PLS-SEM analysis of factors influencing quality of life in Indonesian patients with chronic illness

Análisis PLS-SEM de los factores que influyen en la calidad de vida en pacientes Indonesios con enfermedades crónicas

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Abstract

Introduction: Chronic illnesses often led to declines in both physical and psychological health, making their management a complex public health concern. These conditions disrupted daily functioning and reduced overall well-being.
Objective: The study aimed to examine the relationship between illness acceptance, physical activity, medication adherence, and quality of life among individuals diagnosed with hypertension, diabetes mellitus, and chronic obstructive pulmonary disease in Pidie regency, Aceh, Indonesia.
Methodology: A cross-sectional design was applied to a sample of 379 adults aged thirty-five to seventy years who had been diagnosed with one of the three chronic conditions. Data were obtained using structured questionnaires that measured physical activity, medication adherence, illness acceptance, and quality of life. Statistical analyses included Pearson correlation and multiple regression to determine the strength and direction of relationships among variables.
Results: Physical activity emerged as the strongest predictor of quality of life, followed by medication adherence, both showing statistically significant associations. Illness acceptance demonstrated a weak positive relationship with quality of life, and demographic characteristics did not show meaningful influence on quality of life outcomes.
Discussion: The findings aligned with previous research indicating that active engagement in physical movement and consistent treatment behaviours were central contributors to improved well-being in chronic illness populations, while psychological acceptance alone had limited independent impact.
Conclusions: The study highlighted the need for nursing interventions that reinforce regular physical activity and consistent medication use while integrating psychosocial strategies to support illness acceptance and enhance overall quality of life.

Keywords

Chronic illness; illness acceptance; medication adherence; physical activity; quality of life.

Resumen

Introducción: Las enfermedades crónicas afectaban tanto la salud física como el bienestar psicológico, lo que convertía su manejo en un desafío importante para los sistemas sanitarios. Estas condiciones reducían la capacidad funcional y deterioraban la calidad de vida de las personas afectadas.
Objetivo: El estudio tuvo como finalidad analizar la relación entre la aceptación de la enfermedad, la actividad física, la adherencia a la medicación y la calidad de vida en pacientes con hipertensión, diabetes mellitus y enfermedad pulmonar obstructiva crónica en la regencia de Pidie, Aceh, Indonesia.
Metodología: Se aplicó un diseño transversal a una muestra de trescientos setenta y nueve adultos de entre treinta y cinco y setenta años diagnosticados con una de las tres enfermedades crónicas. La información se recopiló mediante cuestionarios estructurados que evaluaron actividad física, adherencia al tratamiento, aceptación de la enfermedad y calidad de vida. Se realizaron análisis de correlación y regresión para examinar las relaciones entre las variables.
Resultados: La actividad física fue el factor que mostró la asociación más fuerte con la calidad de vida, seguida por la adherencia a la medicación, ambas con efectos significativos. La aceptación de la enfermedad presentó una relación positiva pero débil, mientras que las características demográficas no mostraron influencia relevante sobre los niveles de calidad de vida.
Discusión: Los hallazgos coincidieron con investigaciones previas que señalaban que la actividad física regular y una adherencia constante al tratamiento eran determinantes clave para mejorar el bienestar de las personas con enfermedades crónicas, mientras que la aceptación de la condición aportaba beneficios más limitados de manera independiente.
Conclusiones: Se recomienda que las intervenciones de enfermería integren estrategias para promover la actividad física y la adherencia terapéutica, además de apoyo psicosocial, con el fin de fortalecer la aceptación de la enfermedad y mejorar la calidad de vida.

Palabras clave

Aceptación de la enfermedad; actividad física; adherencia a la medicación; calidad de vida; enfermedades crónicas.

Introduction

Non-communicable diseases (NCDs) such as hypertension, diabetes mellitus, osteoporosis, cancer, and chronic obstructive pulmonary disease (COPD) constitute a significant global health burden that affects numerous individuals and results in increased healthcare costs and diminished quality of life (QoL) (Somrongthong et al., 2016). This is because chronic illness can disrupt a person's normal activities and functions, leading to frustration and loss of hope in life (Al Qadire et al., 2023). For example, diabetes mellitus is caused by pancreatic β-cells being unable to secrete the hormone insulin, resulting in excessive blood glucose concentrations which can result in glycosylation reactions to proteins which contribute to symptoms of medical complications such as coronary heart disease, retinopathy, nephropathy, cataracts, and neuropathy, thus drastically impacting the health and quality of life (QoL) of sufferers (Nurkhozin & Mulyanti, 2017).

The increasing prevalence of these conditions is primarily attributed to demographic shifts, particularly the growing proportion of elderly individuals. According to the World Health Organization (WHO), by 2020, nearly three-quarters (73%) of deaths worldwide were attributed to chronic diseases, highlighting the critical need for improved management approaches (World Health Organization, 2021). COPD is projected to be the third leading cause of death globally, accounting for more than three million deaths each year (World Health Organization, 2023). It is estimated that over 1.3 billion people worldwide suffer from hypertension, whereas diabetes affects more than 463 million individuals (World Health Organization, 2024). However, according to WHO, more than 50% of people are unaware of their diabetes status (Ramalingam et al., 2025).

According to the 2023 Indonesia Basic Health Research (*Riskesdas*), the prevalence of hypertension in Indonesia has increased to 34.1% of the adult population, a significant rise from 25.8% in 2018. Similarly, the prevalence of diabetes mellitus is also on the rise, with Riskesdas 2021 reporting a figure of 8.5% from 6.9% in 2018. Furthermore, data from the Indonesian Ministry of Health (*Kemenkes*) in 2020 estimated that approximately 10.9% of the adult population has diabetes mellitus. Although specific data for COPD are not always presented separately, they fall under the category of non-communicable diseases that are increasing due to risk factors such as smoking and air pollution (Badan Penelitian dan Pengembangan Kesehatan Kemenkes RI, 2018). These three conditions not only affect individuals' physical health but also contribute to a decline in the overall quality of life (QoL). Patients with chronic diseases often face various challenges, including painful physical symptoms, the need for long-term medication, and the psychological and social impacts of their conditions (Islas-Granillo et al., 2018).

Acceptance of illness serves as a reliable indicator of quality of life (QoL) as patients navigate their health conditions, facilitating the evaluation of life satisfaction and current well-being within a comprehensive framework. Acceptance of illness, acknowledgment, and adaptation to living with chronic conditions are vital to improving the quality of life (QoL) of patients with chronic diseases. Studies indicate that those who accept their illness are more inclined to engage in self-management, adhere to treatment, and have better psychological wellbeing (Firdaus et al., 2021; Zhong, 2024). The extent of illness acceptance in individuals can exert a profound influence on various dimensions of their lives, including physical, mental, emotional, social, and spiritual domains, potentially serving as a psychological barometer for disease adaptation (Chrobak-Bień et al., 2018; Davis et al., 2017). Patients exhibiting low levels of illness acceptance are prone to experiencing more severe negative emotions and decreased adaptability, which may elevate the risk of their premature cessation of prescribed therapeutic regimens (Nowicki et al., 2017; Turen et al., 2021).

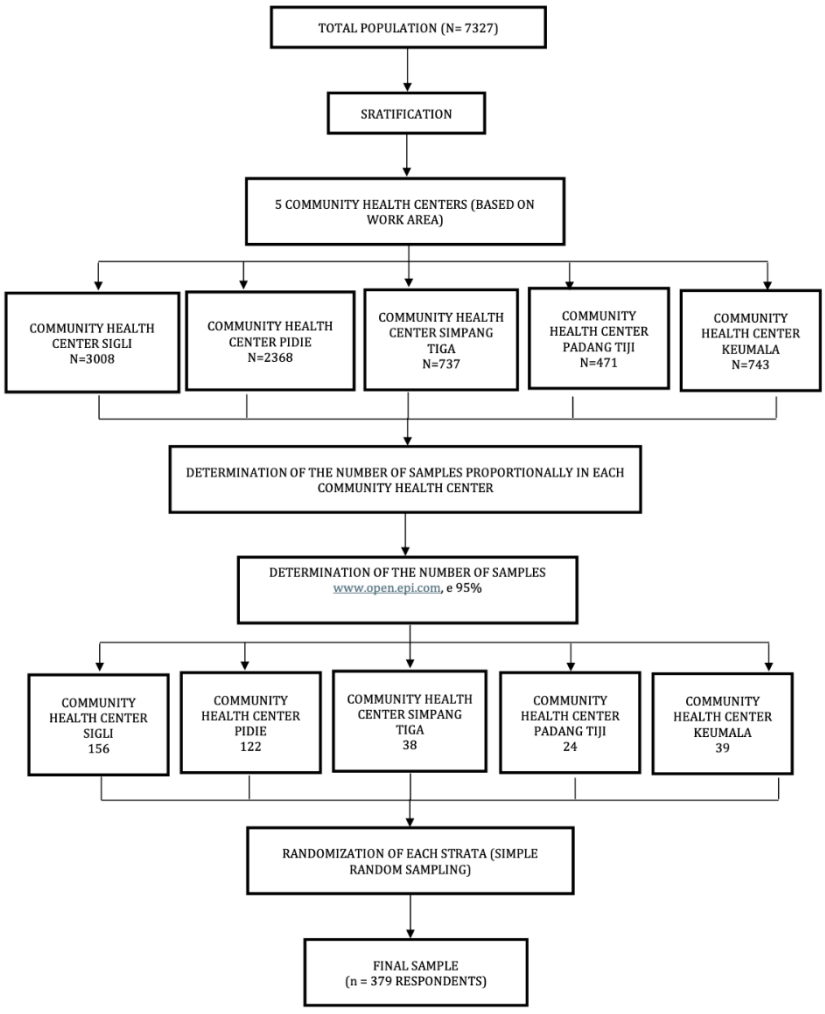
Acceptance can improve coping strategies, that are crucial for managing chronic diseases and can significantly impact health-related quality of life (QoL) (Abdullah et al., 2021). Additionally, interventions promoting illness acceptance may reduce the psychological burden of chronic diseases and improve overall health outcomes (Kastner et al., 2018; Zhong, 2024). Although many studies have addressed illness acceptance in the context of various health conditions, research focusing on the relationship between illness acceptance and quality of life (QoL) among patients with hypertension, diabetes, and COPD remains limited. Therefore, this study aimed to investigate the correlation between the acceptance of illness and the quality of life of patients in Pidie Regency, Aceh Province, Indonesia.

Method

This study used a quantitative, descriptive, and cross-sectional approach to assess the quality of life in patients with chronic diseases, particularly diabetes mellitus, hypertension, and chronic obstructive pulmonary disease (COPD). This cross-sectional study was conducted across five community health centers (*Puskesmas*) in Pidie Regency, Aceh Province, Indonesia, between January and August 2023. In this study, we included subjects diagnosed with noncommunicable conditions, including hypertension, diabetes mellitus, and COPD. The population used in this study was obtained from non-communicable disease surveillance reports from the Health Office of Pidie Regency, Aceh Province, Indonesia (7,323 individuals). A simple random sampling technique was used to identify suitable participants. The OpenEpi program was used to determine the appropriate sample size. Calculations based on a 95% confidence level indicated a minimum of 379 respondents.

The inclusion criteria were as follows: 1) participants aged 35–70 years who resided within the area of the designated community health center serving as the research site and 2) participants who had received a diagnosis of one of the following conditions from a community health center physician: hypertension, diabetes mellitus, or COPD. The exclusion criteria were as follows: 1) individuals who exhibited mental or cognitive impairments that impeded their capacity to provide informed consent or comprehend study-related explanations, 2) individuals who presented with acute or chronic health conditions, such as those in the terminal stages of illness or those with severe mobility limitations, and 3) patients who refused to participate in this study. The sampling stage scheme in this study is as follows (Figure 1):

Figure 1. The sampling stage scheme



Data collection

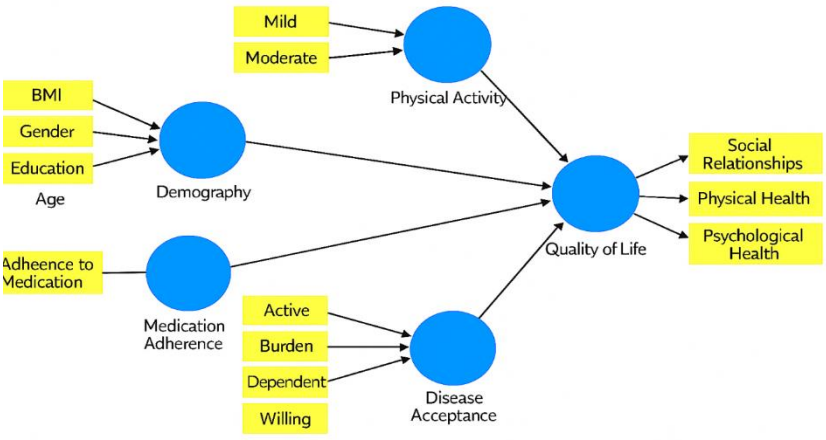
Data collection was conducted through direct interviews with research respondents. An enumerator conducted the interview. Enumerators are nurses who have graduated from the Pidie Regency Government Academy and have worked at the community health centers (*Puskesmas*) in question (namely Padang Tiji Health Center, Sigli City Health Center, PidieTiji Health Center, Pidie Health Center, Simpang Tiga Health Center, and Keumala Health Center). The researcher braafed the enumerator beforehand. The interview lasted for 20 -30 minutes for each respondent.

The questionnaire was divided into five sections. The first focused on collecting demographic data, such as age, sex, occupation, and educational level. The questionnaire included questions on medication adherence, activity, acceptance of illness, and quality of life (QoL). Four standardized questionnaires were administered to participants. I) The Acceptance of Illness Scale (AIS) measures illness acceptance in adults with various medical conditions through eight items detailing the negative impacts of the condition, rated on a 5-point Likert scale from 1 (completely agree) to 5 (completely disagree). The total score (8–40 points) was analyzed, with higher scores indicating better adaptation to the limitations of the illness. Scores from 8 to 40 reflect overall acceptance of the disease. Scores below 20 indicate poor acceptance and adaptation, scores between 20 and 30 indicate moderate acceptance, and scores above 30 indicate high or complete acceptance and adaptation. The reliability of the Polish version was satisfactory, with Cronbach's alpha of 0.85 (Jaworowska & Emocjonalnej, 2001; Krzemińska & Kostka, 2021); II) the physical activity indicator was obtained through the Quick Physical Activity Rating (QPAR), which categorizes activities as heavy, moderate, and light, and the frequency of activities per week (Galvin et al., 2020); III) Medication Adherence was measured using both the standardized 8-item Morisky Medication Adherence Scale (MMAS-8) (Morisky et al., 2008); and IV) the Diabetes Acceptance Scale and Quality of Life Scale (WHOQoL-BREF) evaluates various aspects of physical health, psychological well-being, social relationships, and environment (Group, 1993; Jaracz et al., 2006).

Data analysis

Data analysis was conducted using SmartPLS 3, which included descriptive analysis to examine data distribution and inferential analysis for normalization (Ringle et al., 2024). The data were normalized using z-scores prior to conducting Pearson correlation analysis, followed by parametric tests. This study was approved by the Research Ethics Committee of the Faculty of Nursing at Universitas Syiah Kuala, Banda Aceh, Indonesia. This study was conducted in compliance with the principles of the Declaration of Helsinki. Individuals voluntarily took part in the study, and their identities were kept confidential. Each participant provided written consent, was briefed on the study objectives and procedures, and understood the option to withdraw at any point during the study.

Figure 2. PLS-SEM Schem



Data analysis using PLS-SEM using five variables, namely demographic variables with indicators in the form of body mass index (BMI), gender, education, and age; disease acceptance variables with indicators in the form of active, burden, dependent, and willing; physical activity variables with indicators in the

form of mild and moderate; medication adherence variables with indicators in the form of medication adherence; and quality of life (QoL) variables with indicators in the form of social relationships, physical health, and psychological health (Figure 2).

This study was approved by the Research Ethics Committee of the Faculty of Nursing at Universitas Syiah Kuala, Banda Aceh, Indonesia, with research code 113013150323. This study was conducted in compliance with the principles of the Declaration of Helsinki. Individuals voluntarily took part in the study, and their identities were kept confidential. Each participant provided written consent, was briefed on the study objectives and procedures, and understood the option to withdraw at any point during the study.

Results

Characteristics of the participants. This study involved 379 participants aged 17 to 70 years. The demographics and characteristics of the respondents are listed in Table 1 below.

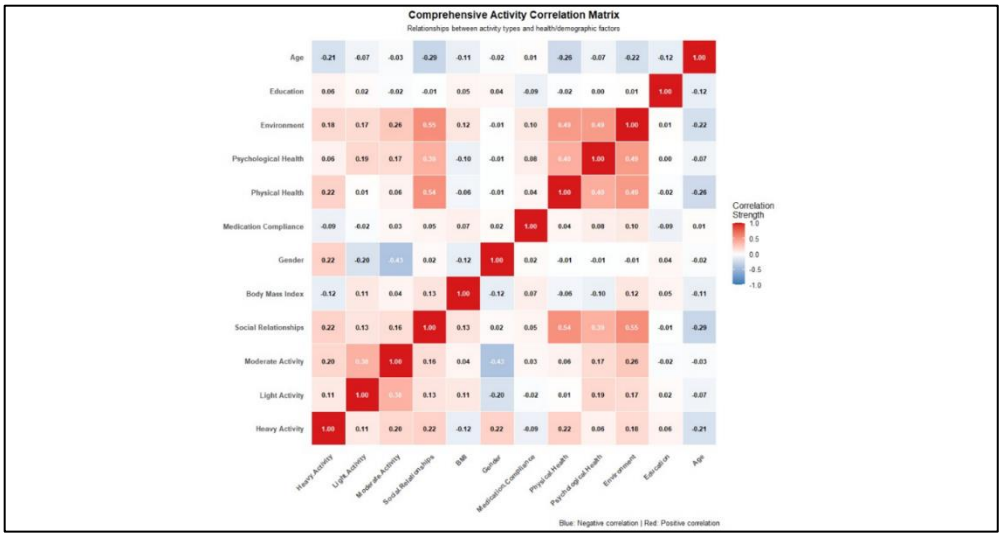
Table 1. Demographic characteristics of the participants (N=379)

Variables	n (%)
Age (years)	54.04±10.81
17-25	2 (0.53)
26-35	11 (2.90)
36-45	79 (20.84)
46-55	118 (31.13)
56-65	108 (28.50)
> 65	61 (16.09)
Gender	
Male	134 (35.36)
Female	245 (64.64)
Occupation	
Employee	378 (99.74)
Unemployed	2 (0.53)
Level of education	
Elementary/Junior High School	194 (51.19)
Senior High School	128 (33.77)
University	58 (15.30)
Illiterate	1 (0.26)
Type of diseases	
Diabetes mellitus	104 (27.44)
Hypertension	266 (70.18)
COPD	9 (2.37)

Values are presented as numbers and percentages (%) or mean±SD.
COPD: chronic obstructive pulmonary disease

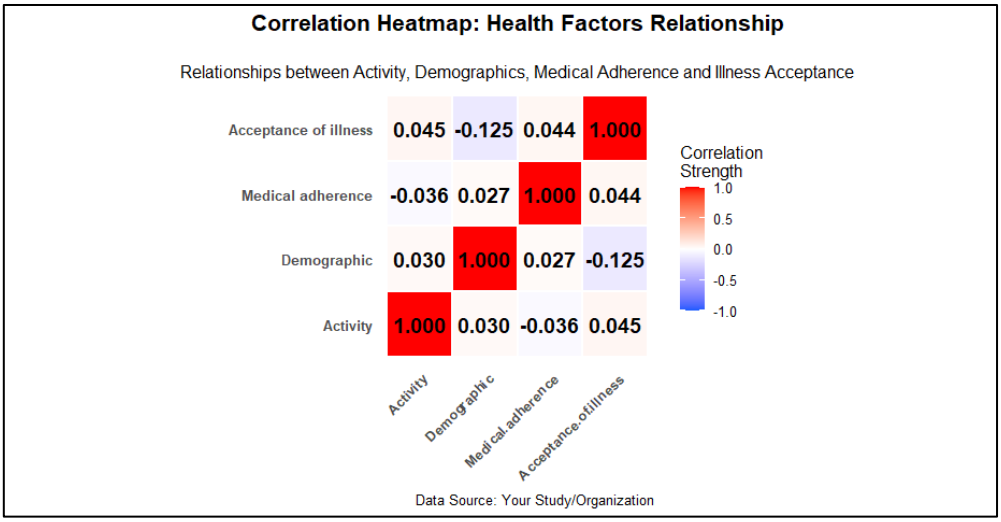
Our findings showed a gender disparity among participants, with 65% women and 35% men. Demographic data revealed that the predominant age group among the respondents was 56–65 years (54.04±10.81). The average age of the participants was 54.04 years with a standard deviation of 10.81 years, indicating that most of the respondents were in the middle to elderly age range, as well as a considerable age variation among the participants. This distribution gives the impression that the study is more followed by the middle-to-upper age population. The most common health condition observed was hypertension, affecting 70% of the study population, followed by diabetes mellitus (27%), and COPD (2%). Employment status data indicated that 99% of the respondents were classified as employed. Regarding educational status, 50% of the participants attained elementary or junior high school. The data revealed that most respondents were middle-aged workers, predominantly suffering from hypertension, coupled with a low educational level that could hinder their health condition management.

Figure 3. Correlation matrix between different indicators across various variables



The heatmap above is a comprehensive activity correlation matrix that displays the Pearson correlation coefficients between various types of activities (such as vigorous, moderate, and light activities) and demographic and health factors (including age, gender, body mass index, and aspects of physical and psychological health) (Figure 3). Red indicates a positive correlation, while blue indicates a negative correlation, with the intensity of the color representing the strength of the relationship (ranging from -1 to +1). For example, there is a relatively strong negative correlation between age and vigorous activity ($r = -0.21$), indicating that the older a person is, the less likely they are to engage in vigorous activity. Moderate activity is highly positively correlated with social relationships ($r = 0.56$), indicating that individuals with good social relationships tend to be more physically active. In addition, the environment exhibits a relatively consistent positive correlation with aspects of health and activity, particularly psychological health ($r = 0.40$) and moderate physical activity ($r = 0.26$). The correlation between physical activities is also high, such as between moderate and light activities ($r = 0.38$). A significant negative correlation was found between gender and social relationships ($r = -0.43$), which may reflect differences in social interaction patterns between men and women in the context of this study.

Figure 4. Correlation Heatmap: Health Factors Relationship



The correlation heatmap above shows the relationship between activity, demographic factors, medical adherence, and disease acceptance. Overall, all correlations shown are very weak (ranging from -0.125 to 0.045), indicating no statistically significant relationship between these variables (Figure 4). The highest positive correlation occurs between activity and disease acceptance (r = 0.045), but its value is minimal and can be practically ignored. In contrast, the strongest negative correlation is observed between demographic factors and disease acceptance (r = -0.125), suggesting a slight tendency for specific demographic characteristics to be associated with lower levels of disease acceptance. However, this relationship is also very weak. Thus, there is no strong association between activity, demographics, medical adherence, and disease acceptance in this dataset.

Table 2. Variables correlated to quality of life (QoL)

Relationship Between Variables	Effect size	*p*-value
Demographics	-0.036	0,635
Medication Adherence	0,103	0,029
Activity	0,308	0,000
Acceptance of Illness	0.055	0,463

Table 2 presents the correlations between various variables and QoL. There was no correlation between demographic characteristics and quality of life (r = -0.036; p = 0.635). In contrast, medication adherence was significantly positively correlated with quality of life (r = 0.103, p = 0.029), indicating that better adherence slightly improved the quality of life. Physica activity had the strongest positive correlation with quality of life (r = 0.308, p = 0.000). However, illness acceptance was not significantly correlated with QoL (r = 0.055).

Discussion

The increasing prevalence of chronic diseases such as hypertension, diabetes mellitus, and COPD significantly challenges individuals and healthcare systems. Managing chronic conditions and comorbidities requires comprehensive care that addresses both the medical and psychosocial aspects, including illness acceptance. Our findings reveal a significant positive correlation between physical activity and health, indicating that individuals who engage in higher levels of physical activity tend to report better social relationships and physical health. This finding is consistent with a previous study that highlighted the significant role of physical activity in improving health-related QoL in individuals with chronic diseases. Alzahrani et al., (2023) found that even minimal levels of physical activity could lead to health benefits, supporting the argument that any degree of physical engagement is more beneficial than complete inactivity. Additionally, Keats et al., (2020) emphasized that insufficient physical activity is linked to a higher prevalence of chronic diseases, reinforcing the importance of maintaining an active lifestyle for both the primary and secondary prevention of NCDs. In addition to its benefits for physical health, physical activity also plays a crucial role in alleviating psychological stress, improving mental health, and enhancing quality of life (Astuti et al., 2024). It allows chronic patients to communicate and socialize with other patients, healthcare professionals, physiotherapists, family, and the general public, fostering a feeling of acceptance from everyone. This strengthens the heart to accept the disease and encourages recovery and the return to normal activities.

However, our findings indicated no significant relationship between physical activity, demographic factors, medication adherence, and acceptance of the illness. Evidence indicates that these factors influence individual health outcomes through various mechanisms. Interestingly, our study found a weak positive correlation between medication adherence and illness acceptance (0.044), which lacks practical implications for interventional strategies. This finding is consistent with the literature, suggesting that while medication adherence is crucial for managing chronic diseases, its direct impact on illness acceptance may be limited (Pozza et al., 2020). In contrast, physical activity emerged as the strongest predictor of QoL, with a correlation coefficient of 0.308, indicating that increased physical activity significantly enhanced QoL. This finding is supported by López Sánchez et al., (2022), who observed that regular physical activity can improve overall health and fitness, thus positively influencing QoL. Physical activity can

impact quality of life by improving side effects associated with chronic disease treatment, such as muscle wasting, fatigue, and depression, by improving physical function, enhancing mood, fostering a sense of well-being, and enhancing quality of life (Astuti et al., 2024). Additionally, the positive effect of medication adherence on QoL, although smaller (0.103), reinforces the importance of adherence to chronic disease management (Alsaqabi & Rabbani, 2020; Hossain et al., 2019; Turen et al., 2021).

Physical activity exerts a significant influence on the quality of life, particularly in the management of chronic diseases. For patients with COPD, exercise can enhance pulmonary function, whereas for those with diabetes, physical activity facilitates the regulation of blood glucose levels (Aschalew et al., 2020; Westerik et al., 2017). Physical activity is useful in stabilizing blood glucose levels for better glycemic control (Ramalingam et al., 2025), because by doing various physical activities, glucose catabolism will occur through glycolysis, the citric acid cycle, as well as electron transport and oxidative phosphorylation to produce adenosine triphosphate (ATP) as an energy source needed for various physical activities (Nurkhozin & Mulyanti, 2017). A previous study highlighted that structured pharmacist-led interventions significantly improve medication adherence and QoL among patients with COPD, reinforcing our findings that increased physical activity leads to better health outcomes (Alocious et al., 2022). The correlation between physical activity and QoL is particularly pronounced in chronic diseases, in which inactivity can exacerbate symptoms and lead to a decline in overall health status.

This study found that activity is a key predictor of an improved quality of life, highlighting its role in managing chronic conditions and daily well-being. The derived equation quantified these relationships: Quality of Life = 0.036 demographics + 0.103 medication adherence + 0.308 activity + 0.055 acceptance of illness. This equation shows that demographics (e.g., age, sex, and socioeconomic status) had a minor impact on quality of life, whereas medication adherence, physical activity, and illness acceptance were more influential. In contrast, a previous study revealed that lower socioeconomic status is associated with poorer QoL outcomes in hypertensive patients, indicating that demographic factors, while less influential in our study, still play a role in the broader context of chronic disease management (Kim & Son, 2022). Other research findings also confirm that health-related quality of life (HRQoL) is not only influenced by the clinical aspects of chronic diseases, but also by the broader social and economic conditions in which the patient lives (Kangas et al., 2025).

Moreover, our findings revealed that while medication adherence positively affects QoL, the effect size is relatively small compared to physical activity. This finding is consistent with previous studies that have demonstrated a dual relationship between medication adherence and health-related quality of life (HRQoL). Moradkhani et al., (2021) reported that medication adherence can initially improve HRQoL by alleviating disease symptoms, but the long-term impact may vary depending on individual circumstances and disease progression. Moradkhani et al., (2021) Similarly, Alsaqabi & Rabbani, (2020) also found limited evidence linking medication adherence to QoL among hypertensive patients.

The role of illness acceptance in influencing QoL was another critical aspect of our findings. Although our study did not find a statistically significant relationship between illness acceptance and QoL, previous studies indicated that higher levels of illness acceptance can lead to better health outcomes. Acceptance and sincerity in accepting chronic illness can minimize or even eliminate unhappiness and psychological stress, thereby improving the quality of life for both men and women suffering from chronic illness (Somrongthong et al., 2016). Moreover, studies have indicated that patients who actively engage in self-management and accept their condition tend to report better QoL outcomes (Chen et al., 2022). This suggests that fostering a positive mindset towards illness can enhance their overall well-being. This is confirmed by research findings that positive measures such as physical activity and social networking can maintain or improve the quality of life of middle-aged and elderly chronic patients, enabling them to enjoy a more active and healthy retirement (Wu et al., 2025). The same applies to children with chronic illnesses. The more positive coping mechanisms children use, including physical activity and socializing with peers as if they were in a normal situation, the greater their preparedness for chronic illness and reduced anxiety levels, significantly improving their quality of life (Hasanah et al., 2025).

When comparing our findings with studies focused on diabetes mellitus, hypertension, and COPD, it becomes evident that while the specific factors influencing QoL may vary, the overarching themes remain consistent. In patients with diabetes mellitus, adherence to medication and lifestyle modifications, including physical activity, are crucial for maintaining QoL (Krzemińska & Kostka, 2021; Turen et al.,

2021). Similarly, COPD patients experience a decline in QoL due to physical limitations and psychological distress, emphasizing the need for interventions that promote physical activity and mental health support (Pazouki Movakher et al., 2021). Jackson et al., (2019) found that depression, which often coexists with COPD, further deteriorates QoL, highlighting the interconnectedness of physical and mental health in chronic disease management.

Conclusions

In conclusion, our findings indicate that physical activity has the strongest positive correlation with quality of life, followed by medication adherence. Illness acceptance showed a positive but weak correlation, whereas demographic factors had a minimal impact on the results. Our study highlights the multidimensional nature of QoL in patients with chronic illness. Physical activity is a key predictor of an improved quality of life, underscoring its essential role in managing chronic conditions and promoting overall well-being. Healthcare providers should prioritize promoting physical activity and ensuring medication adherence to improve patient quality of life. Although illness acceptance had a weaker correlation, it still made a positive contribution and should be included in patient care strategies.

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References

Abdullah, Z. S., El-aziz, A., Mahmoud, N., & Medhat, M. A. (2021). Quality of life among elderly patients with chronic liver diseases at Al-Rajhy Liver Hospital, Assiut University. *Assiut Scientific Nursing Journal*, *9*(24.0), 1–7.

Al Qadire, M., Alhosni, F., Al-Daken, L., Aljezawi, M., Al Omari, O., & Khalaf, A. (2023). Quality of Life and Its Predictors among Patients with Selected Chronic Diseases. *Nursing Forum*, *2023*. https://doi.org/10.1155/2023/6657164

Alocious, A., NM, D., Nandakumar, A., & K. A, A. (2022). Pharmacist Care to Improve Medication Adherence and Quality Of Life of COPD Patients. *Journal of Drug Delivery & Therapeutics*, *12*.

Alsaqabi, Y. S., & Rabbani, U. (2020). Medication adherence and its association with quality of life among hypertensive patients attending primary health care centers in Saudi Arabia. *Cureus*, *12*(12).

Alzahrani, H., Alotaibi, N., Alshahrani, A., Alkhathami, K. M., Alshehri, Y. S., Alzhrani, M., Alshehri, F. H., Almeheyawi, R., Aljulaymi, I. S., & Alsufiany, M. (2023). Self-reported moderate-to-vigorous physical activity: its association with health-related quality of life in a large cohort of people with chronic diseases. *Healthcare*, *11*(23), 3057.

Aschalew, A. Y., Yitayal, M., & Minyihun, A. (2020). Health-related quality of life and associated factors among patients with diabetes mellitus at the University of Gondar referral hospital. *Health and Quality of Life Outcomes*, *18*, 1–8.

Astuti, R. P., Arovah, N. I., & Sukarmin, Y. (2024). The association between physical activity levels and quality of life among patients with chronic kidney disease receiving hemodialysis treatment. *Retos*, *58*, 804–810. https://doi.org/10.47197/retos.v58.106576

Badan Penelitian dan Pengembangan Kesehatan Kemenkes RI. (2018). *Riset Kesehatan Dasar (Riskesdas)*. https://www.litbang.kemkes.go.id/laporan-riset-kesehatan-dasar-riskesdas/

Chen, Y. Y., Lee, M. C., Wu, S. F. V., Liu, Y. M., & Chen, H. M. (2022). Disease knowledge, self-efficacy, and quality of life in patient with hypertensive nephropathy. *Clinical Nursing Research*, *31*(6), 1179–1188.

Chrobak-Bień, J., Gawor, A., Paplaczyk, M., Małecka-Panas, E., & Gąsiorowska, A. (2018). The influence of socio-demographic and clinical factors on the process of acceptance of the disease among patients with ulcerative colitis. *Polish Journal of Surgery*, *90*(6), 6–12.

Davis, E. L., Deane, F. P., Lyons, G. C. B., & Barclay, G. D. (2017). Is higher acceptance associated with less anticipatory grief among patients in palliative care? *Journal of Pain and Symptom Management*, *54*(1), 120–125.

Firdaus, E. K., Widyawati, W., & Effendy, C. (2021). Experience of patients with chronic diseases in complementary medicine and integrative health seeking behaviors. *International Journal of Nursing and Midwifery Science*, *5*(1), 40–48.

Galvin, J. E., Tolea, M. I., Rosenfeld, A., & Chrisphonte, S. (2020). The Quick Physical Activity Rating (QPAR) scale: A brief assessment of physical activity in older adults with and without cognitive impairment. *PLoS One*, *15*(10), e0241641.

Group, WHOQ. (1993). Study protocol for the World Health Organization project to develop a Quality of Life assessment instrument (WHOQOL). *Quality of Life Research*, *2*, 153–159.

Hasanah, I., Nursalam, Lei, C. P., Sari, A. S., Simanjuntak, S. R., Supinganto, A., Zulkahfi, Halid, S., Hadi, I., & Mulianingsih, M. (2025). Factors related to quality of life in children with chronic illness from their own perspectives: A cross-sectional study. *Journal of Pediatric Nursing*, *80*, e218–e227. https://doi.org/10.1016/j.pedn.2024.12.016

Hossain, M. M., Tasnim, S., Sharma, R., Sultana, A., Shaik, A. F., Faizah, F., Kaur, R., Uppuluri, M., Sribhashyam, M., & Bhattacharya, S. (2019). Digital interventions for people living with non-communicable diseases in India: A systematic review of intervention studies and recommendations for future research and development. *Digital Health*, *5*, 2055207619896153.

Islas-Granillo, H., Medina-Solís, C. E., de Lourdes Márquez-Corona, M., de la Rosa-Santillana, R., Fernández-Barrera, M. Á., Villalobos-Rodelo, J. J., Hernández-Martínez, C. T., de Jesús Navarrete-Hernández, J., & Mendoza-Rodríguez, M. (2018). Prevalence of multimorbidity in subjects aged≥ 60 years in a developing country. *Clinical Interventions in Aging*, 1129–1133.

Jackson, D. S., Banerjee, S., Sirey, J. A., Pollari, C., Solomonov, N., Novitch, R., Chalfin, A., Wu, Y., & Alexopoulos, G. S. (2019). Two interventions for patientswith major depression and severe chronic obstructive pulmonary disease: Impact on quality of life. *The American Journal of Geriatric Psychiatry*, *27*(5), 502–511.

Jaracz, K., Kalfoss, M., Górna, K., & Bączyk, G. (2006). Quality of life in Polish respondents: Psychometric properties of the Polish WHOQOL–BREF. *Scandinavian Journal of Caring Sciences*, *20*(3), 251–260.

Jaworowska, A., & Emocjonalnej, M. A. K. I. (2001). *Pracownia Testów Psychologicznych Polskiego Towarzystwa Psychologicznego.* Warszawa, Poland.

Kangas, T., Milis, S. L., Vanthomme, K., & Vandenheede, H. (2025). The social determinants of health-related quality of life among people with chronic disease: A systematic literature review. *Quality of Life Research*, 2501–2511. https://doi.org/10.1007/s11136-025-03976-1

Kastner, M., Cardoso, R., Lai, Y., Treister, V., Hamid, J. S., Hayden, L., Wong, G., Ivers, N. M., Liu, B., & Marr, S. (2018). Effectiveness of interventions for managing multiple high-burden chronic diseases in older adults: a systematic review and meta-analysis. *Canadian Medical Association Journal*, *190*(34), E1004–E1012. https:// doi: 10.1503/cmaj.171391

Keats, M. R., Cui, Y., DeClercq, V., Grandy, S. A., Sweeney, E., & Dummer, T. J. B. (2020). Associations between neighborhood walkability, physical activity, and chronic disease in Nova Scotian adults: An Atlantic PATH cohort study. *International Journal of Environmental Research and Public Health*, *17*(22), 8643.

Kim, H. R., & Son, M. (2022). Associations of socioeconomic status with depression and quality of life in patients with hypertension: an analysis of data from the 2019 Community Health Survey in Korea. *Journal of Preventive Medicine and Public Health*, *55*(5), 444.

Krzemińska, S. A., & Kostka, A. M. (2021). Acceptance of illness and quality of life in patients with type 2 diabetes. *Journal of Education, Health and Sport*, *11*(5), 86–100.

López Sánchez, G. F., Mendiola Olivares, J., & Torres Cantero, A. M. (2022). Association between physical activity and 32 chronic conditions among Spanish adults. *International Journal of Environmental Research and Public Health*, *19*(20), 13596.

Moradkhani, B., Mollazadeh, S., Niloofar, P., Bashiri, A., & Oghazian, M. B. (2021). Association between medication adherence and health-related quality of life in patients with chronic obstructive pulmonary disease. *Journal of Pharmaceutical Health Care and Sciences*, *7*, 1–9.

Morisky, D. E., Ang, A., Krousel-Wood, M., & Ward, H. J. (2008). Predictive validity of a medication adherence measure in an outpatient setting. *The Journal of Clinical Hypertension*, *10*(5), 348–354.

Nowicki, A., Graczyk, P., & Lemanowicz, M. (2017). The acceptance of illness in lung cancer patients before and after surgical treatment. *Polish Journal of Surgery*, *89*(4), 11–15.

Nurkhozin, M., & Mulyanti, S. (2017). *Biokimia: Struktur dan Fungsi Biomolekul*. Andi. Indonesia.

World Health Organization. (2021). *Reducing the burden of noncommunicable diseases through strengthening prevention and control of diabetes*.

World Health Organization. (2023). *Chronic obstructive pulmonary disease (COPD)*. https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd)

World Health Organization. (2024). *Diabetes*. https://www.who.int/news-room/fact-sheets/detail/diabetes

Pazouki Movakher, F., Khanjani, M. S., Hosseini, M. A., Bakhshi, E., & Ebrahimi Barmi, B. (2021). The effects of the home-based self-care program follow-up on re-hospitalization frequency and quality of life in patients with chronic obstructive pulmonary disease. *Iranian Rehabilitation Journal*, *19*(2), 173–180.

Pozza, A., Osborne, R. H., Elsworth, G. R., Gualtieri, G., Ferretti, F., & Coluccia, A. (2020). Evaluation of the health education impact questionnaire (heiQ), a self-management skill assessment tool, in Italian chronic patients. *Psychology Research and Behavior Management*, 459–471.

Ramalingam, P., Sumathi, M., Jothi, J., Hasika, N., Ramanathan, K., Subramanian, S. S., Alhalaiqa, F., Samhan, G., & Abdelhadi, L. (2025). A study to assess the level of resilience and quality of life among patients with diabetes mellitus at selected villages under Rural Health and Training Centre. *Retos, 68,* 1721–1728.https://doi.org/10.47197/retos.v68.114530

Ringle, C. M., Wende, S., & Becker, J.-M. (2024). *SmartPLS 3*. SmartPLS.

Somrongthong, R., Hongthong, D., Wongchalee, S., & Wongtongkam, N. (2016). The influence of chronic illness and lifestyle behaviors on quality of life among older thais. *BioMed Research International*, *2016*. https://doi.org/10.1155/2016/2525941

Turen, S., Yilmaz, R. A., & Gundogdu, S. (2021). The relationship with acceptance of illness and medication adherence in type 2 diabetes mellitus patients. *International Journal of Caring Sciences*, *14*(3), 1824.

Westerik, J. A. M., Metting, E. I., van Boven, J. F. M., Tiersma, W., Kocks, J. W. H., & Schermer, T. R. (2017). Associations between chronic comorbidity and exacerbation risk in primary care patients with COPD. *Respiratory Research*, *18*, 1–17.

Wu, Y., Chen, Z., Cheng, Z., Yu, Z., Qin, K., Jiang, C., & Xu, J. (2025). Effects of chronic diseases on health related quality of life is mediated by sleep difficulty in middle aged and older adults. *Scientific Reports*, *15*(1), 1–9. https://doi.org/10.1038/s41598-025-86420-1

Zhong, W. (2024). Observation on the Effect of Health Education in Health Management of Chronic Disease Patients. *Journal of Biosciences and Medicines*, *12*(2), 294–302.

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