



Are Sociodemographic Characteristics Associated with Course of High Risk for Psychosis Symptoms at 12-Month Follow-Up?

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Background: Research on the Clinical High-Risk (CHR) paradigm for psychosis has significantly increased in recent decades. This approach aims to identify young individuals who experiences attenuated psychotic symptoms, as well as difficulties in social and occupational functioning to provide early intervention.

Purpose: This study aims to analyze the relationship of baseline sociodemographic characteristics to the course of psychopathology and functioning at a 12-month follow-up in a sample of Mexican individuals at CHR-P.

Patients and Methods: We conducted a longitudinal study with 43 Mexicans at CHR-P assessed at baseline and 33 of them at a 12-month follow-up using the Comprehensive Assessment of At-Risk Mental State and the Global Functioning Social and Role Scales. Sociodemographic information, including age, sex, marital status, occupation, education, household type, and socioeconomic status, was collected through a semi-structured interview.

Results: Findings showed significant changes in psychopathology at 12-month follow-up. Participants who reported not studying or working at baseline showed a reduction in attenuated positive symptoms and general psychopathology. Similarly, attenuated positive symptoms improved in those living with friends or roommates at baseline. Individuals with a medium socioeconomic status at baseline also experienced a decrease in general symptoms. No significant changes were observed in negative symptoms or social and role functioning at the 12-month follow-up assessment.

Conclusion: It is important to address the needs of individuals at CHR-P in both schools and workplaces. This includes reducing stress and improving access to mental health care. Promoting social skills and fostering peer relationships can help build supportive networks beyond the family.

Keywords: sociodemographic data, poverty, low educational level, unemployment, developing countries, attenuated psychosis symptoms, clinical high-risk for psychosis, at-risk mental state, longitudinal study

Introduction

The clinical high-risk for psychosis paradigm is focused on identifying individuals at increased risk of developing schizophrenia to prevent or delay the development of the disease and decrease the duration of untreated psychosis.¹ People at clinically high-risk for psychosis (CHR-P) are almost always adolescents or young adults who present attenuated psychotic symptoms, show prolonged impairment in socio-occupational functioning,² and often seek help at mental health services for affective symptoms.³⁻⁶

A recent meta-analysis of 130 longitudinal studies found that the cumulative risk of developing psychosis is of 0.25 for individuals at CHR-P within three years after the baseline assessment. The transition risk in those who did not develop psychosis continued to increase over time, reaching up to 35% in a ten-year follow-up.⁷ The most frequently observed predictors of transition were severe positive and negative symptoms, cognitive deficits, functioning impairments, being male, and a higher proportion of brief, limited, intermittent psychotic symptoms.^{7,8} Although CHR-P describes only a probability and not an imminent transition to psychosis, the great majority who have not presented psychotic disorder are not in full clinical remission. Over time, they may continue to experience mental health problems and difficulties in social functioning.^{9,10}

According to Hartmann et al¹¹ most of the longitudinal studies in CHR-P samples are based on a categorical outcome measure (transition vs non-transition). Considering that the CHR-P population presents a heterogeneous psychopathological manifestation with different outcomes, it is important to capture the changes over time in psychopathology and functioning apart from transitions to psychosis, as well as the factors associated with these changes.^{11–13}

Studies have recently suggested that sociodemographic characteristics play an important role in the psychopathology of individuals at CHR-P. For example, in a longitudinal study over a 3-year follow-up with a sample of 304 participants, Hartmann et al¹¹ found that being female was a significant predictor of higher levels of attenuated psychotic and depressive symptoms and substance abuse. In contrast, age was a significant predictor of a higher level of depressive symptoms. Zhang et al¹⁴ showed that the trajectory of psychotic symptoms is different in adolescents than in adults. Following a sample of 517 individuals at CHR-P for three years, they observed that among adolescents (9–17 years old), the best predictor for conversion to psychosis was the severity of negative symptoms as compared to other clinical variables, while the best predictors in adults (18–45 years old) were positive symptoms.

Several studies have examined the effects of educational level and occupation on the psychopathology of people at CHR-P. Hartmann et al¹¹ found no association between educational level and changes in psychopathology over time. However, Chan et al,¹⁵ in a longitudinal study with 255 individuals at CHR-P followed up over a period of two years, found that a lower educational level and unemployment at baseline predicted the development of a psychotic disorder. Even for participants who did not transition to psychosis, unemployment still predicted the persistence of attenuated psychotic symptoms and the development of other non-psychotic disorders. Dickson et al,¹⁶ in a meta-analysis including more than four million individuals, showed that by age 16, those who later developed psychosis had a lower educational level than those who did not.

Other studies have found that a low socioeconomic status may increase the risk of developing psychosis.¹⁷ Hakulinen et al¹⁸ not only found an association between prolonged low-income status and an increased risk of developing psychosis but also suggested that parental income level and income mobility during childhood may be linked to the risk of developing psychosis in adulthood.

From the perspective of social determinants of health, sociodemographic characteristics can explain many current health inequities, as they may be associated with an increased or decreased risk of developing a mental disorder.¹⁹ Most studies of the relationship of sociodemographic characteristics to the psychopathology of people at CHR-P have been conducted in high-income countries, and data about less wealthy countries is scarce. The economic inequalities, poverty, lower educational levels, and unemployment in low- and middle-income countries (LAMICs)^{19–21} make it essential to extend our understanding of these effects to these contexts to enhance preventive strategies and early interventions for psychosis.

In Mexico, an estimated 36.3% of people live in poverty,²² the average years of schooling in people aged 15 or older is 10.3,²³ and approximately 10% of those aged 6–29 years have never attended school.²⁴ This study aimed to analyze the effects of sociodemographic characteristics in the course of CHR-P symptoms at a 12-month follow-up in a Mexican sample at risk for psychosis.

Materials and Methods

This is an exploratory study that involved a 12-month follow-up of Mexicans at CHR-P and received approval from the Research Ethics Committee of the Ramón de la Fuente Muñiz National Institute of Psychiatry (Approval No. CEI-010-20170316). It adhered to the principles outlined in the Declaration of Helsinki. Written informed consent was obtained

from all participants prior to their enrollment in the study. For participants under the age of 18, written informed consent was secured along with prior authorization from their parents or legal guardians. Participants did not receive any financial compensation for their involvement. The study took place from June 6, 2019, to February 1, 2024, with data collected at two points: baseline and at the 12-month follow-up.

Participants

Recruitment for the study took place in a psychiatric hospital in Mexico City. Young patients suspected of being at Clinical High Risk for Psychosis (CHR-P), based on the clinical judgment of their treating psychiatrist, were invited to participate if they met the following inclusion criteria: a) aged between 13 and 40; b) had completed at least elementary school; and c) met at least one CHR-P criterion established by the Comprehensive Assessment of At-Risk Mental States (CAARMS).²⁵ The exclusion criteria were as follows: a) intellectual disability; b) significant head injury or any current medical or neurological condition; c) a current or past diagnosis of schizophrenia or any other psychotic spectrum disorder, including substance- or drug-induced psychosis; and 4) meeting the criteria for psychosis as determined by the CAARMS.²⁵

Measures

Sociodemographic data were gathered using a semi-structured interview to collect information on age, sex, marital status, occupation, education, household type, and socioeconomic status.

The assessment of Clinical High Risk for Psychosis (CHR-P) criteria is conducted using the Comprehensive Assessment of At-Risk Mental States (CAARMS).²⁵ This specialized clinical interview aims to identify individuals who may be at heightened risk of developing psychosis. The CHR-P criteria are utilized when the severity, frequency, or duration of positive symptoms fall below the threshold typically associated with psychosis. This framework is divided into three subgroups to better capture the diverse experiences of those at risk: (a) attenuated psychotic symptoms (APS) for individuals who have experienced subthreshold positive symptoms in the past year, whether in terms of frequency or intensity; (b) brief limited intermittent psychotic symptoms (BLIPS) includes those who have encountered episodes of overt psychotic symptoms in the past year that resolved on their own within a week; and (c) vulnerability subgroup that consists of individuals with a schizotypal personality disorder or a family history of psychosis in a first-degree relative, who have also faced a significant decline in functioning over the past year.²⁵

The CAARMS was also used to assess the severity of symptomatology in three dimensions: 1) positive symptoms, which included unusual thought content, non-bizarre ideas, perceptual abnormalities, and disorganized speech; 2) negative symptoms, which included avolition/apathy and anhedonia; and 3) general symptoms, which included mania, depression, suicidality and self-harm, mood swings/lability, anxiety, obsessive-compulsive disorder symptoms, dissociative symptoms, and impaired tolerance of normal stress. CHR-P criteria and symptoms were assessed at baseline and follow-up at 12 months by two psychologists trained in the use of the CAARMS.

Social and occupational functioning were evaluated at baseline and again after 12 months using the Global Functioning: Social and Role Scales (GF-Social and GF-Role).²⁶ The Social scale assesses aspects such as peer relationships, peer conflict, age-appropriate intimate relationships, and family involvement. Meanwhile, the Role scale evaluates performance, and the support needed in specific roles, such as in school or work.²⁶ Both scales provide a global rating of current functioning on a scale from 0 to 10, with higher scores indicating better functioning levels.

Statistical Analyses

Baseline sociodemographic and clinical data were reported with frequency and percentages or with means and standard deviations according to the variable type (categorical or continuous). A paired-sample McNemar test was conducted to analyze changes in sociodemographic data between the baseline and follow-up. For dropout analysis, a comparison (Chi-square and *t*-test) of the sociodemographic and clinical data was performed for participants who could not be followed up and those who had completed the two assessments. The Shapiro–Wilk test was used to determine whether the clinical variables met the criteria for normality. To determine the difference in clinical variables over time, repeated measurement *t*-tests were carried out, while the Wilcoxon test was used for variables that did not meet the normality criteria.

A repeated measures ANOVA was conducted to assess the impact of sociodemographic characteristics on the observed changes in psychopathology and functioning between two measurements over time. All analyses were performed using IBM SPSS version 29.

Results

Participant Flow and Retention Over the Study Period

Figure 1 presents the participant flow. Of the 62 subjects contacted, 57 agreed to participate. People who declined to participate in the study ($n = 5$), citing reasons that included a lack of time interest or motivation. Forty-three subjects met the inclusion criteria and were included in the baseline assessment. Overall, 33 participants completed assessments at the 12-month follow-up.

Sociodemographic Data

Comparisons of the sociodemographic and clinical data of the participants who completed the baseline and follow-up assessments ($n = 33$) and those who did not ($n = 10$) showed significant differences only in socioeconomic status. Participants who did drop out had a lower socioeconomic status than those who remained in the study ($\chi^2 = 3.92$; $df = 1$; $p = 0.05$).

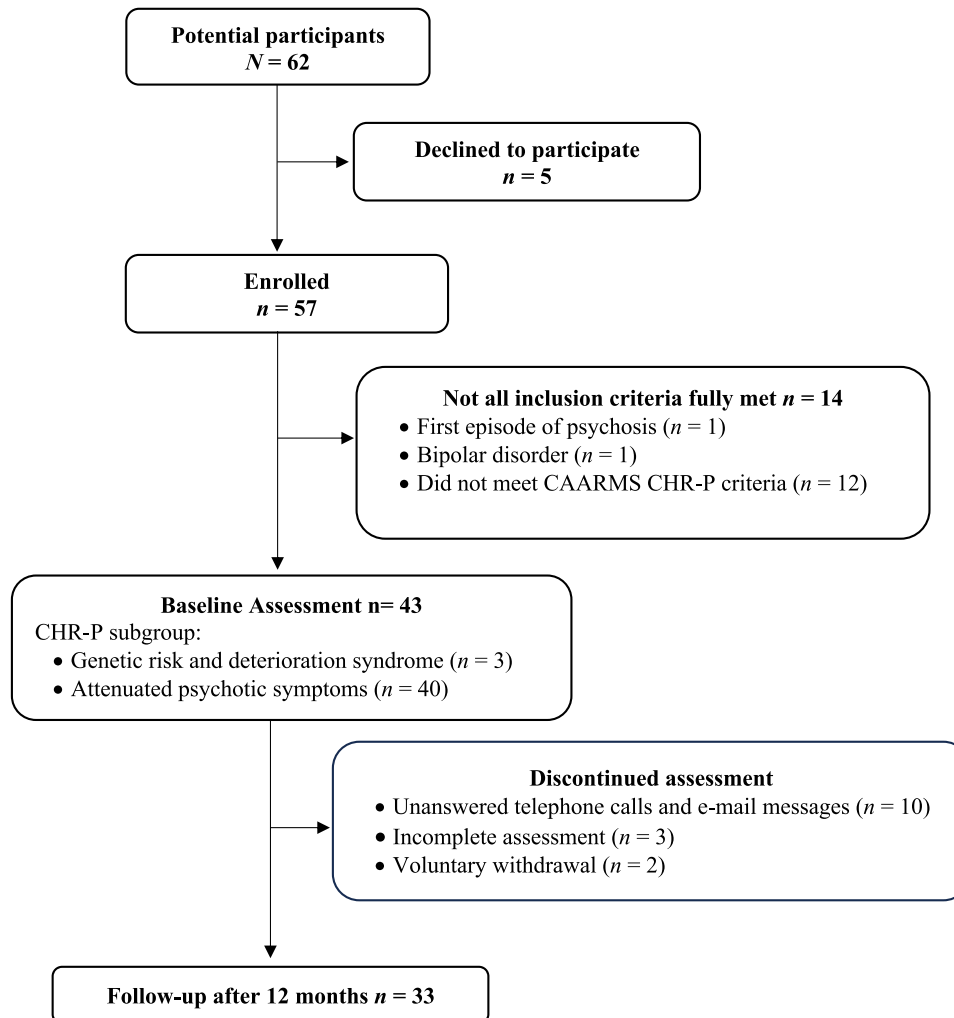


Figure 1 Participant Flow.

Abbreviations: CHR-P, Clinical High Risk for Psychosis; CAARMS, Comprehensive Assessment of At-Risk Mental State.

The sociodemographic, clinical, and functional data of the final sample are described in Table 1. At baseline, the average age of participants was 23.3 years ($SD = 6.5$). Over half the participants were male (57.6%), had a high school education or higher (69.7%), were single (78.8%), and had medium socioeconomic status (75.8%). Most of them worked or studied (90.9%) and lived with their families (87.9%). As shown in Table 1, there were no significant changes in sociodemographic data from baseline to follow-up.

The Course of Psychopathology and Functioning Over 12 months

As shown in Table 1, the severity of positive and general symptoms decreased significantly from baseline to 12 months. However, the severity of negative symptoms and functioning impairment did not show statistical significance.

Table 1 Sociodemographic and Clinical Characteristics of the Sample at Baseline and 12-Month Follow-Up Assessments (N = 33)

| | Baseline Total | 12-Month Follow-Up Total | Comparisons |
|---|-------------------------------|-----------------------------|-------------------|
| Sex | | | |
| Male | 19 (57.6) | 19 (57.6) | |
| Female | 14 (42.4) | 14 (42.4) | |
| Level of Education | | | |
| ≤ Junior high school | 10 (30.3) | 10 (30.3) | |
| ≥ High school | 23 (69.7) | 23 (69.7) | |
| Socioeconomic Status* | | | |
| Low | 8 (24.2) | 8 (24.2) | |
| Medium | 25 (75.8) | 25 (75.8) | χ^2, df, p |
| Marital status | | | |
| Single | 26 (78.8) | 21 (63.6) | 3.2, (1), 0.06 |
| With a partner | 7 (21.2) | 12 (36.4) | |
| Occupation | | | |
| Working or studying | 30 (90.9) | 27 (81.8) | 0.57, (1), 0.45 |
| No current occupation | 3 (9.1) | 6 (18.2) | |
| Household | | | |
| Lives with family | 29 (87.9) | 24 (72.7) | 3.2, (1), 0.06 |
| Living with friends/roommates | 4 (12.1) | 9 (27.7) | |
| Age | \bar{x} (SD) 23.39 (6.5) | \bar{x} (SD) | t, df, p |
| CHR-P symptom dimensions | | | |
| CAARMS positive symptoms | 13.61 (3.12) | 11.55 (3.80) | 2.51, (32), 0.017 |
| CAARMS negative symptoms | 6.30 (3.32) | 5.48 (3.86) | 1.46, (32), 0.154 |
| CAARMS general symptoms | 14.76 (5.93) | 12.42 (6.32) | 2.29, (32), 0.029 |
| Functioning | | | |
| GF-Social | 5.97 (1.04) | 6.27 (1.00) | -1.52, 0.12 |
| GF-Role | 6.64 (0.99) | 6.36 (1.08) | -1.76, 0.07 |
| | n (%) | n (%) | χ^2, df, p |
| Current psychological and/or psychiatric treatment | | | |
| Yes | 29 (87.9) | 21 (63.6) | 8.00, 1, 0.00 |
| No | 4 (12.1) | 12 (36.4) | |

Notes: *Low: < MXN \$11,000; Medium: MXN \$11,000–\$22,000 MXN (MXN \$1 is equivalent to approximately USD \$0.06).

Abbreviations: CHR-P, Clinical High Risk for Psychosis; CAARMS, Comprehensive Assessment of At-Risk Mental States.

Table 2 The Effect of Baseline Sociodemographic Characteristics on Positive and General Symptoms at 12-months Follow-Up

| CHR-P Symptom Dimensions | | F | df | p | η | β |
|--------------------------|---|------|----|------|------|------|
| CAARMS positive symptoms | Positive symptoms | 6.27 | 1 | 0.01 | 0.79 | 0.78 |
| | Positive symptoms x Occupation | 2.5 | 1 | 0.02 | 0.62 | 0.56 |
| | Positive symptoms | 6.20 | 1 | 0.01 | 0.67 | 0.67 |
| | Positive symptoms x Household | 3.81 | 1 | 0.03 | 0.59 | 0.58 |
| CAARMS general symptoms | | F | df | p | η | β |
| | General symptoms | 2.46 | 1 | 0.04 | 0.74 | 0.83 |
| | General symptoms x Socioeconomic status | 2.06 | 1 | 0.02 | 0.68 | 0.62 |
| | General symptoms | 7.01 | 1 | 0.01 | 0.85 | 0.72 |
| | General symptoms x Occupation | 5.28 | 1 | 0.02 | 0.64 | 0.60 |

Note: x= Interaction.

The Effect of Baseline Sociodemographic Characteristics on Positive and General Symptoms at 12-months Follow-Up

The repeated measures ANOVA results indicated that the main effect of evaluation time on positive symptoms and occupation was statistically significant, as was the interaction between the variables (Table 2). As shown in Figure 2, at baseline, those unoccupied had a significantly higher severity of positive symptoms than those working or studying. However, at 12-month follow-up, the severity of positive symptoms of those not working or studying at baseline decreased but remained unchanged in those working or studying at baseline (Figure 2).

As shown in Table 2, the main effect of evaluation time on positive symptoms and household type was significant, as was the interaction between the variables. As shown in Figure 2, there was no significant difference at baseline between those living with their families or with friends/roommates. However, at the 12-month follow-up, those who lived independently of their family of origin at baseline (ie, with friends or roommates) showed a higher decrease in the severity of positive symptoms than those living with their family at baseline (Figure 2).

The main effect of evaluation time on general symptoms and socioeconomic status was also statistically significant, as was the interaction between these variables (Table 2). As shown in Figure 3, at baseline, those with a low socioeconomic status had greater severity of general symptoms than those with a medium socioeconomic status. At the 12-month follow-

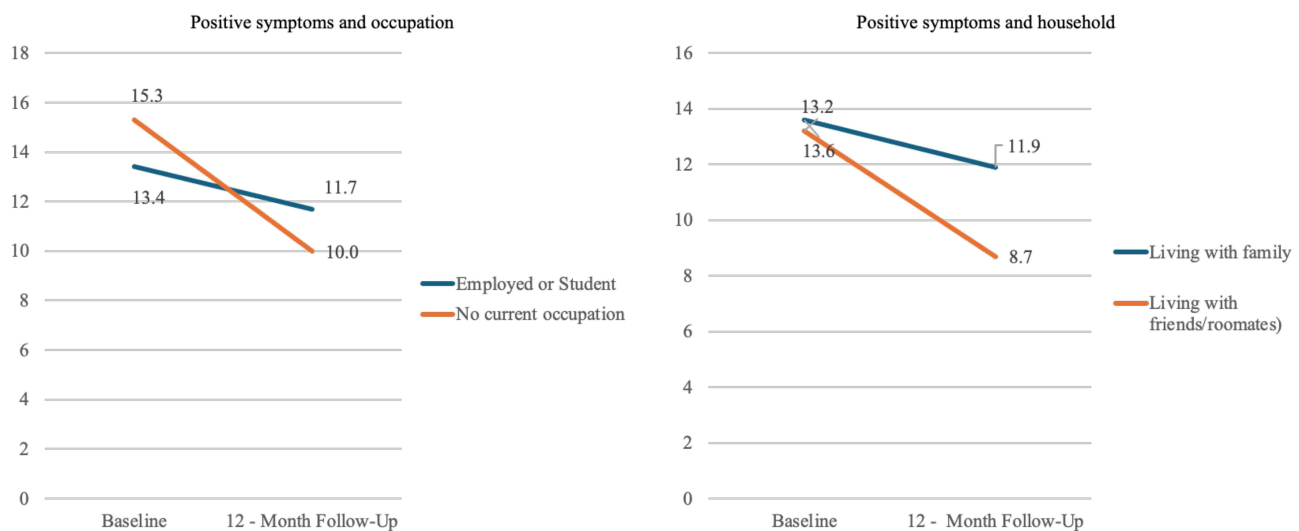


Figure 2 Sociodemographic Data and the Severity of Attenuated Positive Symptoms at Baseline and 12-Month Follow-Up.

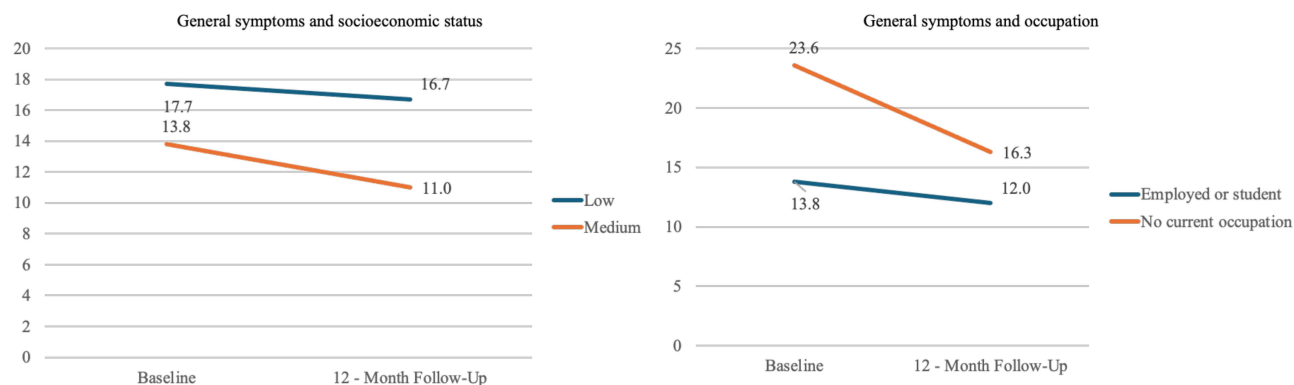


Figure 3 Sociodemographic Data and the Severity of General Symptoms at Baseline and 12-Month Follow-Up.

up, participants with medium socioeconomic status showed a higher decrease in general symptoms than those with lower socioeconomic status.

Finally, the main effect of evaluation time on general symptoms and occupation was significant, as was the interaction between the variables (Table 2). At baseline, those unoccupied showed significantly higher severity of general symptoms than those working or studying. At follow-up, general symptoms decreased more in those unoccupied at baseline than those working or studying at baseline (Figure 3).

Discussion

To our knowledge, this is the first longitudinal study to examine the relationship of sociodemographic characteristics to the course of high-risk for psychosis symptoms and functioning at 12-month follow-up in a sample of Mexicans at CHR-P.

The study produced several results of particular interest. First, attenuated positive symptoms and general psychopathology improved at 12-month follow-up. This could be explained by the fact that more than 63.6% of participants continued under psychiatric or psychological treatment during the study period. A recent meta-analysis by Salazar de Pablo et al²⁷ based on 75 studies of 5288 people at CHR-P found that attenuated positive symptoms improved during the first two years of follow-up, but that these improvements were not maintained in the longer term, and less than half of the subjects fully recovered. The authors suggest that initial improvements could be associated with care received from mental health services but may not be maintained after their discharge. More longitudinal studies with longer follow-ups are needed to know the trajectory of CHR-P symptoms in Mexicans over time.

With respect to changes in negative symptoms, our results did not show a significant decrease but did show a trend of improvement at 12 months. Although negative symptoms are highly prevalent in people at CHR-P²⁸ and were a strong predictor of conversion to psychosis,¹⁴ their mechanisms in the early phases of psychosis remain poorly understood. The bioecosystem theory of negative symptoms suggests that the frequency and persistence of negative symptoms are influenced by a complex interplay of environmental factors that interact with individual biological and psychological processes.²⁹ For example, negative symptoms have been associated with environmental factors such as reduced social interaction and activities, poverty, and neighborhood insecurity.^{12,30} Future studies of low- and middle-income countries should also analyze in depth the relationship of socioeconomic context to the negative symptoms of psychosis, based on bioecosystem theory.²⁹ Such analysis may help to identify environments that can be modified to improve outcomes.

No significant changes were observed in social functioning (eg, interpersonal interactions or activities) or role functioning (eg, academic or work achievement) at the 12-month follow-up. Some studies have reported improvements in functioning at 12 months, but these improvements are not maintained over time.²⁷ Impairments in functioning are persistent in individuals at CHR-P,³¹ even among those who do not make the transition to psychosis.^{9,10} Research into the determinants of these impairments in functioning highlights the role of multiple factors, including negative symptoms, cognitive deficit, and lack of motivation.^{26,32,33} Additional research is necessary to better understand the potential underlying causes of persistent psychosocial impairments in individuals at CHR-P.

Our study indicates that attenuated positive and general symptoms decreased at 12-month follow-up in participants not studying or working at baseline. Based on stress-sensitivity theory, one possible explanation is that not having to carry out academic or work activities meant that participants were exposed to fewer stressors, which may contribute to the symptomatology improvement. Previous studies have found a positive association between stress sensitivity and attenuated positive symptoms.³⁴

Individuals who lived with friends or roommates showed decreased attenuated positive symptoms at the 12-month follow-up. While this finding is difficult to explain, evidence suggest that positive symptoms can be influence by the stressful and negative family environment, such as high levels of conflict, hostility, criticism, over-involvement and lack of communication.^{33,35–37} Families of people at CHR-P may experience high levels of stress and negative emotions when faced with the possibility of a family member developing a psychotic disorder. More studies are required to explore the effect of family environment on the course of CHR-P in Mexico and the role as a possible protective factor of friends and peers living with CHR-P individuals.

Participants with medium socioeconomic status showed a higher decrease in the severity of general symptoms than those with lower socioeconomic status. The association between poverty and mental health is complex, but it is well known that people with low socioeconomic status may be exposed to a greater number of stressors that could affect their mental health, including social exclusion, financial problems, reduced social and cultural resources, violence, social insecurity, food shortages, less access to education and health and welfare safety nets.^{38,39} In contrast, people with medium socioeconomic status are more likely to pay for medication and private mental health care, which may reflect the improvement in their clinical status.

Finally, participants who dropped out had a lower socioeconomic status than those who did not. The few studies that have evaluated participant drop-out in people at CHR-P have not reported any sociodemographic characteristics as predictors.^{39,40} Socioeconomic status represents an important factor to consider, especially in developing countries with high levels of inequality and poverty.^{19,21} Poverty has been associated with a greater risk of mental health problems, including psychosis,^{17,19} as it reduces people's quality of life and exposes them to a greater number of stressors that increase the likelihood of developing mental illness.¹⁷

People with low socioeconomic status may also have less access to information about mental health problems and less access to mental health care.²¹ A recent systematic review by Loch et al⁴¹ found that low mental health literacy and negative beliefs and attitudes toward psychosis can affect people's willingness to participate in CHR-P studies, creating challenges in recruitment and follow-up. Future studies should analyze in depth the factors associated with dropping out by people with low socioeconomic status to improve retention strategies in longitudinal studies.

This study has several limitations that should be considered. The sample size is small, so the findings should be interpreted with caution. Due to the dichotomization of sociodemographic variables, a Bonferroni correction could not be applied, which further emphasizes the need for cautious interpretation of the results. Additionally, participants were recruited from a specialized tertiary care psychiatric hospital, which typically serves individuals with more severe conditions compared to those receiving care in primary settings. Furthermore, we did not assess expressed emotion in this study.⁴² Despite these limitations, the research yielded interesting findings that would benefit from further investigation with larger sample sizes in the future.

Conclusion

The findings of this research suggest that being occupied, living with friends/roommates, and having middle socio-economic status play an important role in improving positive and general symptoms at 12-month follow-up in Mexicans at CHR-P. This allows for identifying some possible risk and protective factors involved in the changes in clinical status over time. Promoting the needs of people at CHR-P at schools and workplaces is also crucial. These might adopt measures such as reducing stress load, facilitating access to specialized mental health care, and reducing stigma. It is important as well to consider therapeutic strategies that focus on enhancing social skills and promote peer interaction to build social support networks beyond those of the family. Finally, it is crucial to ensure that informational campaigns about mental health and accessible care options reach people with low socioeconomic status. Early intervention strategies

tailored to their needs, such as providing free or low-cost services in nearby health centers and through community interventions, should also be developed.

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Disclosure

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