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ORIGINAL RESEARCH

Psychosocial and Clinical Factors That Differentiate and Predict Patients' Adaptation to Chronic Diseases

Ruxandra Laza[1], Loredana Al Ghazi[2], Anca Lustrea[2], Voichita Elena Lazureanu[1], Cristian Iulian Oancea[3,4], Ioana Melinda Luput-Andrica[5], Emanuel Ionut Poplicean[4,5], Razvan Ilina[6], Natalia Cireap[6], Flaviu Bob[7,8], Nicu Olariu[5,9], Ioana Ionita[10,11], Sandra Lazar[10,11], Liana Dehelean[12], Radu Stefan Romosan[12], Ana-Maria Romosan[12]

[1]Department of Infectious Diseases, Victor Babes University of Medicine and Pharmacy Timisoara, Timisoara, Romania; [2]Department of Educational Sciences, University Clinic of Therapies and Psycho-Pedagogical Counseling, West University of Timisoara, Timisoara, Romania; [3]Department of Pneumology, Victor Babes University of Medicine and Pharmacy Timisoara, Timisoara, Romania; [4]Romania Center for Research and Innovation in Precision Medicine of Respiratory Diseases (CRIPMRD), Victor Babes University of Medicine and Pharmacy Timisoara, Timisoara, Romania; [5]Doctoral School Victor Babes University of Medicine and Pharmacy Timisoara, Timisoara, Romania; [6]Department of Oncological Surgery-Surgical Semiology, Victor Babes University of Medicine and Pharmacy Timisoara, Timisoara, Romania; [7]Department of Internal Medicine II—Nephrology, Victor Babes University of Medicine and Pharmacy Timisoara, Timisoara, Romania; [8]Center for Molecular Research in Nephrology and Vascular Disease, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania; [9]Center of Hemodialysis, Pius Branzeu County Hospital, Timisoara, Romania; [10]Department of Hematology, Victor Babes University of Medicine and Pharmacy Timisoara, Timisoara, Romania; [11]Multidisciplinary Research Center for Malignant Hematology (CCMHM), Victor Babes University of Medicine and Pharmacy Timisoara, Timisoara, Romania; [12]Department of Neurosciences-Psychiatry, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania

Correspondence: Loredana Al Ghazi; Anca Lustrea, Department of Educational Sciences, University Clinic of Therapies and Psycho-Pedagogical Counseling, West University of Timisoara, Bd. Vasile Pârvan 4, Timişoara, 300223, Romania, Tel +40752171111; +40741795465, Email loredana.al@e-uvt.ro; anca.lustrea@e-uvt.ro

Purpose: Adaptation to chronic disease is an important factor for the quality of life of patients and their families. This research aimed to identify the psychosocial and clinical factors that determine significant differences and best predict the patients' adaptation to chronic diseases. Understanding these factors enables the design of evidence-based preventive interventions that promote early adaptation.

Patients and Methods: A quantitative, non-experimental comparative and predictive study design was conducted. Several clinical, demographic, and psychological factors were measured with an online questionnaire. This study was conducted on a convenience sample of 263 patients with chronic diseases: 63 (24%) had chronic kidney disease with dialysis dependency, 49 (18.6%) had solid neoplasms, 61 (23.2%) had hemopathies, 64 (24.3%) had HIV infection, and 26 (9.9%) had tuberculosis.

Results: Adaptation to chronic disease varies based on the type of diagnosis, with lower adaptation seen in conditions that significantly impact daily life, involve comorbidities, and require frequent treatments, like chronic kidney disease. The most significant predictor of adaptation to the chronic disease is the female gender. Other predictive factors are medication adherence, social support, and self-efficacy in managing chronic disease. Patients without comorbidities and fewer medications are more prone to illness denial, alongside younger, urban, employed, and higher-educated patients, potentially neglecting treatment. Patients with comorbidities and the older patients require greater emotional support, with psychological counseling and support groups being beneficial.

Conclusion: Current data underlines the need for an individualized approach to chronic disease management, which should consider demographic and psychological factors in addition to clinical ones. It is important to design early interventions for the development of adaptation to chronic disease, which could include individual and family counseling and education programs for medication administration, treatment at home, adherence to a healthy lifestyle, and inclusion of the patient and his family in social support groups.

Keywords: adaptation to chronic disease, predictive factors, medication adherence, social support, self-efficacy

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Introduction

With the rise in chronic and degenerative diseases, every person now faces a high risk of developing a chronic condition during their lifetime.[1,2] A patient can live with a chronic disease for a long period of time and should manage his disease correctly and efficiently and have a good quality of life.[3,4] Accepting and adapting to the disease are the first steps towards a satisfactory quality of life.[5,6] Adaptation to the chronic disease is a complex process through which the patient accepts the disease, learns to manage the treatment and its effects, faces the challenge, and integrates the disease into his daily life.[7] Compliance and adherence to therapy are essential predictors of successful adaptation to chronic diseases, as consistent therapeutic engagement directly influences symptom management, reduces complications, and enhances overall psychological and physical well-being. Moreover, sustained adherence fosters patient autonomy, strengthens the patient-provider relationship, and increases the effectiveness of clinical interventions, ultimately contributing to improved long-term health outcomes and quality of life.

Padhy et al[8] proposed the following mechanisms of adaptation to chronic disease: illness denial, characterized by denying the existence of the disease, delaying the presentation to the doctor, non-adhering to prescribed medication, ignoring the doctor's advice; illness-compliant behavior, expresses the extent to which the patient respects the treatment and medical prescriptions, shows up for periodic check-ups, follows the medical prescriptions regarding a healthy lifestyle; strategic positive engagement, consists of coping with the health worries by planning and implementing activities to keep busy and avoid the health concerns; emotional support for illness, represents the need for emotional support from those around, sharing emotions and worries about the disease and treatment, discussing experiences, and seeking emotional support; emotional engagement, describes the situation in which patients engage in many activities to avoid fear, worries and negative feelings related to the disease.[8]

This capacity to adapt is dependent on many factors, which can be physiological, clinical, social, or psychological.[9,10] The current research investigated clinical, sociodemographic, and psychological factors in relation to adaptation to chronic illness.

The type of chronic disease, which could induce different levels and types of adaptation, was the main clinical factor under analysis. Each disease has its own specificity, with different consequences in daily life, permanent treatments, life expectancy, quality of life, etc.[11,12]

There have been previous studies on adaptation to chronic disease on different types of diagnoses: cancer, chronic obstructive pulmonary disease, rheumatic diseases, cardiovascular diseases, diabetes, or advanced chronic kidney disease.[13–18] The chronic diseases included in this study were chronic kidney disease with dialysis dependency, solid neoplasms, hematologic disorders, HIV infection, and tuberculosis.

Other clinical factors reported in the literature in relation to adaptation and assessed in our study were: presence of comorbidities, the daily medication count, time since diagnosis, type of treatment, participation in psychological counseling, access to medical services, and satisfaction with provided medical services.[9,13,19–23]

Several demographic factors were analyzed by other studies, and investigated in this study, including age, sex, residential area, relationship status, current occupational status, occupational status after diagnosis, living standard, and educational background.[10,16]

The psychological factors considered as predictors of adaptation to chronic disease were adherence to medication, social support, and self-efficacy in managing the chronic disease.[24–26]

This research aimed to identify the psychosocial and clinical factors that determine significant differences and best predict the patients' adaptation to chronic diseases. By knowing these factors, it will be possible to make evidence-based recommendations and proposals for early intervention measures. A good adaptation to chronic disease can have positive consequences on multiple levels: improving clinical results, reducing medical costs, preventing resistance to treatment, and increasing the patients' quality of life.

Materials and Methods

A quantitative, non-experimental, comparative, and predictive study design was conducted. The purpose of this study was to identify the psychosocial and clinical factors that determine significant differences and best predict the patients` adaptation to chronic diseases.

The clinical factors taken into consideration were type of diagnosis (chronic kidney disease with dialysis dependency, solid neoplasms, hemopathies, HIV infection, and tuberculosis), comorbidities, time since diagnosis, type of treatment, participation in psychological counseling, access to medical services, satisfaction with provided medical services, and daily medication count. The demographic factors taken into consideration were age, sex, residential area, relationship status, present occupational status, occupational status after diagnosis, educational level, and living standard (income related). The psychological factors included were self-efficacy to manage chronic disease, adherence to medication, resilience, and perceived social support.

Research Questions

RQ1: Which are the factors that determine significant differences in patients' adaptation to chronic diseases?

RQ2: Which factors best predict the patients' adaptation to chronic diseases?

Participants

This study was conducted on a convenience sample of 263 patients with chronic diseases that receive treatment in public hospitals in Timisoara, Romania. Participants in this study were adult patients diagnosed with severe, incurable chronic illnesses, recruited from various chronic disease units within hospitals in Timişoara. Of the participants, 63 (24%) had chronic kidney disease with dialysis dependency, 49 (18.6%) had solid neoplasms, 61 (23.2%) had hemopathies, 64 (24.3%) had HIV infection, and 26 (9.9%) had tuberculosis. 139 (52.9%) have comorbidities requiring long-term treatment. For the majority of participants (n = 106, 40.3%), the time elapsed since the diagnosis is between 1 and 4 years. The majority of participants (n = 201, 76.4%) underwent both surgical and pharmacological treatment. The daily medication count varied between 0 and 25 pills, with a mean of 5.75 (SD = 4.79). The patients' ages ranged from 17 to 92 years (M = 53.79 years, SD = 17.14). 153 were men (58.2%), and 160 (60.8%) were participants living in the urban environment. The sample distribution on all the demographic and clinical variables is presented and can be consulted in detail in Table 1.

Instruments

To assess all the psychological and clinical factors, several instruments were integrated into a single online questionnaire. Socio-demographic and clinical data were collected through 15 questions: 7 on clinical factors and 8 on socio-demographic factors. Age was assessed through an open question, while sex, residential area, and comorbidities were dichotomous. Eight items had multiple answer options (eg, diagnosis, time since diagnosis, treatment, psychological support, relationship status, current and post-diagnosis occupational status, and education). Three items used Likert scales: access to medical services, satisfaction with care, and living standard.

The psychological factors measured were adaptation to chronic diseases, self-efficacy to manage chronic disease, adherence to medication, resilience, and perceived social support.

The Chronic Illness Adjustment Scale (CIAS) measures the adaptation to chronic diseases, which represented the dependent variable of the present study.[8] The CIAS evaluates patients' adaptation to chronic diseases on 19 items, distributed across five factors. Each factor consists of an adaptation mechanism for chronic disease: factor 1: illness denial behavior (4 items); factor 2: illness-compliant behavior (4 items); factor 3: strategic positive engagement (4 items); factor 4: emotional support for illness (3 items); factor 5: emotional engagement (4 items). The answers were given on a 4-level Likert scale with responses ranging from 1 (never) to 4 (always). A high score indicates a good adaptation to chronic disease.

The Self-Efficacy to Manage Chronic Disease Scale (SEMCD) assesses patients'confidence in managing chronic illness through six items rated on a 10-point Likert scale (1 = not at all confident, 10 = totally confident). Higher scores reflect better self-management.[27]

The Medication Adherence Report Scale (MARS-10 evaluates adherence to prescribed medication through 10 items rated on a 5-point Likert scale (5 = never, 1 = always). Higher scores indicate better treatment adherence.[28]

Table 1 Descriptive Summary of the Participants

A. Clinical Factors	n	%	B. Sociodemographic Factors	n	%
A1. Diagnosis			**B1. Sex**		
Chronic kidney disease with dialysis dependency	63	24.0	Men	153	58.2
Solid neoplasms	49	18.6	Women	110	41.8
Hemopathies	61	23.2	Residential area		
HIV infection	64	24.3	Urban	160	60.8
Tuberculosis	26	9.9	Rural	103	39.2
A2. Comorbidities			**B2. Relationship status**		
Present	139	52.9	Married or in a long-term relationship	158	60.1
Not present	124	47.1	Single	56	21.3
A3. Time passed since diagnosis			Divorced	21	8.0
< 1 year	66	25.1	Widowed	28	10.6
1–4 years	106	40.3	**B3. Present occupational status**		
5–9 years	46	17.5	Employed / entrepreneur	87	33.1
10–15 years	23	8.7	Unemployed	13	4.9
> 15 years	22	8.4	Pension (due to invalidity)	62	23.6
A4. Treatment			Pension (due to age)	93	35.4
Medication and/or surgical interventions	201	76.4	Student	8	3.0
Medication/surgery and alternative treatment	54	20.5	**B4. Occupational status after diagnosis**		
Medication/surgery and physical therapy	8	3.0	Retained the same job as before diagnosis	99	37.6
A5. Psychological consulting and/or psychotherapy			Multiple job changes due to health condition	3	1.1
No sessions whatsoever	168	63.9	Leaving job due to health condition / invalidity pension	76	28.9
Yes. several sessions in the past	83	31.6	Unemployment or pension before diagnosis	85	32.3
Yes. still having regular sessions	12	4.6	**B5. Educational background**		
A6. Access to medical services			Elementary studies	103	39.2
Very good accessibility (same town)	89	33.8	High school studies	105	39.9
Good accessibility (close vicinity)	62	23.6	Superior studies (university / post-university degrees)	55	20.9
Poor accessibility (rural environment)	60	22.8	**B6. Living standard (income related)**		
Very poor accessibility (>100 km from medical services)	52	19.8	Poor income (< 600 EUR per month)	140	53.2
A7. Satisfaction with provided medical services			Medium income (600–1200 EUR per month)	84	31.9
Not satisfied	4	1.5	Good income (1200–2000 EUR per month)	31	11.8
Satisfied	106	40.3	Very good income (> 2000 EUR per month)	8	3.0
Very satisfied	153	58.2			

The Brief Resilience Scale (BRS) measures resilience in managing chronic illness through 6 items rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Higher scores indicate greater resilience.[29]

The Social Support Survey (MOS) assesses perceived social support in chronic illness through 19 items rated on a 5-point Likert scale (1 = never, 5 = all the time), covering four factors: emotional/informational (8 items), tangible (4), affectionate (3), and positive social interaction (3). Higher scores indicate greater perceived support.[30]

Procedure

The research was implemented with the approval of the Ethics Commission of Victor Babes Hospital Timisoara no. 5925/05.07.2024 All ethical research regulations were respected, including obtaining the informed consent of the patients, voluntary participation, ensuring confidentiality, and data protection. The data were gathered in the months of July-August 2024 from 263 chronic patients under treatment in public hospitals in Timisoara, Romania. The possibility to participate in this research was explained to the chronic patients who came for their current medical check-ups; informed consent was presented to them, and the agreement to participate was obtained from those who wanted to participate. The participants filled out the online questionnaire on the spot, if necessary, with the assistance of a resident doctor.

Statistical Analysis

The statistical analysis for this study was computed using the IBM SPSS Statistics program (version 20). Because of the non-Gaussian data distribution (as observed by the Shapiro–Wilk and Kolmogorov–Smirnov tests), differences between groups of variables were assessed using non-parametric methods (the Mann–Whitney *U*-test, the Kruskal–Wallis test, followed by Dunn's post hoc analysis – Bonferroni corrected). To assess the predictive value of several parameters on chronic illness adjustment abilities, multiple regressions were performed. For each regression analysis, the following parameters were reported: F (F-test of overall model significance), p (level of significance), R^2 (coefficient of determination), and β (unstandardized coefficients). Tests were considered statistically significant if $p<0.05$ and all results were two-tailed.

Results

RQ1: Which are the factors that determine significant differences in patients' adaptation to chronic diseases?

The demographic, clinical, and psychological factors considered were numerous. Due to the limited space in an article, in the following only the factors and the significant differences obtained are presented.

Clinical Factors

Type of Diagnosis

The first clinical factor analyzed in relation to adaptation to chronic diseases was the type of diagnosis. A Kruskal–Wallis test with Bonferroni correction was performed to evaluate the differences in patients' adaptation to chronic diseases by type of diagnosis. Statistically significant differences were identified in overall adaptation ($p<0.0001$), illness denial behavior ($p < 0.0001$), illness-compliant behavior ($p = 0.01$), strategic positive engagement ($p = 0.011$), and emotional support for illness ($p<0.0001$) across the various diagnoses (Table 2).

To explore the variations in adaptation across different diagnoses, Dunn's post hoc test with Bonferroni correction was conducted for all five variables. For the adaptation to chronic diseases total score, the patients with hemopathies (n = 61) showed significantly higher CIAS total scores than patients with tuberculosis (n = 26) ($p = 0.001$), than those with HIV infection (n = 64) ($p<0.0001$), but also than patients with chronic kidney disease with dialysis dependency (n = 63) ($p<0.0001$). The patients with solid neoplastic tumors (n = 49) showed significantly higher CIAS total scores than the patients with HIV infection (n = 64) ($p = 0.027$) and then the patients with chronic kidney disease with dialysis dependency (n = 63) ($p = 0.033$). Patients with hemopathies have the best level of adaptation to chronic disease, followed by patients with tuberculosis, solid neoplasms, and HIV infection. Patients with chronic kidney disease had the weakest adaptation.

Table 2 Kruskal–Wallis Test for Differences Between Adaptation to Chronic Diseases for Various Diagnoses

Scales	Kruskal–Wallis test H	p
Adaptation to chronic diseases (CIAS total score)	37.79	p<0.0001
Illness denial behavior (CIAS 1)	32.19	p<0.0001
Illness-compliant behavior (CIAS 2)	13.27	p=0.01
Strategic positive engagement (CIAS 3)	13.07	p=0.011
Emotional support for illness (CIAS 4)	46.59	p<0.0001
Emotional engagement (CIAS 5)	1.97	0.74

Abbreviations: H, Kruskal–Wallis test; p, level of significance.

For factor 1, illness denial behavior, patients with tuberculosis had significantly lower CIAS 1 factor scores than those with HIV infection (p = 0.003) and then those with hemopathies (p = 0.001). Patients with chronic kidney disease had significantly lower CIAS 1 factor scores than those with HIV infection (p = 0.001) and those with hemopathies (p< 0.0001). The highest illness denial behavior was measured for patients with HIV infection and hemopathies, and the lowest for the patients with chronic kidney disease. For factor 2, illness-compliant behavior, the patients with chronic kidney disease presented scores significantly lower than those with hemopathies (p = 0.009). For factor 3, strategic positive engagement, the patients with solid neoplastic tumors presented significantly lower sub-scores than those with HIV infection (n = 64) (p = 0.043), but also those with chronic kidney disease (p = 0.049). For factor 4, emotional support for illness, patients with HIV infection presented significantly lower sub-scores than those with chronic kidney disease (p = 0.007), those with solid neoplastic tumors (p<0.0001), and those with hemopathies (p<0.0001). Patients with chronic kidney disease showed significantly lower scores than those with hemopathies (p = 0.03).

Comorbidities

To evaluate the differences between patients with and without comorbidities in adaptation to chronic illness, a Mann–Whitney *U*-test was conducted (Table 3).

Patients without other comorbid chronic diseases presented significantly higher scores on the illness denial behavior subscore than those with comorbid chronic diseases requiring permanent treatment (U = 6957, Z = 2.75, p = 0.006). Patients with comorbid chronic diseases requiring permanent treatment had significantly higher scores on the emotional support for illness sub-score than those without other comorbid chronic diseases (U=7118.5, Z=−2.45, p=0.014).

Table 3 Mann–Whitney *U*-Test for Adaptation to Chronic Disease Total Score and Subscales by Comorbidities

Scales	Mann–Whitney U	Wilcoxon W	Z	p
Adaptation to chronic diseases (CIAS total score)	8485,500	18,215,500	−0.215	0.829
Illness denial behavior (CIAS 1)	6957,000	16,687,000	−2.751	0.006
Illness-compliant behavior (CIAS 2)	7784,000	17,514,000	−1.368	0.171
Strategic positive engagement (CIAS 3)	7812,500	15,562,500	−1.317	0.188
Emotional support for illness (CIAS 4)	7118,500	14,868,500	−2.455	0.014
Emotional engagement (CIAS 5)	7587,000	17,317,000	−1.691	0.091

Abbreviations: U, Mann–Whitney *U*-test; W, Wilcoxon sum of ranks; Z, Standardized test statistic for Wilcoxon signed-rank test; p, level of significance.

Daily Medication Count

To test if there is a relationship between daily medication count and patients' adaptation to chronic disease, a Spearman correlation was performed. There is a statistically significant negative correlation between daily medication count and illness denial behavior (rs=−0.18, p=0.003), and emotional engagement (rs=−0.17, p=0.006). The lower the number of medications taken daily, the higher the illness denial and emotional engagement. There is a statistically significant negative correlation between daily medication count and emotional support for illness *(rs* = 0.14, p = 0.019). The greater the number of daily medications, the greater the need for emotional support.

No significant differences in adaptation to chronic illness were observed for the clinical factors: time since diagnosis, type of treatment, participation in psychological counseling, access to medical services, and satisfaction with provided medical services.

Demographic Factors

Sex

To evaluate the differences between male and female patients in adaptation to chronic illness, a Mann–Whitney *U*-test was conducted (Table 4).

Female participants presented significantly higher adaptation to chronic diseases scores (U = 6778, Z = −2.69, p = 0.007), and for factor 4, emotional support for illness, than male participants: (U = 6278, Z = −3.54, p<0.0001). Male participants presented significantly higher scores on strategic positive engagement than female participants (U=6623, Z=−2.96, p=0.003).

Age

To test if there is a relationship between age and patients' adaptation to chronic disease, a Spearman correlation was performed. There is a statistically significant negative correlation between age and illness denial behavior *(rs* = −0.17, p = 0.007) and emotional engagement *(rs* = −0.13, p = 0.035). The younger the patients, the higher the levels of illness denial behavior and emotional engagement. There is a statistically significant negative correlation between age and emotional support for illness *(rs* = 0.12, p = 0.042). The older the patients, the greater the need for emotional support.

Residential Area

To test the differences between the patients living in an urban and in a rural environment in adaptation to chronic illness, a Mann–Whitney *U*-test was conducted (Table 5).

Participants living in the urban environment presented significantly higher scores on factor 1, illness denial behavior (U=6506.5, Z=−2.93, p=0.003) than those from rural areas.

Relationship Status

A Kruskal–Wallis test with Bonferroni correction was conducted to assess the variations in patients` adaptation to chronic diseases by relationship status. Statistically significant differences were identified only in emotional support for illness (H = 24.17, p<0.0001) across the various relationship statuses (Table 6).

Table 4 Mann–Whitney *U*-Test for Adaptation to Chronic Disease Total Score and Subscales by Sex

Scales	Mann–Whitney U	Wilcoxon W	Z	p
Adaptation to chronic diseases (CIAS total score)	6778,000	18,559,000	−2.693	0.007
Illness denial behavior (CIAS 1)	8343,500	20,124,500	−0.120	0.905
Illness-compliant behavior (CIAS 2)	7632,500	19,413,500	−1.299	0.194
Strategic positive engagement (CIAS 3)	6623,000	18,404,000	−2.964	0.003
Emotional support for illness (CIAS 4)	6278,000	18,059,000	−3.540	0.000
Emotional engagement (CIAS 5)	8147,500	19,928,500	−0.444	0.657

Abbreviations: U, Mann–Whitney *U*-test; W, Wilcoxon sum of ranks; Z, Standardized test statistic for Wilcoxon signed-rank test; p, level of significance.

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Table 5 Mann–Whitney *U*-Test for Adaptation to Chronic Disease Total Score and Subscales by Residential Area

Scales	Mann–Whitney U	Wilcoxon W	Z	p
Adaptation to chronic diseases (CIAS total score)	7244,500	12,600,500	−1.655	0.098
Illness denial behavior (CIAS 1)	6506,500	11,862,500	−2.936	0.003
Illness-compliant behavior (CIAS 2)	7166,000	12,522,000	−1.801	0.072
Strategic positive engagement (CIAS 3)	8063,500	13,419,500	−0.295	0.768
Emotional support for illness (CIAS 4)	7420,500	20,300,500	−1.372	0.170
Emotional engagement (CIAS 5)	7333,500	12,689,500	−1.521	0.128

Abbreviations: U, Mann–Whitney *U*-test; W, Wilcoxon sum of ranks; Z, Standardized test statistic for Wilcoxon signed-rank test; p, level of significance.

Table 6 Kruskal–Wallis Test for Differences Between Adaptation to Chronic Diseases for Various Relationship Statuses

Scales	Kruskal–Wallis test H	p
Adaptation to chronic diseases (CIAS total score)	5.84	0.120
Illness denial behavior (CIAS 1)	3.83	0.279
Illness-compliant behavior (CIAS 2)	2.91	0.404
Strategic positive engagement (CIAS 3)	0.598	0.112
Emotional support for illness (CIAS 4)	24.17	0.000
Emotional engagement (CIAS 5)	0.31	0.958

Notes: H, Kruskal–Wallis test; p, level of significance.

To explore the differences, Dunn's post hoc analysis with Bonferroni correction was conducted. For the emotional support for illness, the single participants (n = 56) showed significantly lower scores than participants married/in a stable relationship (n = 128) ($p<0.0001$) and then the widowed (n = 28) (p ($p=0.003$).

Present Occupational Status

A Kruskal–Wallis test with Bonferroni correction was performed to evaluate the differences in patients` adaptation to chronic diseases by the present occupational status. Statistically significant differences were identified in illness denial behavior ($H = 20.69$, $p<0.0001$) and emotional support for illness ($H = 14.01$, $p = 0.007$) across the various occupational statuses (Table 7).

Table 7 Kruskal–Wallis Test for Differences Between Adaptation to Chronic Diseases for Various Occupational Statuses

Scales	Kruskal–Wallis test H	p
Adaptation to chronic diseases (CIAS total score)	4.07	0.397
Illness denial behavior (CIAS 1)	20.69	p<0.0001
Illness-compliant behavior (CIAS 2)	1.83	0.766

(*Continued*)

Table 7 (Continued).

Scales	Kruskal–Wallis test H	p
Strategic positive engagement (CIAS 3)	8.89	0.064
Emotional support for illness (CIAS 4)	14.01	p=0.007
Emotional engagement (CIAS 5)	11.97	0.18

Notes: H, Kruskal–Wallis test; p, level of significance.

To further investigate the differences, Dunn's post hoc analysis with Bonferroni correction was conducted. Employed participants (n = 87) presented significantly higher illness denial behavior than those on disability pension (n = 62) (p = 0.015) and then those retired due to age (n = 93) (p (p=0.01). The retired participants due to age (n = 93) presented emotional support for illness sub-scores significantly higher than those employed (n = 87) (p=0.006).

Occupational Status After Diagnosis

A Kruskal–Wallis test with Bonferroni correction was performed to evaluate the differences in patients` adaptation to chronic diseases by occupational status after diagnosis. The results revealed statistically significant differences in illness denial behavior (H = 14.40, p = 0.002) and strategic positive engagement (H = 11.30, p = 0.01) across the various occupational statuses after diagnosis (Table 8).

To better understand the differences, Dunn's post hoc analysis with Bonferroni correction was conducted. Participants who lost their job due to illness/retired due to illness (n = 76) had significantly lower illness denial behavior subscores than those who kept the same job after diagnosis (n = 99) (p = 0.002). Participants who lost their job due to illness or retired due to illness (n = 76) presented strategic positive engagement sub-scores significantly higher than those who kept the same job after diagnosis (n = 99) (p = 0.019).

Educational Background

A Kruskal–Wallis test with Bonferroni correction was performed to evaluate the differences in patients` adaptation to chronic diseases by the participants` educational background. Statistically significant differences were identified in illness denial behavior (H=17.44, p<0.0001) across the various educational backgrounds (Table 9).

To explore the differences, Dunn's post hoc analysis with Bonferroni correction was conducted. Participants with higher education (university, postgraduate studies) (n = 55) presented illness denial behavior subscores significantly

Table 8 Kruskal–Wallis Test for Differences Between Adaptation to Chronic Diseases for Various Occupational Statuses After Diagnosis

Scales	Kruskal–Wallis test H	p
Adaptation to chronic diseases (CIAS total score)	2.24	0.523
Illness denial behavior (CIAS 1)	14.40	p=0.002
Illness-compliant behavior (CIAS 2)	0.857	0.836
Strategic positive engagement (CIAS 3)	11.30	p=0.01
Emotional support for illness (CIAS 4)	5.65	0.130
Emotional engagement (CIAS 5)	9.94	0.19

Notes: H, Kruskal–Wallis test; p, level of significance.

Table 9 Kruskal–Wallis Test for Differences Between Adaptation to Chronic Diseases for Various Educational Backgrounds

Scales	Kruskal–Wallis test H	p
Adaptation to chronic diseases (CIAS total score)	2.24	0.523
Illness denial behavior (CIAS 1)	14.40	p=0.002
Illness-compliant behavior (CIAS 2)	0.857	0.836
Strategic positive engagement (CIAS 3)	11.30	p=0.01
Emotional support for illness (CIAS 4)	5.65	0.130
Emotional engagement (CIAS 5)	9.94	0.19

Notes: H, Kruskal–Wallis test; p, level of significance.

higher than those with elementary education (n = 103) ($p<0.0001$) and then those with secondary education (p = 0.016) (n = 105).

Living Standard (Income-Related)

A Kruskal–Wallis test with Bonferroni correction was performed to evaluate the differences in patients` adaptation to chronic diseases by the participants` living standards. Statistically significant differences were identified in illness-compliant behavior (H = 14.98, p = 0.002) and emotional support for illness (H = 10.72, p = 0.013) across the various educational backgrounds (Table 10).

To further investigate the differences, Dunn's post hoc analysis with Bonferroni correction was conducted. Participants with average income (n = 84) presented significantly higher scores than those with good income (n = 31) (p = 0.002), but also than those with low income (n = 140) (p = 0.03). Participants with low incomes (n = 140) had significantly higher emotional support for illness scores than participants with good incomes (n = 31) (p (p=0.049).

RQ2: Which factors best predict the patients` adaptation to chronic diseases?

Multiple regression was used to test the effect of several parameters (self-efficacy to manage the chronic disease, resilience in the face of the disease, social support received by the patient, adherence to treatment, age, sex, presence of other comorbid conditions, number of medications administered daily) on the patients' ability to adapt to the chronic disease.

Table 10 Kruskal–Wallis Test for Differences Between Adaptation to Chronic Diseases for Various Living Standards

Scales	Kruskal–Wallis test H	p
Adaptation to chronic diseases (CIAS total score)	8.43	0.38
Illness denial behavior (CIAS 1)	7.99	0.50
Illness-compliant behavior (CIAS 2)	14.98	p=0.002
Strategic positive engagement (CIAS 3)	5.84	0.120
Emotional support for illness (CIAS 4)	H=10.72	p=0.013
Emotional engagement (CIAS 5)	6.58	0.086

Notes: H, Kruskal–Wallis test; p, level of significance.

Table 11 Results of Multiple Linear Regression

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	19.496	4.816		4.049	0.000	10.013	28.980
	MOS	0.170	0.024	0.377	7.032	0.000	0.122	0.218
	SEMCD	0.140	0.027	0.294	5.192	0.000	0.087	0.192
	Number of pills taken daily	−0.085	0.088	−0.059	−0.970	0.333	−0.259	0.088
	MARS-10	0.298	0.078	0.202	3.824	0.000	0.145	0.452
	Gender	2.221	0.746	0.157	2.978	0.003	0.752	3.690
	Comorbid conditions	0.361	0.897	0.026	0.403	0.688	−1.406	2.129
	Age	0.021	0.027	0.053	0.795	0.427	−0.032	0.074
	BRS	0.011	0.151	0.004	0.074	0.941	−0.286	0.309

Notes: a. Dependent Variable: CIAS (Chronic illness Adjustment Scale) total score.
Abbreviation: R^2, coefficient of determination; F, F-test of overall significance; β, unstandardized coefficient; CI, confidence interval; p, level of significance; SEMCD, Self-Efficacy to Manage Chronic Disease Scale; MARS-10, Medication Adherence Report Scale; MOS, Social Support Survey; BRS, Brief Resilience Scale.

The model was statistically significant ($F = 15.72$, $p<0.0001$), indicating that the combined action of the predictors significantly explains 33% of the variance ($R^2 = 0.33$) (Table 11).

The factors significantly associated with adaptation to chronic disease were:

1. Sex (t=2.98, p=0.003), women presenting an adaptation score 2.21 units higher than men (β=2.21, 95% CI [0.75, 3.69]).
2. Social support score (t=7.03, p<0.0001): an increase in the Social Support score by one unit is associated with an increase of 0.17 in the CIAS adaptation score (β=0.17, 95% CI [0.12, 0.21]).
3. Self-efficacy to manage chronic disease score (t = 5.19, p<0.0001): an increase in SEMCD score by one unit is associated with a 0.14 increase in CIAS adaptation score (β = 0.14, 95% CI [0.09, 0.19]).
4. Medication adherence MARS-10 score (t = 3.82, p<0.0001): an increase in the Medication adherence MARS-10 score by one unit is associated with an increase of 0.29 in the CIAS adaptation score (β = 0.29, 95% CI [0.15, 0.45]).

The values of the standardized coefficients β suggest that the factor with the greatest impact on the adaptation to the chronic disease was the sex of the participants, followed by medication adherence, social support, and self-efficacy to manage chronic disease scores.

The factors without statistical significance on the adaptation to the chronic disease were the BRS score (p = 0.94), age (p = 0.42), the presence of chronic comorbidities (p = 0.69), as well as the number of medications administered daily (p = 0.33).

Thus, we can conclude that the female sex, a better adherence to medication, a better ability in chronic disease management, and better social support received by chronic patients are key factors that influence the patients' ability to adapt to chronic disease.

As a next step, multiple regressions were performed in order to test the influence of these 4 variables showing a significant impact on chronic disease adjustment skills (sex, total MOS score, MARS-10 score, and SEMCD score) on the 5 factors of CIAS. The results of these regressions are presented for each CIAS subscore in Table 12.

The self-efficacy to manage chronic disease (SEMCD) score is a predictive factor for total CIAS and 4 out of 5 components of CIAS (exception: CIAS 3: Strategic positive engagement). The medication adherence MARS-10 score is a predictive factor for the total CIAS and for CIAS subscores 1 and 2 (illness denial behavior and illness compliant

Table 12 Summary of Multiple Regression Analysis

	R^2	F	p	SEMCD			MARS-10			MOS			Gender		
				β	p	95% CI	β	p	95% CI	β	p	95% CI	β	p	95% CI
CIAS 1	0.19	15.35	**<0.0001**	0.04	**<0.0001**	[0.02; 0.05]	0.16	**<0.0001**	[0.11;0.21]	0.009	0.25	[−0.006; 0.02	0.08	0.74	[−0.39; 0.55]
CIAS 2	0.16	12.67	**<0.0001**	0.04	**<0.0001**	[0.02; 0.05]	0.11	**<0.0001**	[0.05; 0.16]	0.03	**0.001**	[0.01; 0.04]	0.34	0.18	[−0.16; 0.84]
CIAS 3	0.09	6.67	**<0.0001**	0.02	0.09	[−0.003; 0.04]	−0.01	0.73	[−0.08; 0.06]	0.04	**<0.0001**	[0.02; 0.06]	0.9	**0.007**	[0.25; 1.55]
CIAS 4	0.30	27.78	**<0.0001**	−0.02	**0.03**	[−0.04; −0.003]	0.02	0.41	[−0.03; 0.08]	0.08	**<0.0001**	[0.06; 0.10]	0.91	**0.001**	[0.39; 1.44]
CIAS 5	0.15	11.17	**<0.0001**	0.06	**<0.0001**	[0.04; 0.08]	0.009	0.78	[−0.05; 0.07]	0.02	0.09	[−0.003; 0.03]	0.14	0.64	[−0.46; 0.74]

Notes: Bolded values indicate statistically significant results.

Abbreviations: R^2, coefficient of determination; F, F-test of overall significance; β, unstandardized coefficient; CI, confidence interval; p, level of significance; CIAS 1, Illness denial behavior; CIAS 2, Illness-compliant behavior; CIAS 3, Strategic positive engagement; CIAS 4, Emotional support for illness; CIAS 5, Emotional engagement; SEMCD, Self-Efficacy to Manage Chronic Disease Scale; MARS-10, Medication Adherence Report Scale; MOS, Social Support Survey.

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behavior). The social support MOS score is a predictive factor for total CIAS and CIAS subscores 2, 3, and 4 (illness-compliant behavior, strategic positive engagement, emotional support for illness). Female gender is a predictive factor for the total CIAS score and CIAS subscores 3 and 4 (strategic positive engagement, emotional support for illness).

Discussion

The purpose of this study was to identify the psychosocial and clinical factors that determine significant differences and best predict the patients' adaptation to chronic diseases. If the factors involved in the adaptation mechanism are known, it is possible to design preventive or therapeutic interventions based on scientific evidence, which will increase the patients' ability to accept and adapt to the chronic disease.

To identify the factors that determine differences in and predict the adaptation to chronic diseases, a quantitative, non-experimental, comparative, and predictive study design was conducted. 263 patients participated in this study. The factors analyzed were demographic, clinical, and psychological. The statistical analysis consisted of differences between groups and multiple regressions.

Firstly, the results showed that the clinical factors that determine differences in adaptation to chronic disease are fewer than the demographic factors. Only the type of diagnosis, the presence of comorbidities, and the daily medication count determined significant differences in adaptation to chronic disease. No significant differences in adaptation to chronic illness were observed for the clinical factors: time since diagnosis, type of treatment, participation in psychological counseling, access to medical services, and satisfaction with provided medical services.

The factor that determined the most differences was the type of diagnosis. The results showed that, among the categories of chronic diseases analyzed, patients with hemopathies have the best level of adaptation to chronic disease, followed by patients with tuberculosis, solid neoplasms, and HIV infection. The patients with hemopathies demonstrated the best adaptation to the chronic disease, in line with Esser et al study that found a good quality of life for patients who survived hematological malignancies.[31] The patients with tuberculosis showed a poorer adaptation, in line with other studies that found that patients with tuberculosis often experience psychological distress and decreased quality of life.[32,33] The patients with solid neoplasms showed lower positive strategic engagement, likely due to the severe physical and emotional impact of cancer treatment.[34,35] Patients with HIV infection showed the highest levels of disease denial, probably due to high stigma, but also required substantial emotional support.[36,37] CKD patients on dialysis showed the poorest adaptation, reflecting the heavy burden of frequent treatments and reduced quality of life, requiring significant emotional support.[38]

Regarding the presence of comorbidities, the results showed that patients without comorbid conditions presented significantly higher scores on the illness denial behavior. Chronically ill patients experience and express illness denial in different forms and with varying degrees of severity.[39] Further studies should investigate the relationship between disease severity and illness denial behavior. Patients' with comorbid chronic diseases requiring permanent treatment perceived a higher need for emotional support as an adaptation mechanism. Health psychology interventions, including social support measures, are recognized and recommended for approaching chronic disease management in a holistic manner.[18]

The results showed that the lower the number of medications taken daily, the higher the illness denial and emotional engagement. The greater the number of daily medications, the greater the need for emotional support. Other studies showed that the number of medications taken daily is negatively correlated with illness acceptance, with patients taking more medications showing lower acceptance levels.[20] The number of medications may influence disease denial and acceptance differently depending on how patients perceive the severity of the disease and the impact of the treatment on their daily lives. Patients who take fewer medications may be more in denial about their illness because they are not constantly confronted with the severity of their condition through frequent medication administration.

Resuming, adaptation to chronic disease varies on the type of diagnosis; the diseases with greater impact on everyday living, including comorbidities, with multiple and frequent treatments and medication taken, have a lower adaptation. The illness denial behavior is adopted by the patients without comorbid conditions and with less medication. Consequently, health conditions that seem easier to manage and treat must be given special attention because illness denial could occur, and the patients may neglect treatment, consultations, and good health behaviors. Emotional support

is needed more by the patients with comorbidities and harder to manage treatments. Psychological counseling and support groups for patients and their families could improve mental health.

Secondly, it was determined that most of the demographic variables considered determined differences in adaptation to the chronic disease. Among these variables, only the sex of the patients is a predictive factor with a high predictive power. The results of this research show that female participants presented significantly higher adaptation to chronic diseases scores. Women and men use different strategies to adapt to the disease.[10] Females had a higher need for emotional support for illness than male participants. Male participants presented significantly higher scores on strategic positive engagement than female participants.

Other demographic variables that determined differences in patients' adaptation strategies were: a. age (similar with Aslan et al), the younger the patients, the higher the levels of illness denial behavior and emotional engagement, the older the patients, the greater the need for emotional support;[40] b. living environment, analyzed by other research (Van Wilder et al, 2021), participants living in the urban environment presented significantly higher scores on the illness denial behavior than those from rural areas;[41] c. relationship status, single participants reported a significantly lower need for emotional support in managing the disease compared to those who were married or in a stable relationship, possibly due to the absence of a partner to provide such support, as noted by Martire & Helgeson;[42] d. present occupational status, the active, employed participants had higher illness denial behavior than those inactive, on disability or age pension. The professional inactive participants presented the need for emotional support significantly higher than those active and employed. Work should be encouraged and supported because it has numerous benefits for the health and well-being of chronically ill people;[43] e. educational status was analyzed in relation to many health variables; participants with higher education (university, postgraduate studies) presented illness denial behavior higher than those with lower education statuses;[44] f. living standard; the best adaptive scores were obtained by the participants with average, and participants with low incomes had significantly higher emotional support needs (similar with Namkoong et al).[45]

Resuming, the categories of patients who resort more to illness denial are young patients, participants living in the urban environment, the active, employed participants, and participants with higher education. The result seems counter-intuitive at first glance; these categories of patients should have compliant treatment behavior and a low denial. Education has a positive impact on health behaviors, the urban environment offers greater opportunities for good health behaviors, and the working participants should actively seek to stay healthy by complying with the treatment to keep the employment.[44,46,47] However, illness denial could be a negative or a positive adaptation mechanism depending on each individual or type of illness.[39] Further studies should investigate whether illness denial is harmful or helpful for these categories of patients in the long term. Also, because these behaviors are counterintuitive in these categories of patients, the multidisciplinary care team should pay more attention to these categories, planning for psychological counseling and more frequent follow-ups.

Fourthly, psychosocial factors with predictive value in adapting to chronic disease were analyzed using multiple regressions. Patients` sex was the factor with the highest predictive value; women recorded a better adaptation to chronic disease than men. The difference in adaptation can also be explained from the perspective of the gender difference between the types of chronic diseases in chronic morbidities.[48] Each chronic disease has its own clinical picture, types of treatments, and impact on patients' lives, and the specificity of gender differences in chronic disease can be the explanation for a better adaptation of women. Women also tend to have more developed emotional coping skills and be more open in expressing their emotions and seeking social support, which may help them better adapt to the challenges of chronic illness.[49–51] Research also suggests that women are more proactive in managing their health and are more likely to follow treatment and participate in rehabilitation programs, which contributes to better adaptation to chronic illness.[52]

The next factor as a predictive value was medication adherence, patients who follow the prescribed treatment regimens are more likely to develop a good adaptation to the disease. There are several possible explanations for this predictive relationship. First, an effective treatment, followed successfully by the patient, can lead to a reduction of symptoms and a greater state of well-being, which facilitates a better adaptation to the disease.[24] Secondly, effective treatment can give the proactive feeling of tackling the disease so that through the treatment the patient will manage to have control over the diseases.[53] Thirdly, it is possible that the constant following of treatment increases the self-

confidence of the patient that he will be able to face the disease and its consequences. Education programs and permanent monitoring can be proposed for compliance with medication administration and a healthy lifestyle.

Also, patients who perceive good social support are more likely to adapt well to the disease. Having social support is important to reduce stress and anxiety about the disease.[25] Sharing emotions with others and receiving unconditional support reduces stress and the likelihood of adaptation to the disease. Social support is also a coping resource through optimistic models of disease reporting, healthy behaviors, and the ability to manage complex situations.[54] A preventive measure to support adaptation to disease can be the implementation of social support measures. Family counseling by health specialists in providing support to the patient or the implementation of social support groups for patients and families can increase the degree of adaptation to the disease.

Patients who have increased self-efficacy to manage chronic disease have a greater chance for a favorable adaptation.[26] Individuals with high self-efficacy are more inclined to adopt and maintain healthy behaviors, such as adherence to treatment and involvement in health-promoting activities, and therefore achieve better adjustment.[55] Patients should be taught and advised how to develop self-management of the chronic disease. The initial accompaniment of the patient immediately after diagnosis with self-management counseling can be a decisive element in increasing self-confidence and adapting to the disease.

Limitations

The size of the sample is relatively small, considering that data were collected from 5 different types of diagnoses. Future studies could be performed on larger groups of patients or different studies on single diagnoses.

The results rely on data gathered with self-reported instruments, and social desirability bias can be suspected, especially on the medical adherence scale. Future studies can use a mixed methodology, adding qualitative insights from interviews with patients and their families.

A specific limitation lies in the absence of objective clinical validation for the self-reported data, as the study relied exclusively on participants' responses without corroboration from medical records or healthcare professionals.

Another limitation of the study is that data were collected from patients within a geographically limited area, which may affect the generalizability of the findings. Future research could address this limitation by including more diverse populations from different regions.

Conclusions

Adaptation to the chronic disease is an important factor in the success of the treatment, the quality of life, and the well-being of the patient. Therefore, adaptation to the disease should be considered in the design of chronic disease management programs. The current study aimed to provide scientific evidence on the psychosocial and clinical factors that determine significant differences and best predict the patients` adaptation to chronic diseases.

Adaptation to chronic disease varies based on the type of diagnosis, with lower adaptation seen in conditions that significantly impact daily life, involve comorbidities, and require frequent treatments. Patients without comorbidities and fewer medications are more prone to illness denial, potentially neglecting treatment. Therefore, even seemingly manageable conditions require careful attention to prevent denial. Patients with comorbidities need greater emotional support, with psychological counseling and support groups being beneficial. Notably, denial behavior is more common among younger, urban, employed, and more educated patients.

The results showed that the most significant predictor of adaptation to the chronic disease is the female gender. Other predictive factors are medication adherence, social support, and self-efficacy in managing chronic disease. Adaptation to chronic disease can be nurtured from diagnosis through prevention programs. These preventive programs may include education programs for disease management, individual and family counseling regarding medication administration, treatment adherence, and adoption of a healthy lifestyle. The inclusion of the patient and his family in social support groups can increase the adaptation to the chronic disease. Additionally, interdisciplinary care teams should tailor interventions based on patients' psychological profiles, self-efficacy levels, and access to support resources in order to optimize long-term outcomes.

Data Sharing Statement

The data supporting this study are available from the corresponding author upon reasonable request.

Ethics Statement

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of Infectious Diseases and Pneumophtisiology Victor Babes Hospital, 5925/05.07.2024. All collected information remained confidential; participation was completely voluntary, and written informed consent was secured from all participants.

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Disclosure

The authors declare no conflicts of interest related to this article.

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