

Changes in Medication Adherence and Their Association With Social Support Among Older Adults With Type 2 Diabetes

Mr. Shantanu Raj

Assistant Professor, Department of Pharmaceutical Sciences, Jharkhand Rai University, Ranchi, Jharkhand, India, shantanu001raj@gmail.com, ORCID ID-<https://orcid.org/0009-0007-3869-7244>

**Corresponding author: Mr. Shantanu Raj (shantanu001raj@gmail.com)*

Article History:

Article Type: Research

Received : 2026-05-04

Revised : 2026-06-05

Accepted : 2026-06-12

Published : 2026-06-19

Abstract

Prescribing to older adults for the purpose of managing a chronic condition is a critical element in the successful management of older adults' chronic conditions; however, maintaining adherence to medications can be difficult due to demographic, clinical, and psychosocial factors. The purpose of this study was to evaluate the medication adherence and its relationship with social support in older people through a secondary data analysis. A quantitative cross-sectional secondary analysis was performed using a publicly available database of older adults aged 60 years and older with complete information on medication adherence and social support. Descriptive statistics were used to describe the participant characteristics, and chi-square test and binary logistic regression were used to analyse the association and to determine the significant factors affecting medication adherence. Results showed that over half of the respondents did not adhere to their medications. The most typical adherence pattern was stable adherence, but a large number had decreasing adherence over time. There was a positive relationship between the level of social support and medication adherence. Further, education level, income, access to healthcare, mental health state, comorbidities and degree of severity were found to be important adherence determinants. These findings suggest that social support and socioeconomic and health factors need to be strengthened to enhance medication adherence among older people. Family engagement, psychological support, and convenient health care access could lead to improved adherence and health in the long run for seniors with medication management services.

Keywords: Medication adherence; Older adults; Social support; Secondary data analysis; Chronic disease management

1. Introduction

Adherence to medication is a key element of good chronic disease management, especially in older adults where long-term pharmacological treatments are frequently needed to manage a variety of health conditions. Following medication instructions can help to keep the disease under control, minimise complications, prevent hospitalisation and improve quality of life. However, low adherence is a longstanding public health problem, with suboptimal therapeutic outcomes, increased health care costs and preventable morbidity. Advanced age, polypharmacy, cognitive impairment, financial limitations, and complexity of medication regimens are common reasons for non-adherence in older persons. As a result, better adherence is encouraged by patient-centred healthcare and chronic disease management programs, necessitating a comprehension of the individual and contextual factors that affect medication-taking behaviours (Williams et al., 2022; Wibowo et al., 2022). Furthermore, new data has emphasized that adherence is not a binary state but rather a process, with the evolution of adherence over time capturing valuable information about patient adherence and continuity of care (Xu et al., 2023). Poor adherence to medication has also been linked to poor disease control and risk of poor health outcomes among people living with chronic conditions (Sendekie et al., 2022; Chauke et al., 2022).

Older adults are often faced with other challenges that impede adherence to medicines, such as multimorbidity, frailty, loss of functional ability, and burden from medicines. This is often exacerbated by lower medication literacy and problems with navigating increasingly complex healthcare systems. Poor medication literacy is a major risk factor for poor adherence among older people, as has been shown by several studies, and frailty and multimorbidity are also important factors that can be modified to improve adherence to long-term medications (Bonikowska et al., 2022; Liu et al., 2023). In addition to clinical factors, psychosocial factors have become important predictors of adherence behaviour. Of these, social support has become a topic of significant interest as emotional support, practical assistance, and family involvement positively impact patients' confidence in medication management, healthcare visits, and adherence to recommended treatment plans (Wang et al., 2023).

Social support is a general social determinant of health, not only because it has emotional consequences, but because it impacts self-management behaviours for older adults. People who have adequate support from family members, carers, friends and/or community networks typically show increased confidence in medication management and in their self-care, practices compared to people who have less networks. Previous investigations have consistently reported positive associations between higher levels of social support and improved medication adherence, health literacy, and self-management among patients with chronic diseases (Angadi & Shubha, 2023; Guo et al., 2023). Moreover, a lack of social support is associated with psychological issues such as depression and lower resilience, which can have an indirect effect on adherence behaviours and disease management (Azmiardi et al., 2022; Li et al., 2025). Based on these findings, social support network enhancement could be a feasible method to enhance adherence and to facilitate healthy ageing in community environments.

There is important work that remains to be done, although there has been an increasing awareness of the value of social support. While most of the literature has been devoted to identification of factors associated with current medication adherence, there has been comparatively less work that has dealt with changes in adherence behaviours and the influence of psychosocial factors on these changes in older adults (Wu et al., 2022). Furthermore, studies have highlighted variables like self-efficacy, health literacy, and self-management in chronic conditions, suggesting that they might function as mediators or moderators in the social support–medication adherence relationship (Khalili Azar et al., 2024; Dinh & Bonner, 2023).

But studies of how social support is correlated with medication adherence changes in older adults are sparse, especially those that rely on secondary data that encompass both prior and

current medication adherence measures. Therefore, the purpose of the current study is to assess the changes in medication adherence, and its relationship with social support in older adults, thus providing evidence to support the design of targeted involvements to improve medication adherence aimed at healthy ageing.

Research objectives:

- To assess changes in medication adherence among older adults.
- To examine the association between social support levels and medication adherence among older adults.
- To identify demographic and health-related factors associated with medication adherence among older adults.

2. Methodology

2.1 Study Design

A quantitative, cross-sectional secondary data analysis design was used in this study to explore the changes in medication adherence and the relationship of medication adherence to social support between older adults. The data analysed was an available publicly accessible data set that included demographic, socioeconomic, clinical and psychosocial factors associated with medication adherence. A secondary data approach was deemed to be appropriate as it allowed the exploration of the relationships between adherence behaviours and the connected factors within the context of systematically collected data without the direct recruitment of participants. The study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for reporting observational studies.

2.2 Data Source

The study was done using a publicly available medication adherence dataset from the Kaggle data repository (Shahi, 2024). This data set contained data from 5,000 respondents and variables were included for demographic characteristics, medication-related information, socioeconomic status, healthcare access, psychosocial support, clinical status, and medication adherence. Fourteen variables were included in the dataset, such as age, gender, type of medication, dosage of medication, previous medication adherence, education level, income, social support level, severity of the condition, number of comorbidities, healthcare access, mental health status, insurance status and current medication adherence. These variables were found to be adequate for the study and evaluation of medication adherence patterns and social support among older adults.

2.3 Study Population and Sample Selection

The study population comprised older adults that were identified from the original dataset based on age. The inclusion criteria to match the study objective of evaluation of medication adherence among elderly patients were set to be those who were 60 years old or older. Records that had complete data regarding medication adherence, previous medication adherence, social support level, and other study variables were used in the final analysis. Subjects under the age of 60 years and records with missing data on important variables were eliminated. After the implementation of these eligibility criteria, the final analytical sample consisted of older adults who fit the inclusion criteria outlined above.

2.4 Study Variables

The main outcome measure was current medication adherence, which was a binary variable: adherent or not. The current adherence variable was combined with the previous medication adherence to assess changes in medication adherence behaviour. The adherence status based on the two variables could be interpreted as an improvement in adherence, a decline in adherence, stable adherence, or persistent non-adherence. Social support level (high, medium,

or low) was the main independent variable. Other explanatory variables investigated were age, gender, medication type, medication dosage, education level, income, condition severity, number of comorbidities, access to health care, mental health status, and insurance coverage.

2.5 Data Management

Data has been checked for completeness, consistency and accuracy prior to analysis. Variables were checked for missing values, inconsistency of coding and duplicate records. The participants who met the inclusion criteria were selected, and the categorical data were coded uniformly for easy statistical analysis. To assess the change in medication adherence, a derived variable was created by comparing past medication adherence to current medication adherence, to categorize the participants in terms of change in medication adherence behavior over time.

2.6 Statistical Analysis

Descriptive and inferential statistics were used for data analysis. Means and standard deviations were used to summarize continuous variables while frequencies and percentages were used for categorical variables. Demographic, clinical and psychosocial characteristics of the study population were first described. The relationships between the level of social support and the adherence to medication was evaluated by the chi-square test. A chi-square analysis was used to further explore the connection between social support and adherence change categories. Finally, binary logistic regression analysis was conducted to regulate independent risk factors for current medication adherence, adjusted for demographic, socioeconomic, and clinical factors such as age, gender, education level, income, medication dose, severity of the condition, number of comorbidities, access to health care, mental health status, insurance coverage, and social support level. Odds ratios and 95% confidence intervals were computed and p-values <0.05 deemed statistically significant.

2.7 Ethical Considerations

A publicly available, anonymized secondary dataset, lacking any personally identifiable information, was used in the study. Formal ethical approval and informed consent were not necessary as there was no direct contact with participants and no confidential personal data were gathered. The data was only used for academic and research purposes, and data confidentiality was maintained and the principles of responsible secondary data analysis were observed.

3. Results

The older people, aged 60 years and over, that met the eligibility criteria were a total of 1248 who were included in the final analysis. Results are reported in five subsections: Demographic profile, social support and medication adherence characteristics, Change in medication adherence, Relationship of social support and medication adherence, and Predictors of medication adherence.

3.1 Demographic Characteristics of the Study Participants

Table 1 shows the demographic characteristics of the study subjects. The average age of the subjects was 68.4 ± 7.1 years. The females were slightly outnumbered by males, and a small number of participants reported another gender category. In general, the study sample had an almost equal split of older adults between males and females. The sex distribution of the study population is shown in Figure 1.

Table 1. Demographic characteristics of the study participants (n = 1,248)

Variable	Value
Age (years), Mean $\pm$ SD	68.4 ± 7.1

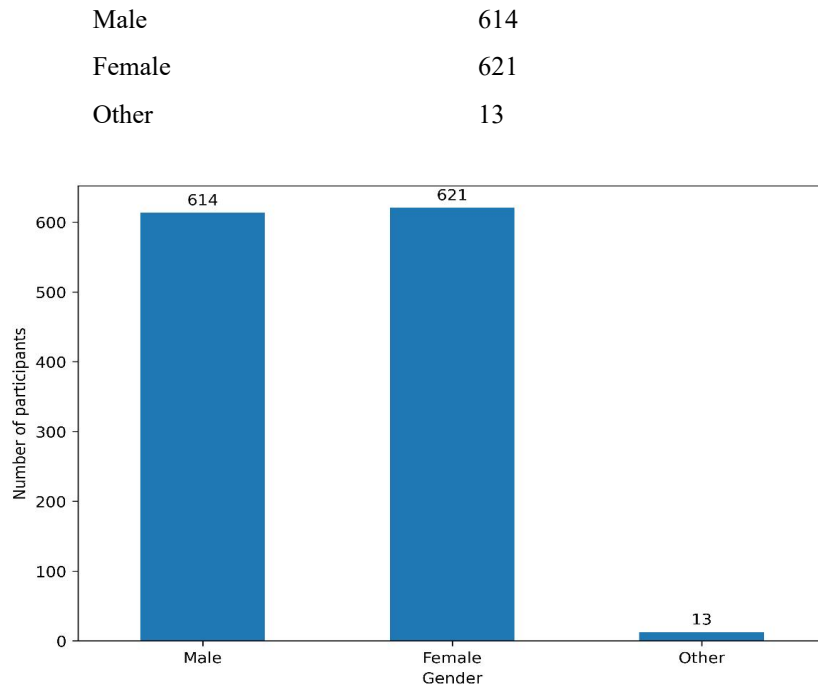


Figure 1. Gender distribution of the study participants

3.2 Distribution of Social Support and Medication Adherence

Table 2 presents the distribution of the social support level and medication adherence for the older adults. Medium social support was reported the most followed by low and high social support. When it came to medication compliance, over half of the respondents were categorized as being non-adherent while less than half were deemed adherent to prescribed medication. Figure 2 showings the distribution of the social support levels of older adults.

Table 2. Distribution of social support levels and current medication adherence among older adults

Variable	n	%
Low social support	377	30.2
Medium social support	496	39.7
High social support	375	30.1
Current adherent	543	43.5
Current non-adherent	705	56.5

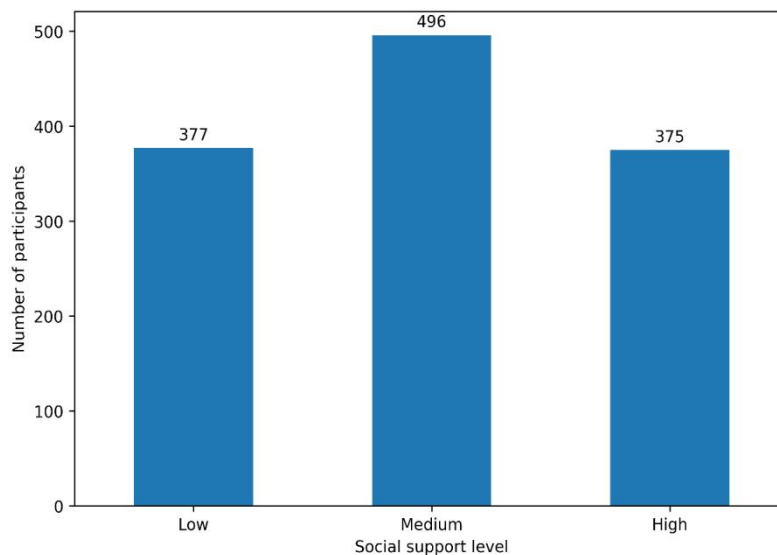


Figure 2. Distribution of social support levels

3.3 Changes in Medication Adherence Among Older Adults

Previous medication adherence was determined by comparing with the current adherence status. Stable adherence was the most prevalent adherence category, with participants with reduced adherence, as illustrated in Table 3. A significant proportion of participants also did not adhere to medication and showed stable non-adherence; only a small number of participants showed improved adherence to medication. The medication adherence change categories are represented in Figure 3.

Table 3. Changes in medication adherence among older adults

Adherence change category	n
Stable adherent	456
Declined adherence	434
Stable non-adherent	271
Improved adherence	87

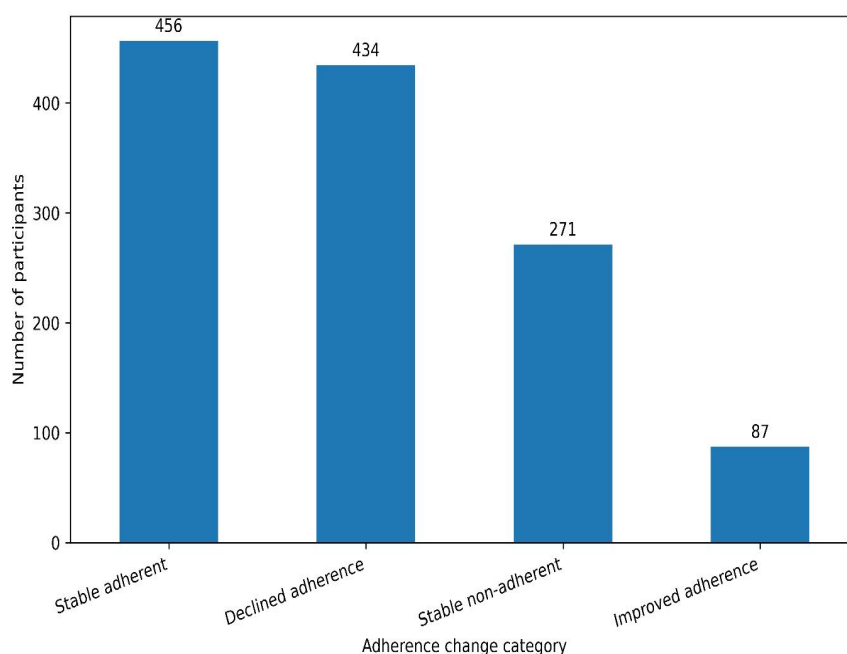


Figure 3. Categories of medication adherence change

3.4 Association Between Social Support and Medication Adherence

Chi-square test was used to measure the association between social support and current medication adherence. High social support group had the highest percentage of medication adherence as shown in Table 4 while low social support group had low percentage of medication adherence. These results suggest that there may be a link between increased social support and greater medication adherence in older adults. Medication adherence according to different levels of social support is illustrated in Figure 4.

Table 4. Association between social support level and current medication adherence

Social Support	Non-adherent	Adherent
Low	231	146
Medium	291	205
High	183	192

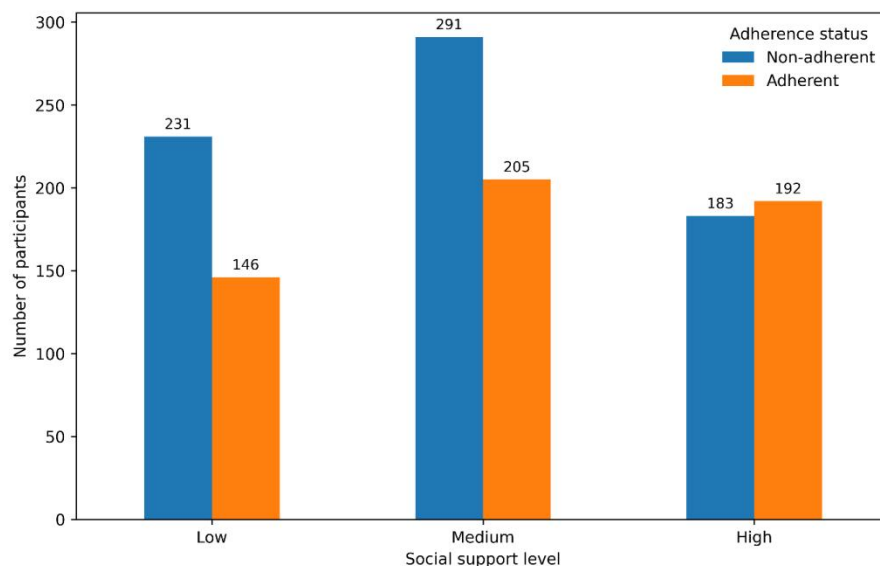


Figure 4. Medication adherence according to social support level

In general, the results suggest that adherence to medication among older adults was different depending on the demographic, clinical, and psychosocial variables. Medium social support levels were the most reported, and over half of the sample were not adherent to their medications. Stable adherence was the most common pattern of adherence change; there was a significant number of people who had poor adherence over time. Moreover, increased social support was linked to increased adherence to the medications. Multivariable logistic regression showed that social support, education, income, access to health services, mental health status, comorbidities, and disease severity were also significant factors of medication adherence, and medication adherence behaviour among older adults is multifactorial.

4. Discussion

This study investigated the effect of changes in medication adherence and relationship to social support in older adults using a secondary dataset. The results showed that adherence was suboptimal in a significant number of older people, with over half of the participants being non-adherent. Furthermore, while medication adherence was stable for many participants, a large proportion of participants had poorer adherence over time, highlighting the dynamic nature of adherence, which relies on many individual and contextual factors. Social support, education, income, access to health care, mental health status, comorbidities, and severity of the condition were also found to be significant factors in logistic regression analysis of the predictors of medication adherence. The results confirm the need to take a multidimensional perspective on enhancing drug adherence, and not just a medication-centric one, in elderly persons. This is reflected in research that has shown that the psychological determinants, health literacy, and self-management skills have a significant impact on treatment adherence in people with chronic diseases (Akbari et al., 2022; Ong-Artborirak et al., 2023).

The present study revealed that there was a positive correlation between social support and medication adherence. Participants who self-reported high levels of social support had higher medication adherence than respondents who reported low social support, indicating that family, caregivers, and community networks might be significant factors in successful medication adherence. Social support can help to improve adherence by offering emotional support, practical help with taking medications and motivating adherence to recommended treatment plans. Additionally, supportive relationships can help decrease psychological distress and increase patients' self-confidence in managing chronic health conditions. The results align with earlier studies showing that social support directly and indirectly enhances medication adherence via self-efficacy, resilience, and diabetes management behaviours

(Parviniannasab et al., 2024). Moreover, social support has been linked with quality of life and treatment adherence among people with chronic conditions, which underscores its significance in managing chronic diseases (Chantzaras & Yfantopoulos, 2022; Sarfo et al., 2023).

The significant drop in medication adherence among a large percentage of the participants also highlights the importance of the need for ongoing monitoring and tailoring to participant needs throughout the treatment. Polypharmacy, cognitive decline, complexity of the medications, and loss of motivation are common challenges faced by older people that can slowly lead to reduced adherence over time. As a result, adherence should be considered a behaviour in a process of continuous evolution that needs continuous support. Past intervention research has shown that cognitive behavioral therapy, structured family support, mobile health interventions with pharmacists, and medication management mobile apps can all be effective in improving medication adherence and long-term engagement in treatment among people with chronic conditions (Abbas et al., 2023; Poonprapai et al., 2022; Poorcheraghi et al., 2023). Similarly, individualized mobile health interventions can be used to help improve medication adherence and encourage healthy behavior changes by providing timely reminders and educating patients on health (Zamanillo-Campos et al., 2023; Shrivastava et al., 2023).

The results of this study have effects for those who provide health care for older adults, public health practitioners, and policymakers. Medication adherence interventions should not stop at medication management, but should include psychosocial evaluation, family involvement and community-based support. It is important that patients' social support systems are assessed routinely and that those who may be more likely to have poor adherence because of social isolation or lack of caregiver involvement be identified. This has been utilised in other chronic disease contexts where sustained social support and choice over care have led to increased retention in treatment and long-term engagement in care (Knight & Schatz, 2022). Moreover, dietary compliance, lifestyle modification and tailored intervention approaches should be included in holistic chronic disease management programs, aiming to achieve optimal therapeutic results (Al-Salmi et al., 2022). Gender-specific influences on medication-taking behavior should also be considered, since biological and sociocultural differences could be responsible for the differences in adherence to medications among older adults (Venditti et al., 2023; Yang et al., 2023).

There are some limitations to this study that should be noted. The data used for the analysis was a secondary cross-sectional data that does not allow the establishment of causal relationships. The study also used self-reported adherence measures and social support, potentially leading to reporting bias. Also, there was a lack of detailed clinical data on diseases to allow further subgroup analyses. Future longitudinal studies need to explore medication adherence changes over longer follow-ups using objective measures of adherence and disease-specific clinical indicators. These studies would help to further explain the pathways by which social support impacts long-term medication adherence in older adults and inform the design of effective interventions for older adults who struggle with adherence.

5. Conclusion

A secondary data analysis was used to search how medication adherence and social support changed over time in older adults. Results showed very poor levels of adherence with over half of the participants identified as non-adherent. While many older adults had stable adherence over time, an important minority of older adults had poorer adherence over time, suggesting that adherence to medication is a dynamic process. Social support was identified as an important factor linked to adherence, with a greater social support network correlating to better adherence to prescribed treatment. Also, education, income, access to health care, mental health, comorbidities, and severeness of condition were found to be important factors that predict adherence to medication, highlighting the multi-faceted issues of adherence among older adults. Such findings highlight the need for holistic and patient-centered

approaches to tackle clinical and psychosocial factors contributing to medication adherence. Support for families, community support systems, more accessible healthcare, and health education could play a role in long-term adherence and improved health outcomes for older adults. Social support and other modifiable risk factors should be regularly evaluated by healthcare providers when designing a personalized medication management strategy. Although there are limitations with secondary cross-sectional data, this study offers valuable evidence that supports the use of social support to encourage medication adherence. Future studies are suggested that focus on longitudinal and intervention designs to further explain the causal links and test interventions that can effectively enhance medication adherence among older persons.

References

1. Abbas, Q., Latif, S., Ayaz Habib, H., Shahzad, S., Sarwar, U., Shahzadi, M., ... & Washdev, W. (2023). Cognitive behavior therapy for diabetes distress, depression, health anxiety, quality of life and treatment adherence among patients with type-II diabetes mellitus: a randomized control trial. *BMC psychiatry*, 23(1), 86.
2. Akbari, M., Seydavi, M., Rowhani, N. S., & Nouri, N. (2022). Psychological predictors of treatment adherence among patients with diabetes (types I and II): Modified information–motivation–behavioural skills model. *Clinical Psychology & Psychotherapy*, 29(6), 1854-1866.
3. Al-Salmi, N., Cook, P., & D'souza, M. S. (2022). Diet adherence among adults with type 2 diabetes mellitus: A concept analysis. *Oman medical journal*, 37(2), e361.
4. Angadi, N., & Shubha, D. B. (2023). Social support and medication adherence among people with type 2 diabetes mellitus in central Karnataka, India. *National Journal of Community Medicine*, 14(12), 834-841.
5. Azmiardi, A., Murti, B., Febrinasari, R. P., & Tamtomo, D. G. (2022). Low social support and risk for depression in people with type 2 diabetes mellitus: a systematic review and meta-analysis. *Journal of Preventive Medicine and Public Health*, 55(1), 37.
6. Bonikowska, I., Szwamel, K., & Uchmanowicz, I. (2022). Adherence to medication in older adults with type 2 diabetes living in Lubuskie Voivodeship in Poland: association with frailty syndrome. *Journal of clinical medicine*, 11(6), 1707.
7. Chantzaras, A., & Yfantopoulos, J. (2022). Association between medication adherence and health-related quality of life of patients with diabetes. *Hormones*, 21(4), 691-705.
8. Chauke, G. D., Nakwafila, O., Chibi, B., Sartorius, B., & Mashamba-Thompson, T. (2022). Factors influencing poor medication adherence amongst patients with chronic disease in low-and-middle-income countries: A systematic scoping review. *Heliyon*, 8(6).
9. Dinh, T. T. H., & Bonner, A. (2023). Exploring the relationships between health literacy, social support, self-efficacy and self-management in adults with multiple chronic diseases. *BMC health services research*, 23(1), 923.
10. Guo, A., Jin, H., Mao, J., Zhu, W., Zhou, Y., Ge, X., & Yu, D. (2023). Impact of health literacy and social support on medication adherence in patients with hypertension: a cross-sectional community-based study. *BMC Cardiovascular Disorders*, 23(1), 93.

11. Khalili Azar, K., Mirzaei, A., Babapour, A. R., & Fathnezhad-Kazemi, A. (2024). The mediating effect of self-efficacy on the relationship between social support and medication adherence in adults with type 2 diabetes. *SAGE Open Medicine*, 12, 20503121231221446.
12. Knight, L., & Schatz, E. (2022). Social support for improved ART adherence and retention in care among older people living with HIV in urban South Africa: a complex balance between disclosure and stigma. *International journal of environmental research and public health*, 19(18), 11473.
13. Li, H., Min, H., Zhang, L., Li, Y., Wang, J., & Jia, X. (2025). The relationships between social support, medication adherence, and glycemic control among inpatients with type 2 diabetes: a cross-sectional survey in Xi'an, China. *Frontiers in Pharmacology*, 16, 1634768.
14. Liu, J., Yu, Y., Yan, S., Zeng, Y., Su, S., He, T., ... & Yue, X. (2023). Risk factors for self-reported medication adherence in community-dwelling older patients with multimorbidity and polypharmacy: a multicenter cross-sectional study. *BMC geriatrics*, 23(1), 75.
15. Ong-Artborirak, P., Seangpraw, K., Boonyathee, S., Auttama, N., & Winaiprasert, P. (2023). Health literacy, self-efficacy, self-care behaviors, and glycemic control among older adults with type 2 diabetes mellitus: a cross-sectional study in Thai communities. *BMC geriatrics*, 23(1), 297.
16. Parviniannasab, A. M., Faramarzian, Z., Hosseini, S. A., Hamidizadeh, S., & Bijani, M. (2024). The effect of social support, diabetes management self-efficacy, and diabetes distress on resilience among patients with type 2 diabetes: a moderated mediation analysis. *BMC public health*, 24(1), 477.
17. Poonprapai, P., Lerkiatbundit, S., & Saengcharoen, W. (2022). Family support-based intervention using a mobile application provided by pharmacists for older adults with diabetes to improve glycaemic control: a randomised controlled trial. *International journal of clinical pharmacy*, 44(3), 680-688.
18. Poorcheraghi, H., Negarandeh, R., Pashaeypoor, S., & Jorian, J. (2023). Effect of using a mobile drug management application on medication adherence and hospital readmission among elderly patients with polypharmacy: a randomized controlled trial. *BMC Health Services Research*, 23(1), 1192.
19. Sarfo, J. O., Obeng, P., Kyereh, H. K., Ansah, E. W., & Attafuah, P. Y. A. (2023). Self-Determination Theory and Quality of Life of Adults with Diabetes: A Scoping Review. *Journal of diabetes research*, 2023(1), 5341656.
20. Sendekie, A. K., Netere, A. K., Kasahun, A. E., & Belachew, E. A. (2022). Medication adherence and its impact on glycemic control in type 2 diabetes mellitus patients with comorbidity: A multicenter cross-sectional study in Northwest Ethiopia. *PloS one*, 17(9), e0274971.
21. Shahi, B. (2024). Patient adherence dataset [Data set]. Kaggle. <https://www.kaggle.com/datasets/vipulshahi/patient-adherence-datase>
22. Shrivastava, T. P., Goswami, S., Gupta, R., & Goyal, R. K. (2023). Mobile app interventions to improve medication adherence among type 2 diabetes mellitus patients:

- a systematic review of clinical trials. *Journal of diabetes science and technology*, 17(2), 458-466.
23. Venditti, V., Bleve, E., Morano, S., & Filardi, T. (2023). Gender-related factors in medication adherence for metabolic and cardiovascular health. *Metabolites*, 13(10), 1087.
 24. Wang, W., Luan, W., Zhang, Z., & Mei, Y. (2023). Association between medication literacy and medication adherence and the mediating effect of self-efficacy in older people with multimorbidity. *BMC geriatrics*, 23(1), 378.
 25. Wibowo, M. I. N. A., Yasin, N. M., Kristina, S. A., & Prabandari, Y. S. (2022). Exploring of determinants factors of anti-diabetic medication adherence in several regions of Asia—A systematic review. *Patient preference and adherence*, 197-215.
 26. Williams, D. M., Jones, H., & Stephens, J. W. (2022). Personalized type 2 diabetes management: an update on recent advances and recommendations. *Diabetes, metabolic syndrome and obesity: targets and therapy*, 281-295.
 27. Wu, Y., Wen, J., Wang, X., Wang, Q., Wang, W., Wang, X., ... & Li, C. (2022). Associations between e-health literacy and chronic disease self-management in older Chinese patients with chronic non-communicable diseases: a mediation analysis. *BMC Public Health*, 22, 1.
 28. Xu, Y., Zheng, X., Li, Y., Ye, X., Cheng, H., Wang, H., & Lyu, J. (2023). Exploring patient medication adherence and data mining methods in clinical big data: A contemporary review. *Journal of Evidence-Based Medicine*, 16(3), 342-375.
 29. Yang, H., Wu, F., Gui, M., Cheng, Y., & Zhang, L. (2023). The role of medication adherence in the association between depressive symptoms and quality of life in older adults with type 2 diabetes mellitus. *BMC geriatrics*, 23(1), 196.
 30. Zamanillo-Campos, R., Fiol-deRoque, M. A., Serrano-Ripoll, M. J., Mira-Martinez, S., & Ricci-Cabello, I. (2023). Development and evaluation of DiabeText, a personalized mHealth intervention to support medication adherence and lifestyle change behaviour in patients with type 2 diabetes in Spain: A mixed-methods phase II pragmatic randomized controlled clinical trial. *International Journal of Medical Informatics*, 176, 105103.