suggest that the neuroprotective effects of estrogen are insufficient to counteract the cumulative impact of stressors. Furthermore, in natives group, job status was identified as being associated with AOP in this group, underscoring the relevance of environmental factors in psychosis onset, a concept well-established in existing literature (Butjosa et al., 2016). However, it is important to acknowledge the potential for an inverse association, where an earlier age of onset leads to a worse prognosis and subsequently to a poorer job status. Age was also a variable associated with AOP; one plausible explanation for this finding is that as individuals age, they are exposed to cumulative stressors or environmental factors that could potentially influence the emergence of psychosis.

Immigrants and the native-born population also exhibited commonalities. In both studied groups, the presence of comorbid psychiatric diagnoses such as personality disorders and obsessive-compulsive disorders was associated with an earlier AOP. This connection suggests the possibility of shared underlying vulnerabilities or common risk factors contributing to the emergence of both psychosis and concurrent psychiatric conditions

(Hogg et al., 2023). However, the occurrence of childhood adversity (CA) in individuals with schizophrenia is not substantially higher compared to those with affective psychoses, personality disorders, and depression (Matheson et al., 2013). This suggests that CA is a common risk factor rather than one that is specific to schizophrenia (Sideli et al., 2020). However, further studies are needed to clarify these connections.

Our study diverges from prior research findings as it did not establish an association between family history and cannabis use with the AOP. Prior research found that family history and cannabis use were respectively associated with an earlier AOP (Esterberg et al., 2010; Mané et al., 2017; O'Donoghue et al., 2015). Limited data and absence of external reporting sources due to socioeconomic and educational backgrounds of our sample might explain the lack of family history correlations. Similarly, assessment of cannabis use in this study was limited to subjective reporting, which may introduce biases related to memory and social desirability, meaning the absence of objective tests to verify cannabis use might impact the cannabis-use findings.

5.3. Gender perspective as intersectional approach: stress, migration and psychosis (hypothesis 4 and 5).

The results of this study reveal significant differences between immigrant women and men with psychotic disorders in terms of sociodemographic, clinical, and migration process-related variables. Significant between-group differences were also observed in terms of the association between these variables and stress levels over the past year.

5.3.1. Comparison of sociodemographic between non-refugee immigrant women and men with psychotic disorders.

First, while the predominant origin among men aligns with the main source of migration to Spain (11.49% of migrants in Spain are from Morocco) (IOM- United Nations 2020), most women in our study are from South America. Although current evidence suggests a slightly higher prevalence of psychosis in men compared to women (Jongsma et al., 2019), the incidence of psychosis appears to remain consistent worldwide (0.7–1%) (Jauhar et al., 2022; McGrath et al., 2008). Given these data, it becomes evident that there is an under-representation of North African

women in our sample, which prompts next question why these women are not accessing our services. It has been well described that immigrant, due to different barriers, have less access to specialized, primary, specialized and mental healthcare when compared to local-born clients (Fiscella & Shin, 2005; Pérez-Urdiales, 2021). These differences are even more pronounced among female immigrants (Gea-Sánchez et al., 2017). In this regard— and in line with our results—a previous study, carried out in Spain, found that women from South America accessed the healthcare system more frequently than African women, mainly due to cultural and linguistic similarities with the host culture (Pérez-Urdiales, 2021).

In our sample, 46.2% of the women had children versus only 21.9% of men. Interestingly, more than half of these women were single (53.8%). These findings shed light into a critical factor that has been described to influence psychosis risk among immigrants (Dykxhoorn, Hollander, Lewis, Dalman, et al., 2019): female and single immigrants carry a higher risk of psychosis than those immigrating with their families (Dykxhoorn, Hollander, Lewis, Magnusson, et al., 2019). Conversely, among men, those immigrating to join a

family and those immigrating with their dependent children had an increased risk of psychosis (Dykxhoorn, Hollander, Lewis, Magnusson, et al., 2019). Thus, sex-specific differences in how family networks are perceived during the migration process and the association with psychosis risk must be considered.

Another notable gender-related difference was that the divorce/separation rate was nearly three times higher in women than in men. This finding is consistent with previous research showing that women facing serious medical illness are more likely to be abandoned by their partners (Glantz et al., 2009). Furthermore, when partner separation occurs it leads to a negative impact on life's quality (Glantz et al., 2009). While previous research did not focus on psychosis, it is well known that women who live with psychosis deal with important social stigma (Chernomas et al., 2017). Another concerning finding was the relatively low percentage of women receiving a welfare allowance compared to men (3.8% vs. 8.2%). Even though both numbers are relatively low, the increased welfare allowances among male immigrants cannot be solely explained by worse symptomatology according to PANSS scores in female immigrants. The reason for this difference is not clear, but this finding warrants more research to prevent social-support gender discrimination.

Even though intersectional factors create a more challenging situation for female immigrants, women had a substantially higher employment rate than men (15.4% vs. 2.7%). This finding—considered together with the lack of between- group differences in terms of education and PANSS scores— is consistent with the findings from other studies describing the "feminization of survival", in which female immigrants take on a larger role than men in providing for their families (González-Juárez et al., 2014). However, it is important to note that a higher proportion of men present an illegal status, which may also contribute to these lower job rates.

5.3.2. Clinical data and stress comparison between women and men.

Regarding clinical variables, women compared to men, were diagnosed more frequently with psychosis NOS and less with Schizophrenia. This finding may be explained by insights from prior research studies. First, cultural barriers, together with insufficient cultural competence in healthcare services, could lead to a less precise diagnosis (Alda Díez et al., 2010; Bhui et al., 2007). In this regard, some studies suggest that the underrepresentation of minority perspectives in academia may lead to the development of ethno- centric mental health assessment protocols (Aggarwal et al., 2016; Dein, 2007). Moreover, the clinical characteristics of psychosis in women (e.g. more mood symptoms or better functioning) could lead—independently of migrant status—to misdiagnosis and treatment delays in this population (Ferrara & Srihari, 2020; Mazza et al., 2021). Finally, immigrants, and more women than men, present worse adherence to mental health services, which might explain lower diagnostic rates for chronic illnesses such as schizophrenia (J. R. Betancourt et al., 2003; T. S. Betancourt et al., 2017; Pérez-Urdiales, 2021).

When comparing Holmes and Rahe scores, although men presented more distress secondary to stressful events in the past year (impact scores of 375.6 among men vs 302.2 in women) both groups presented exceptionally high impact scores. Previous literature has described that impact scores above 300 could result in an upcoming (physical or mental) illness risk of 80% (Blasco-Fontecilla et al., 2012; Rahe et al., 1970). Furthermore and as stated, stress, as measured by Holmes and Rahe scores, significantly influences psychotic symptoms and psychosis risk (Butjosa et al., 2016; Myin-Germeys et al., 2005).

5.3.3. Associations between stress in the past year and sociodemographic, clinical, and migration variables.

We performed a multivariable analysis to determine whether any sociodemographic, migration, or clinical variables is associated with stressful events or distress in the past year. In women, stress levels were significantly associated with age at first migration (that is, younger migrants report more stress) and be a racialized person (racialized migrants report more stress). By contrast, in men, stress was associated with factors related to the migration process (language barrier) and clinical burden (physical disorder). A potential explanation for these differences could be that stress levels are influenced by traditional gender roles and expectations (Alexander et al., 2021), in which the responsibility of taking care of the family falls mainly on women (Luo & Sato, 2021; Wu et al., 2021). As a result, when women migrate to a new country, they may face challenges adapting to a new environment while simultaneously upholding these traditional family roles (Alexander et al., 2021; Luo & Sato, 2021). This dual pressure can lead to increased stress, especially when migration occurs at a critical time in their life, such as early adulthood or young motherhood when they have young children (Wu et al., 2021). This is particularly relevant given the findings recently reported by Wu et al., who found post- migration stress has time-varying effects on mental health (Wu et al., 2021). Moreover, several studies have shown that racism and sexism are interconnected, and individuals with multiple disadvantages face a higher exposure to discrimination, leading to more stress and worse mental health (Denise, 2012; Perry et al., 2013; Thomas et al., 2008). This could explain our results, in which being a racialized person was associated with stress only in women.

In contrast, men face challenges related to migration and adaptation within the framework of their provider and protector roles (Abdullah & Brown, 2011; Assari & Lankarani, 2017; Gelfer, 2014; Wu et al., 2021), resulting in stress that is less influenced by their age at first migration but more in factors that endure migration process itself. For instance, physical illness comorbidity can exacerbate disability burden and diminish quality of life in individuals with psychosis (Šimunović Filipčić & Filipčić, 2018).

There is, however, a need to move beyond stereotypical and overly simplistic gender models to better understand a highly complex gendered reality (Alexander et al., 2021; Lokot, 2018). The explanations underlaying these differences need to be corroborated and studied further.

5.4. Trauma to psychosis: understanding neurobiological and psychological pathways.

Within this doctorate thesis and beyond migration status we aimed to summarize current insights about the impact of psychological trauma on neurobiological and psychological processes. As stated, psychological trauma and social adversities, whether occurring in childhood or adulthood, have been widely recognized as potential risk factors for schizophrenia (Simona A Stilo & Murray, 2019). The intricate relationship between trauma and psychosis has prompted extensive research into various psychological and biological models to understand the underlying mechanisms (Bloomfield et al., 2021; Misiak et al., 2017; Rosenfield et al., 2021). This exploration includes examining the impact of severe life stressors on brain development and the lasting detrimental effects these stressors can have, potentially contributing to the onset of psychosis. To make this complex interplay easier to follow, we have complemented the text with a diagram (figure 2) that outlines the key neurobiological and psychological pathways linking trauma to psychosis. This discussion will delve into these pathways, highlighting the multifaceted factors that may drive this association.

Figure 4: Diagram of neurobiological and psychological processes linking trauma to psychosis. The diagram uses arrows to indicate that one process influences or impacts another. Additionally, warning marks (⚠) are used to show where processes are inhibited or interfered with.
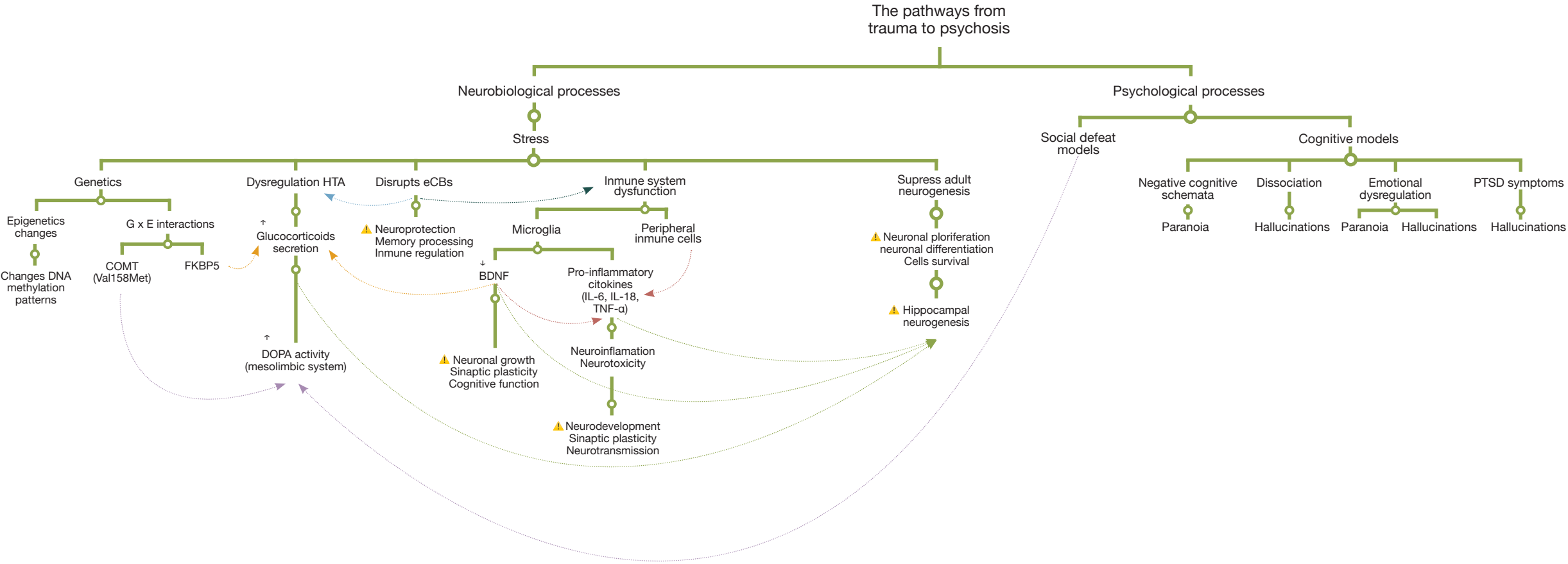
5.4.1. Neurobiological processes

The "traumagenic neurodevelopmental model of psychosis" postulates that early childhood trauma can lead to brain alterations similar of those observed in schizophrenia, including disruptions in the hypothalamic-pituitary-adrenal (HPA) axis and abnormalities in neurotransmitter systems like dopamine and structural changes to the brain (Read et al., 2001). This hypothesis has evolved into a developmental risk factor model, identifying childhood adversity, urban living, migration, and heavy cannabis use as significant contributors to schizophrenia risk (Murray et al., 2017). Recent research, has further corroborated the role of childhood adversity in schizophrenia risk, revealing that both the severity and frequency of adversities and the age that are experienced are linked to an elevated risk of schizophrenia (Morgan et al., 2020). These findings suggest that severe experiences of threat, hostility, and violence during critical periods of brain development may result in cognitive and affective impairments associated with schizophrenia (Morgan et al., 2020). These effects are believed to be mediated by changes in neurobiological systems, that could explain the underlaying developmental trajectories leading to the onset of psychosis (Misiak et al., 2017; Morgan et al., 2020).

5.4.1.1. HPA axis

The dysregulation of the HPA axis (stress response system), has been extensively documented in individuals across the schizophrenia spectrum (E. Walker et al., 2008). Studies suggest a complex interplay between HPA axis activation and dopaminergic circuitry, with glucocorticoid secretion potentially increasing dopamine activity, particularly in the mesolimbic system (Misiak et al., 2017; E. Walker et al., 2008). In this sense, childhood trauma, may contribute to elevated glucocorticoid release, stimulating dopaminergic activity in the striatum, and increasing susceptibility to psychosis, as proposed by the neural diathesis-stress model (Popovic et al., 2019; Read et al., 2001; E. F. Walker & Diforio, 1997).

Evidence indicates that individuals with psychosis or at-risk individuals often exhibit abnormalities in cortisol levels, including elevated morning and diurnal cortisol levels, blunted cortisol awakening response (CAR), and attenuated cortisol response to stress (Ciufolini et al., 2014; Day et al., 2014; Girshkin et al., 2014; Mondelli et al., 2011). Moreover, meta-analytic findings reveal higher pituitary gland volume in subjects at risk of psychosis and first-episode psychosis (FEP) patients, with a positive correlation observed between antipsychotic treatment and pituitary gland volume in schizophrenia patients (Nordholm et al., 2013).

5.4.1.2 Endocannabinoid system

Endocannabinoid (eCB) system in the brain plays various roles, such as neuroprotection, pain modulation, memory processing, and immune regulation (Di Marzo et al., 1994). eCB signaling operates in a retrograde manner, affecting neurotransmitter release (Wang & Ueda, 2009). Notably, early cannabis use is linked to an increased risk of schizophrenia, and individuals with schizophrenia show alterations in the eCB system, including elevated levels of eCBs and changes in receptor binding (Andréasson et al., 1987; Bioque et al., 2013; Ceccarini et al., 2013; Jenko et al., 2012; Leweke et al., 2007; Ujike et al., 2002; Wong et al., 2010; Zavitsanou et al., 2004).

The eCB system also plays a role in stress regulation, with animal studies implicating it in the modulation of the hypothalamic-pituitary-adrenal (HPA) axis response to stress(Hill et al., 2005, 2009; Rademacher et al., 2008). Chronic stress can disrupt this system, potentially contributing to an elevated psychosis risk (Popoli et al., 2011). Childhood trauma and cannabis use interact synergistically to increase psychosis risk (Harley et al., 2010). Notably, early adolescence represents a sensitive period for eCB system development, possibly explaining increased vulnerability to cannabis and stress during this time (Arseneault et al., 2002; Cass et al., 2014; Long et al., 2012).

5.4.1.3 Immune system

An immune system dysfunction has been also discussed in the schizophrenia pathogenesis (Benros et al., 2012). Inflammatory immune responses mediated by cytokines may contribute to schizophrenia's psychopathology through various mechanisms impacting neurodevelopment, synaptic plasticity, and neurotransmission (Benros et al., 2012; Song et al., 2009). Concretely, TNF-α, IL-18, and IL-6 cytokines, play crucial roles in regulating neuronal excitability, neurotransmitter metabolism, and alterations here may increase the risk for schizophrenia (Di Nicola et al., 2013; Goldsmith et al., 2016; Tian et al., 2014; Upthegrove et al., 2014). A meta-analysis revealed e.g. a significant association between developmental trauma and inflammatory markers in adulthood, with differential effects observed across various types of traumatic events (Baumeister et al., 2016). Specifically, physical, and sexual abuse were linked to increased levels of TNF-α and IL-6, while parental absence in early life was primarily associated with elevated C-reactive protein (CRP) levels (Baumeister et al., 2016). Furthermore, in individuals with schizophrenia, heightened levels of pro-inflammatory markers, such as IL-6 and TNF-α, have been observed primarily in those with history of childhood trauma, highlighting the interaction between early-life stress and immune-inflammatory dysregulation (Dennison et al., 2012). Of note, first psychotic episode patients with childhood trauma exhibited significantly higher serum levels of TNF-α and monocyte chemoattractant protein-1 (MCP-1) compared to those without trauma, suggesting a specific association between childhood trauma and select inflammatory markers. However, no significant associations were observed with other cytokines (Di Nicola et al., 2013).

Additionally, microglia, the immune cells of the central nervous system, play a crucial role in modulating neuroinflammatory responses and maintaining brain homeostasis. Under normal conditions, microglia secrete anti-inflammatory and BDNF (Schmidt & Duman, 2007). However, in response to stress, trauma, or inflammation, microglia can become activated, producing pro-inflammatory cytokines, and triggering immune

responses, which, if dysregulated, may contribute to neuroinflammation and neurotoxicity (Lucassen et al., 2015). In this sense, childhood trauma and recent stressors have been associated with lower BDNF expression mediated by inflammation, leading to increased IL-6 expression and cortisol levels (Mondelli et al., 2011).

5.4.1.4 BDNF

BDNF plays a crucial role in neuronal growth, synaptic plasticity, and cognitive function. Reduced BDNF levels have been consistently observed in the brain, serum, and plasma of individuals with psychotic disorders, suggesting a potential association between BDNF deficiency and schizophrenia risk (Cui et al., 2012; Durany et al., 2001). Moreover, evidence suggests that BDNF may mediate the impact of early-life trauma on psychosis vulnerability, serving as a potential biomarker for the detrimental effects of childhood trauma on brain plasticity (Theleritis et al., 2014).

Some BDNF polymorphism, such as, Val66Met, have been associated with lower BDNF expression (Green et al., 2011). Individuals who present BDNF Val66Met Met variant, and childhood trauma has exhibited an additive association resulting in even lower BDNF levels (Aas et al., 2014; Mondelli et al., 2011).

5.4.1.5 Adult neurogenesis

To understand the interplay between early-life trauma, stress, and neurobiological alterations requires examining neurogenic processes in response to environmental challenges. Adult Neurogenesis (AN), the generation of new neurons in the adult brain, is regulated by various environmental factors, including stress, which can suppress AN through inhibiting proliferation, neuronal differentiation, and cell survival, ultimately impacting hippocampal neurogenesis (Czéh et al., 2006; Gould et al., 1997; Lucassen et al., 2015). The hippocampus, crucial for memory and stress regulation, and the amygdala, involved in emotional reactivity and learning, are believed to mediate the link between childhood adversities and psychosis (Gallagher & Chiba, 1996; B. Myers et al., 2014). Studies have found associations between childhood trauma and reduced volumes of these brain regions in FEP patients, as well as overall brain volume reductions in chronic patients (Aas et al., 2012; Hoy et al., 2012; Ruby et al., 2014). Interestingly, higher evening cortisol levels have been linked to greater brain volume reductions (Ruby et al., 2014).

The relationship between childhood trauma and brain alterations in psychotic disorders is complex. For example, BDNF 66Met allele carriers who were highly exposed to childhood adversities exhibit reduced hippocampal subfield volumes and worse cognitive performance (Aas et al., 2013, 2014), however findings have been inconsistent across studies (Hernaus et al., 2014). Moreover, elevated levels of stress hormones and cytokines like IL-6, along with lower BDNF levels, predict reduced hippocampal volume, particularly in those with a history of childhood trauma (Mondelli et al., 2011). Additionally, sexual abuse has been associated with lower gray matter volume, highlighting the impact of different types of childhood adversity on brain structure (De Bellis et al., 1999; Sheffield et al., 2013).

5.4.1.6 Genetics

While there have been described an association between childhood trauma and psychosis, it is important to note that such environmental factor within a multifactorial concept is not sufficient to trigger the onset of psychosis (Collip et al., 2013; van Winkel et al., 2008). Studies have highlighted substantial heritability of schizophrenia-related disorders, prompting investigations into gene-environment (GxE) interactions as a potential bridge between childhood stress and psychosis development (Misiak et al., 2017).

Studying the interplay between genes and environmental factors is crucial for understanding the development of psychosis. An extensively studied gene is FKBP5, which plays a role in regulating sensitivity to stress hormones like cortisol. Variations in this gene have been linked to an increased risk of psychosis in individuals who have experienced childhood trauma (Collip et al., 2013). Similarly, the catechol-O-methyltransferase (COMT) gene polymorphism (Val158Met) has garnered attention for its involvement in dopamine regulation and its interaction with childhood trauma in predisposing individuals to psychotic experiences (Ramsay et al., 2013).

Furthermore, epigenetic studies, which investigates how environmental factors can modify gene expression without altering the underlying DNA sequence, suggest that experiences such as childhood trauma can lead to changes in DNA methylation patterns, potentially influencing susceptibility to mental health disorders (Misiak et al., 2015).

This phenomenon underscores the complex interaction between genetic predispositions and environmental influences in shaping mental health outcomes.

The European Network of National Networks studying Gene-Environment Interactions in Schizophrenia (EUGEI) has conducted extensive research on GxE interactions, particularly focusing on the impact of childhood trauma and cannabis use. Their findings indicate that genetic factors, in conjunction with environmental exposures, significantly contribute to the risk of schizophrenia (Guloksuz et al., 2015). However, not all studies have consistently demonstrated these interactions, indicating the need for further investigation (Antonella Trotta et al., 2016, 2019).

5.4.2 Psychological processes

5.4.2.1. Cognitive and emotional models

Psychological processes, including dissociation, emotional dysregulation, negative cognitive schemata, and PTSD symptoms, such as avoidance, numbing and hyperarousal, have been proposed as potential pathways linking developmental trauma to psychotic symptoms (Bloomfield et al., 2021). Recent meta-analysis results reveal that dissociation may contribute to the development of hallucinations through impairing an individual's ability to differentiate internal experiences from reality (Bloomfield et al., 2021). Similarly, emotional dysregulation plays a mediating

role in hallucinations and paranoia, aligning with the threat anticipation model (Berry et al., 2018; Bloomfield et al., 2021). Negative cognitive schemata, on the other hand, can foster negative beliefs about others which may lead to paranoia and delusions (Bloomfield et al., 2021; Freeman, 2016). Lastly, PTSD symptoms have been associated with hallucinations, explained by disruption of the normal encoding of emotional and perceptual information due to traumatic experiences, resulting in unprocessed, fragmented memories that are susceptible to involuntary recovery (Bloomfield et al., 2021; Hardy, 2017).

5.4.2.1. Social Defeat models

The social defeat hypothesis postulates that experiences of social exclusion or marginalization contribute to the development of psychosis by sensitizing the mesolimbic dopamine system (Cantor-Graae & Selten, 2005; Rosenfield et al., 2021; J. P. Selten et al., 2019; Els van der Ven & Selten, 2018).
Numerous studies provide support for the social defeat hypothesis. Individuals exposed to social exclusion, such as childhood bullying, discrimination against minorities, homosexuals or persons with an intellectual incapacity or hearing impairment, exhibit an increased risk of psychosis (Jean-Paul Selten et al., 2013). Additionally, living in neighborhoods with a high density of the individual's ethnic group has been found to have a protective effect for psychosis, suggesting that social cohesion and community integration may mitigate the risk of psychosis (Schofield et al., 2017). Rodents' studies have demonstrated dopamine sensitization in response to social defeat, indicating that chronic experiences of social exclusion can lead to alterations in dopamine function (Hammels et al., 2015). Positron emission tomography studies have further supported this finding, revealing increased dopamine synthesis and release in the striatum, in individuals with history of migration (migrants and migrants' descendants) (Egerton et al., 2017). This last study was assessed in healthy controls, individuals with schizophrenia and clinical high-risk patients (Egerton et al., 2017).

The chronic experience of social defeat could encompass daily discrimination, racism, as well as broader exclusion from resources and power (Rosenfield et al., 2021). Immigrants, particularly those with black skin or from low-income countries, are at a greater risk of experiencing psychosis, highlighting the role of minority status in the social defeat hypothesis (Jean-Paul Selten et al., 2013).

06
Strengths and limitations

6.1. Strengths

Our research addresses an important gap in the literature concerning 1) trauma burden in non-refugee immigrants with psychotic disorders, 2) the influence of environmental factors, such as stressful life events and exposure to traumatic events, on the AOP in this population, and 3) the factors associated with stress in immigrant women with psychotic disorders. This study provides a robust sample size and the population is culturally diverse, which enhances the generalizability of the results. The comprehensive and systematic assessment of trauma exposure adds depth to the study, and the results hold important clinical implications.

We believe that this topic is particularly relevant given the global increase in non-refugee migrants due to different humanitarian crises and the high incidence of psychosis disorders described in this population. The findings of this study provide important clinical implications and valuable insights into underlying precipitating factors associated with psychosis, given the crucial role of AOP in the prognosis of psychotic disorders. Additionally, female immigrants with psychotic disorders face unique stressors due to the intersectionality of their various minority identities. The findings of this study provide empirical evidence demonstrating the major stress burden faced by non-refugee immigrant women with psychotic disorders.

6.2. Limitations

Several limitations warrant consideration before translating our results into clinical practice:

1) Retrospective assessment of traumatic events may introduce recall bias due to the sensitive nature of the content. However, our use of well-established and multiple self-report questionnaires in trauma research aimed to mitigate this limitation. Furthermore, previous studies have highlighted that associations between childhood maltreatment and a future psychopathology is particularly influenced by subjective experiences rather than objective measures (Danese & Widom, 2023).

2) Resilience was not assessed which could potentially be a confounding variable in understanding individual responses to distress. However, there is still an ongoing and considerable debate in how resilience is defined and studied in clinical research (Bhatnagar, 2017).

3) The instruments employed in our study, primarily standardized for Western academia, may have limited cultural applicability However, we aimed to amend this limitation by culturally competent professionals for the assessments.

4) Although our sample includes individuals from diverse cultures, it is essential to consider cultural factors when interpreting and extrapolating our findings to other foreign populations. Further research is warranted to study the generalizability of these outcomes in different cultural and migration contexts thus, in order to avoid research ethnocentrism.

5) The absence of family reports due to socioeconomic factors or lack of availability resulted in lost data regarding obstetric complications, restricting including this variable in the AOP analyses.

6) Our study examinate individual variables, potentially overlooking the cumulative effects of multiple factors.

7) There was a notable difference in the number of male and female participants in the study (26 women vs. 73 men), which could limit the statistical power in the comparison between female and male non-refugee immigrants with psychotic disorders.

8) Cross-sectional design does not allow us to establish causality. Further longitudinal studies are warranted to elucidate the direction of causal relationships.

07
Conclusions

This dissertation provides a comprehensive analysis of the intricate relationship between trauma, migration, and psychotic disorders among non-refugee immigrants, providing insights from three distinct but interrelated studies.

The first study highlights the high trauma load of non-refugee immigrants with psychotic disorders. According to our results, when compared to native-born patients, non-refugee immigrants presented significantly higher levels of PTSD, childhood trauma, stressful events in the last year, and lifetime cumulative trauma.

The second study extends this understanding by revealing that non-refugee immigrants tend to experience the onset of psychosis at a younger age than native-born individuals. This early onset was notably associated with age at first migration and lifetime cumulative trauma distress. Given the crucial role of AOP in understanding and prognosis of psychotic disorders, these findings not only hold substantial clinical implications but provide valuable insights into underlying precipitating factors associated with psychosis.

Finally, the third study, identified significant gender-specific variations in the stress burden associated with migration, with immigrant women facing unique challenges due to their intersecting minority status. These findings advocate for the incorporation of gender perspectives in developing policies and interventions to mitigate psychological distress among immigrant women with psychotic disorders.

The collective findings call for multifaceted interventions and humane immigration policies, emphasizing the need for culturally and gender-sensitive strategies to improve mental health outcomes in immigrant populations.

08
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09
Annex
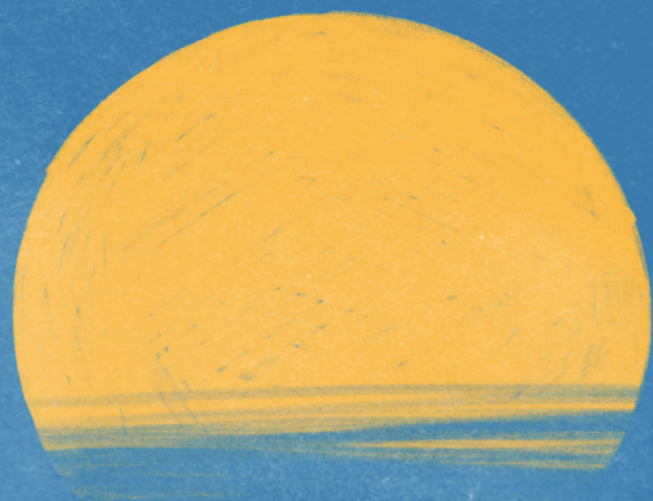
9.1. Study 4

Posttraumatic Stress Symptoms, Physical Illness, and Social Adjustment Among Disaster Victims

Disaster Medicine and Public Health Preparedness

9.2. Poster

Comparison of trauma exposure between immigrant and non-immigrant psychotic patients.

33rd Congress of the European College of Neuropsychopharmacology (ECNP).

Virtual, 2020.

Certificate

This certificate indicates that the poster

P.694

Comparison of trauma exposure between immigrant and non-immigrant psychotic patients

has been presented by

Amira Trabsa, Spain

at the **33rd ECNP Congress, 12-15 September 2020,** *Virtual*

Authors: Trabsa , A.*,Vargas , L.,Llimona , A.,Valiente , A.,Moreno , A.,Amann , B.,Pérez-Sola , V.

Andreas Reif
Chair Scientific Programme Committee

ECNP european college of
neuropsychopharmacology

9.3. Poster

The incidence of posttraumatic stress symptoms and physical illness and social adjustment in disaster victims.

28th European Congress of Psychiatry

Virtual, 2020.

9.4. Poster

Comparison of developmental trauma between immigrant and non-immigrant psychotic patients.

29th European Congress of Psychiatry

Virtual, 2021.

9.5. Oral Communication:

Cumulative trauma exposure comparison between non-refugee immigrants and locals with psychotic disorder.

31st European Congress of Psychiatry.

Paris, 2023.

9.6. Poster

The forgotten: Immigrant women with psychotic disorders. Comparison of traumatic burden between immigrant and local women with psychotic disorder, an intersectional approach.

IV EUROPEAN MEETING ON WOMEN'S MENTAL HEALTH

Barcelona, 2023.

PARTICIPATION CERTIFICATE

This document is to certify that:

Amira Trabsa Biskri, Ana Moreno, Víctor Pérez-Sola, Benedikt Amann, Anna Mané

presented the Poster

The forgotten: Immigrant women with psychotic disorders. Comparison of traumatic burden between immigrant and local women with psychotic disorder, an intersectional approach.

during the

IV EUROPEAN MEETING ON WOMEN'S MENTAL HEALTH

held in **Barcelona**, from 9th to 10th March 2023.

And as evidence thereof, I hereby issue this certificate on March 10th, 2023

Judith Usall i Rodié
CONGRESS PRESIDENT

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https://intranet.pacifico-meetings.com/Esperso/faces/comprobarCertificadoFirmado.xhtml?ccf=AY810-C183846-PCA771-PDI1122-V1

9.7. Poster

Diferencias en la exposición a eventos estresantes en el último año entre personas migradas y personas locales con trastorno psicótico.

XXVI Congreso Nacional de Psiquiatría

Salamanca, 2023.

El Comité Organizador del XXVI Congreso Nacional de Psiquiatría certifica que

Amira Trabsa, Anna Mané, Francesc Casanovas, Víctor Pérez Solá, Alicia Valiente, Benedikt Amann, Ana Moreno.

Han presentado el Póster Modalidad "B": Proyectos de Investigación, titulado:

Diferencias en la exposición a eventos estresantes en el último año entre personas migradas y personas locales con trastorno psicótico.

Durante el XXVI Congreso Nacional de Psiquiatría celebrado en Salamanca los días 23, 24 y 25 de noviembre de 2023.

Dr. Manuel Martín Carrasco
Presidente SEPSM
Presidente Comité Organizador

Dra. Marina Díaz Marsá
Presidenta Comité Científico