

THE EFFECTS OF BELIEFS AND HEALTH LITERACY ON MEDICATION USE IN CULTURALLY AND LINGUISTICALLY DIVERSE POPULATIONS: A LITERATURE REVIEW

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ABSTRACT

Social and individual factors (beliefs, and health literacy) play a crucial role in health promotion and disease prevention among older culturally and linguistically diverse (CALD) populations. This review examines the recent publications regarding the impact of health beliefs, and health literacy on patients' medication use involving adherence, polypharmacy, and potentially inappropriate medications (PIMs) in older CALD population.

Databases were systemically searched for articles published from inception to January 2025. Thirteen research articles on beliefs and medication use (randomized control trials [n=1], cross-sectional [n=6], observational [n=1], qualitative [n=2], or unknown [n=3]) were obtained from databases. Ten research articles (observational [n=2], cross-sectional [n=2], interview [n=5], randomized control trials [n=1]) were retrieved for health literacy and medication use. Findings were categorized into four themes: (1) beliefs and health promotion and disease prevention, (2) beliefs and medication adherence, (3) beliefs and polypharmacy, and PIM, and (4) health literacy and medication use.

Results highlighted that beliefs and health literacy often negatively influenced medication use and health outcomes. While these findings, were specific to groups like Mexican Americans, African Americans, Indian Americans, and British Bangladeshis, the results emphasize the need for research into the influence of health beliefs, and health literacy on medication use in other older CALD populations. Future studies should address these gaps to develop culturally sensitive, interventions, and support mechanisms.

KEYWORDS

health beliefs, health literacy, CALD, medication adherence, polypharmacy, PIMs, health promotion, disease prevention

INTRODUCTION

The World Health Organization (WHO) projects that by 2050, the global population aged 80 and above will reach 446 million, a significant increase from 126 million in 2015. Currently, 617 million individuals, representing 8.5% of the global population, are aged 65 or older [1]. In this context, the use of medications in older adults continues to rise.

Health beliefs refer to personal perceptions, ideas, and attitudes individuals hold about their health, illness, and the factors that influence health outcomes [2]. It might alternatively be described as those components of the health belief model that offer a well-established theoretical framework for research on the safety and usage of medications [3].

The term "CALD" or "Culturally and Linguistically Diverse" population refers to groups of people who come from various cultural backgrounds and speak languages other than the dominant languages of the region in which they reside in. In Australia, this group includes individuals living in Australia who were born overseas, have parents born overseas, or speak multiple languages other than English. It may also include individuals born overseas but whose first language is English or from non-English-speaking backgrounds [4].

It is believed that social and individual factors like beliefs, and health literacy can impact medication use, and safety in older adults [5, 6]. Older adults from CALD backgrounds (≥ 65 years) present a unique opportunity to benefit from medical advancements. However, they also face a significantly elevated risk of medication-related harm [7]. To combat the growing burden of chronic illness in older CALD population, healthcare is shifting towards proactive strategies like health promotion and disease prevention [8]. Individuals bring their own beliefs, perceptions, and understanding of medicines into their healthcare, which can shape their attitudes toward healthcare and influence their use of medications [9]. A recent study indicates that factors such as ethnicity, socioeconomic status, and other key determinants significantly impact medication use and safety, particularly in cases of polypharmacy among older adults [10]. These factors often contribute to poorer health outcomes.

Given the global diversity of ethnicities, and the known cultural influences on medication beliefs and adherence, further research in suboptimal medicines use in diverse communities is warranted [5]. Such studies could uncover additional influences, such as healthcare access, system barriers, and costs, that may affect medication use and participation in health promotion initiatives [11, 12]. While some research exists on medication use in health promotion and disease prevention among CALD populations [13, 14], there is limited focus on the impact of health beliefs and health literacy on medication use in older CALD adults. This literature review aims to examine the social and individual factors influencing health promotion and disease prevention involving medication use (adherence, polypharmacy, and PIMs) in older CALD populations.

METHODOLOGY

SEARCH STRATEGY

A systematic literature search was conducted across multiple databases (from inception to 2025), including PubMed, Scopus, PsycINFO, CINAHL, and Web of Science, to identify relevant studies. The search terms were developed using a combination of keywords and medical subject headings (MeSH) related to: "health beliefs," "cultural beliefs," "medication perceptions," "attitudes toward medication"; "health literacy," "medication literacy," "health knowledge," "patient education"; "medication use," "medication adherence," "prescription use," "drug utilization," "medication compliance"; "culturally and linguistically diverse populations," "ethnic minorities," "migrant health," "culturally diverse," "limited English proficiency," "non-native speakers". The search was limited to peer-reviewed articles published in English.

SELECTION CRITERIA

Included studies examined health beliefs, health literacy, medication use, or medication-related behaviors in culturally and linguistically diverse populations. Excluded studies comprised of general population studies without a CALD focus;

studies not linking beliefs or health literacy to medication use; editorials, commentaries, case reports, non-peer-reviewed articles, and non-English publications.

STUDY SELECTION

Two reviewers independently screened titles and abstracts, and assessed full-text eligibility. Discrepancies were resolved through discussion.

DATA EXTRACTION

The following data were extracted from eligible studies into a standardised extraction tool. Data extracted included the study and year, number of participants, participant or population, study type, country, and key findings. Table 1 presents the effectiveness of belief-related outcomes associated with health promotion and disease prevention; Table 2 presents the effectiveness of belief-related outcomes associated with medication adherence; and Table 3 presents the effectiveness of health literacy outcomes associated with medication use.

RESULTS

BELIEFS AND HEALTH PROMOTION AND DISEASE PREVENTION AMONGST CALD POPULATIONS.

Health beliefs are significant factor influencing health promotion or disease prevention, particularly among older adults [13, 14, 20]. Eight articles explored the impact of beliefs on health promotion or disease prevention in the CALD population [14-21]. Of these, five were conducted in the United States [14-18], two in the United Kingdom [19, 20], and one in Norway [21] (Table 1).

A cross-sectional study conducted by Rovner & Casten showed that African Americans (67 years ~ mean age) with higher discordant health beliefs and no telehealth use tended to have worsened diabetes than those with less discordant health beliefs and access to telehealth use [14]. For instance, the participants who highlighted, "Medicines worry me" were 0.32 times [CI 0.86, 1.19] as likely to utilize telehealth as those who did not possess that belief [14]. According to this study, African Americans with diabetes frequently have contradictory health beliefs, which are linked to poorer glycemic control, diabetes self-care, and low telehealth utilization. Although these results are limited by the small sample, underpowered analysis, and limited generalizability, they are consistent with earlier research showing poor telehealth use among CALD groups [14].

Brown et al. conducted a study comparing the effects of health beliefs on diabetes management interventions among Mexican Americans aged 35 to 70 years [15]. Participants were divided into two intervention groups: (i) weekly instructional meetings covering topics such as exercise, home glucose monitoring, nutrition, and self-care, and (ii) support group meetings focused on encouraging behavioral changes through goal setting, problem-solving, and food preparation demonstrations. Both groups showed significant improvements in mean health belief scores across subscales, including perceptions of barriers, benefits, control, job impact, and social support [15]. Notably, perceptions of control over diabetes significantly improved in both groups. Participants in the extended program experienced more sustained improvements in health attitudes at 12 months, with the health belief subscale "control" emerging as the strongest predictor of HbA1c levels. The study concluded that culturally competent diabetes self-management education programs effectively promoted positive health beliefs and improved diabetes management outcomes. These results on health beliefs show that the intervention had a dose effect and reinforced the need for continuous interaction through support groups to achieve longer-lasting gains in health beliefs [15].

Moreover, the cross-sectional study on "culture" in diabetes-associated beliefs among high and low-education Indian American, White, and African American older adults (60 years or older) conducted by Grzywacz et al. reported that "ethnicity or culture or belief played a significant role in their diabetes disparities ($p < 0.01$) [16]. The study showed a cultural basis for diabetes-related beliefs among Indian Americans, whites, and African Americans [16]. The limitations of the study must be taken into account while evaluating the research's contributions. Since the sample was not drawn at random and was made up of people from a specific geographic area, it is questionable whether the study's conclusions can be

applied to communities outside of the Southeast United States. People from other ethnic groups with a higher incidence of diabetes, such as Koreans, or Latinos were excluded from the sample [16].

In summary, the intervention to promote the knowledge of individuals is an important action to be taken toward a healthy lifestyle with support from healthcare professionals. Therefore, considering the growing older CALD population, healthcare professionals should prioritize developing interventions to prevent diseases and promote health in this populace. There is a need for further studies to determine the impacts of health beliefs in promoting health and preventing disease for this group.

BELIEFS AND MEDICATION ADHERENCE AMONGST CALD POPULATIONS.

Medication adherence is a significant health-related behaviour that promotes quality of life. A total of five articles reported on the impact of beliefs on medication adherence in the CALD population [22-26]. Of these, two were from the United States [24, 25], two from Australia [23, 26], and one from Finland [23] (Table 2). The National Institute for Clinical Excellence defines medication adherence as the degree to which a patient's behavior aligns with prescribed guidelines [27]. Adherence is critical for effectively managing chronic illnesses and achieving positive health outcomes [28]. However, poor adherence remains a significant challenge for healthcare professionals and a major obstacle to effective treatment [29].

It has been revealed that medication adherence is multifaceted. Cultural and personal beliefs are known psychosocial factors that contribute to medication adherence [30]. According to a recent cross-sectional study by Rees et al. African Americans and Singaporeans of Chinese descent (≥ 65 years; $P < 0.05$; 57%, and 48%, respectively) significantly reported less or poorer medication adherence due to their beliefs, whereas the White Australians and Americans significantly reported greater medication adherence (65% and 67% reported total adherence respectively) [22]. The belief about the treatment of glaucoma was predictive of medication adherence in White Americans and Australian samples ($P < 0.05$) [22]. The relatively small sample size in the African American group may have hampered the groups' comparisons. There might be more variations among the samples that this study did not evaluate. For instance, it's unclear if the samples were similar in terms of visual symptom experience, disease type, or stage. It's also possible that the samples' views of the stigma attached to acknowledging poor adherence vary [22]. Self-reported rates may have been greater in some groups because participants may have been less inclined to acknowledge not taking doses. In conclusion, this study discovered that varied populations had notable variations in adherence rates and attitudes toward glaucoma and its management. Further cross-cultural studies are needed to investigate more into the nature of beliefs held by various groups. Identifying crucial predictors of adherence, particularly in non-western cultures [22].

Eh et al. investigated issues related to culture and other factors affecting the self-management of type 2 diabetes by Chinese immigrants (mean age of 64 years) in Australia [23]. The patients were found to have moderate adherence to medications and poor general self-management practices [23]. A greater level of acculturation predicted good adherence to medications, while stronger beliefs in Traditional Chinese Medicine (TCM) predicted poor adherence to medications [23].

Stronger beliefs in traditional Chinese medicine (TCM) were linked to poorer medication adherence, while higher levels of acculturation were associated with improved adherence [23]. Additionally, diabetes self-management practices were influenced by factors such as gender, education level, and the duration of diabetes. However, this study has several shortcomings. The small sample size limits the findings. The results may not be applicable to the entire Chinese immigrant population in Australia due to potential bias introduced by the convenience sample [23]. Additionally, the Royal Prince Alfred Hospital (RPAH) Diabetes Centre provided the majority of the sample. Nonetheless, there were no appreciable variations in self-management techniques between those sourced from the community and those recruited from the RPAH Diabetes Centre. Furthermore, the results may be an imprecise assessment of self-management performance because they relied on participants' self-reports. Causality cannot be established because this study was cross-sectional [23].

In summary, health beliefs are a significant factor in improving medication adherence. It is essential to assess patients' beliefs during clinical evaluations and incorporate them into strategies designed to enhance adherence. To foster positive attitudes and support therapeutic adherence, patient counseling and education about medical conditions, the importance of treatment, and potential side effects are crucial. Delivering patient-centered care and understanding individual beliefs about medications are vital for clinicians to achieve optimal health outcomes.

BELIEFS AND POLYPHARMACY AND POTENTIALLY INAPPROPRIATE MEDICATION AMONGST CALD POPULATIONS.

The usage of five or more medications in the community and nine or more in aged care is known as polypharmacy [31]. This issue is of considerable concern due to the associated risks and potential mortality, particularly given the growing population of older adults. Over the past decade, factors such as polypharmacy have contributed to the rising prevalence of geriatric syndrome, which refers to clinical conditions in older adults that do not fit into specific disease categories [32]. A patient's beliefs about medication can significantly influence their expectations, adherence, and willingness to discontinue treatment [33].

Conversely, potentially inappropriate medications (PIMs) refer to drugs where the risks outweigh the benefits, especially when safer, more effective alternatives are available [34]. The combination of an aging population, polypharmacy, multimorbidity (three or more chronic conditions), and shifting health beliefs poses a significant challenge for healthcare systems worldwide. The number of prescribed medications remains the primary risk factor for the use of PIMs [35].

Few studies, across a vast range of conditions, have provided insight into the opinions held regarding prescribed medicines among older patients experiencing polypharmacy or PIMs.

In a mixed-method study by Clyne et al. on elderly patients (mean age = 76.5) with polypharmacy, the majority (96.3%) believed their medications were necessary, although 33.9% expressed significant concerns. Positive and negative attitudes coexisted with strong beliefs in medications. It's possible that the doctor-patient relationship shaped attitudes and beliefs about medications, emphasizing the value of solid doctor-patient relationships that must be taken into account while deprescribing [36]. However, this study has few limitations. The topic guide was not designed to expressly address polypharmacy-related difficulties, the sample was restricted to trial participants who might not be representative of all older adults, and the average interview length was shorter (14 minutes) than one might anticipate. A more thorough interview might have yielded a more nuanced perspective, even though the ideas discussed here were clearly drawn from the data [36].

Another study by Reeve et al. investigated individuals' (≥ 18 years; median 71.5) beliefs, attitudes, and experiences concerning polypharmacy, and willingness to deprescribe [37]. The study found that participants were taking an average of ten different prescription and over-the-counter medications, including complementary treatments, both regularly and as needed. More than 60% of respondents felt they were on too many medications, and 92% indicated they would be willing to stop one or more of their prescriptions if possible [37]. Interestingly, factors such as age, the number of medical conditions, or the amount of regular medications did not influence participants' desire to discontinue a medication, with similar results observed for both older and younger individuals [37].

Considering the significant role of beliefs in the use of medications in older adults, it is important to study the impacts of beliefs on older CALD populations with polypharmacy and PIMs. This will help address polypharmacy and PIMs in the context of older CALD adults.

HEALTH LITERACY AND MEDICATION USE AMONGST CALD POPULATIONS.

Health literacy refers to an individual's ability to access, understand, evaluate, and use health information and services to make informed decisions and take appropriate actions for their health and well-being [38]. It plays a crucial role in improving health outcomes (polypharmacy, PIMs, and medication adherence), reducing health disparities, and empowering individuals to participate in their healthcare actively [39-41]. Low patient health literacy has been linked to poor health outcomes, such as higher hospitalisation, diagnosis delays, suboptimal use of preventive interventions, and an increased mortality risk in adults [42]. Only one article reported on the influence of health literacy on medication use in the CALD population (Table 3) [43].

In an observational study by Bauer et al. on health literacy and medication adherence among adults with diabetes (including Asians, African Americans, Latinos, and Filipinos) [43]. Among 2,040 patients newly prescribed an antidepressant, complete health literacy data was available for 1,366 (67%), the majority of whom (72%; n=984) reported having some health literacy limitations. After adjusting for clinical covariates and sociodemographic factors, those with limited health literacy showed significantly poorer medication adherence compared to those without such limitations [43]. In summary, there is a scarcity of research examining the impact of health literacy on medication use within CALD populations, indicating a need for further investigation in this area. The study findings emphasize the vital role of health literacy and education in promoting treatment adherence and improving access to healthcare.

DISCUSSION

The key findings obtained from the various themes of this study underscore the significant impact of health beliefs and health literacy on medication use involving adherence, polypharmacy, and PIMs in older CALD populations. While research highlights the role of cultural and personal beliefs in shaping health behaviours [2, 44], gaps persist in understanding their detailed effects, particularly concerning older adults from CALD populations. Only thirteen articles addressed the evaluations of health beliefs, while ten articles focused on health literacy across different conditions in older CALD populations, however, prospective experiments were lacking. This highlights that evidence on the impact of health beliefs on health promotion and disease prevention remains exploratory.

The first theme, "Beliefs and Health Promotion and Disease Prevention", examines the influence of health beliefs on medication use in treating conditions such as psychosis, diabetes, and hypertension among various populations, including African Americans, Indian Americans, Bangladeshi, Mexican Americans, Nigerians, Taiwanese, and both White males and females. The findings suggest that older CALD adults tend to hold more negative beliefs about their medications compared to White patients. Furthermore, these older CALD patients were more likely to report underuse of medications, reflecting more negative beliefs/attitudes than their White counterparts [14-21].

Understanding the impact of health beliefs on medication usage is essential for healthcare professionals to provide patient-centered and tailored interventions [2]. Moreover, it is important to recognize that patients make rational decisions about their health and take medications based on their knowledge, experience, and beliefs. Therefore, healthcare providers should strive to understand and address patients' concerns and beliefs to improve medication adherence and health outcomes. By acknowledging and integrating diverse health beliefs into treatment plans, healthcare professionals can better support patients in managing their health conditions effectively.

The second theme, "Beliefs and Medication Adherence", explores the extent to which a patient's health beliefs align with and influence established therapeutic guidelines. For example, the participants perceived that diabetes medicines were a significant and efficient part of their therapeutics, and they reported higher comfort in the adherence to their prescribed treatment regimens than in making life-long lifestyle changes. Researchers reported that in this group, participants' evaluations of their condition and treatment, as well as their adherence to diabetes self-care activities, were significantly correlated. Poorer adherence to dietary advice, exercise, blood glucose testing, and foot care were highly significantly linked with Arabic-speaking participants (ASPs) negative beliefs about diabetes [22-26]. Addressing medication adherence, quality of life, and patients' understanding of their diseases is essential for optimizing health outcomes. Future research efforts should focus on implementing targeted interventions, exploring psychosocial factors, and evaluating innovative healthcare delivery models to improve patient care and enhance treatment outcomes. No studies were identified specifically addressing the impact of health beliefs on health promotion and disease prevention among older CALD populations dealing with polypharmacy and potentially inappropriate medications (PIMs); instead, studies focused on older populations more generally.

The fourth theme, health literacy and medication use discusses the impact of health literacy on medication use involving adherence, polypharmacy, and PIMs [42]. According to the result of the studies, health literacy and education play a

crucial role in treatment adherence and access to medical care. Improving health literacy is essential for enhancing medication adherence, managing polypharmacy, and minimizing PIM use, particularly among older CALD populations. Healthcare providers should address the needs of culturally and linguistically diverse populations with tailored educational materials, target CALD patients with low literacy levels, offer additional support to manage complex treatment regimens and ensure CALD patients understand instructions through demonstration or repeat-back techniques. By integrating these strategies, healthcare systems can address disparities, improve adherence rates, and enhance health outcomes in diverse CALD populations. Limited studies were obtained on health literacy on polypharmacy and PIMs amongst CALD populations.

Despite the positive outcomes, this review has shown that the relationship between health beliefs and health literacy in the older culturally and linguistically diverse (CALD) population is not sufficiently incorporated into health-related discussions or healthcare planning. This highlights the need for greater cultural competency in healthcare to address the unique needs of these populations. Older CALD individuals are predominantly positioned as patients rather than represented among healthcare professionals or policymakers, limiting their influence on the system.

Individuals from CALD backgrounds face challenges navigating health and social systems due to limited English proficiency, cultural differences, and several interrelated socioeconomic factors, including lower income, education, and access to resources. These barriers are compounded by the prevalence of chronic conditions and multimorbidity, which require tailored and equitable approaches to care. To effectively prevent and manage diseases, health systems, and services must prioritize culturally relevant health treatments that align with diverse health beliefs and practices.

Acculturation also plays a significant role, as varying levels of adaptation to the dominant culture influence health beliefs, health literacy, and interactions with healthcare providers. Addressing these disparities requires practical measures such as ensuring the availability of multilingual health resources and on-site interpreters, which are critical for overcoming language and cultural barriers and enhancing healthcare access.

Given the limitations of existing studies on the influence of health beliefs and health literacy on promoting health and preventing disease in the older Korean population, it is essential to build on available findings and focus on strategies that guide future research. More studies are needed to explore how cultural health beliefs, health literacy, socioeconomic status, and acculturation intersect and influence health promotion and disease prevention in this demographic. These insights can inform culturally competent healthcare planning and ultimately improve health outcomes for older CALD populations.

CONCLUSION

This review highlights how health beliefs and health literacy can affect medication adherence, polypharmacy, and potentially inappropriate medications, as well as health promotion and disease prevention. However, no direct findings were available regarding the impact of health beliefs on polypharmacy and PIMs in older CALD populations. Also, there is a scarcity of research examining the impact of health literacy on medication use within CALD populations. Addressing these concerns underscores the need for further research in this area. Future studies should focus on examining the effects of health beliefs on health promotion and disease prevention in older CALD populations to better understand their support needs and inform the development of targeted interventions.

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References

1. Wan H, Daniel G. Worlds older population grows dramatically. National Institutes of Health [internet]. 2016 Mar–, Available from: <https://www.nih.gov/news-events/news-releases/worlds-older-population-grows-dramatically>
2. Misra, R., Kaster, E.C. Health Beliefs. In: Loue, S., Sajatovic, M, editors. Encyclopedia of Immigrant Health. Springer, New York, NY: Springer; 2012. P. 1-6. Available from: https://doi.org/10.1007/978-1-4419-5659-0_332
3. Alyafei A, Easton-Carr R. The Health Belief Model of Behavior Change. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan–. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK606120/>
4. Australian Institute of Health and Welfare. Reporting on the health of culturally and linguistically diverse populations in Australia: An exploratory paper, catalogue number PHE 308, AIHW, Australian Government [internet]. 2022. Available from: <https://www.aihw.gov.au/reports/cald-australians/reporting-health-cald-populations/summary>
5. Shahin W, Kennedy GA, Stupans I. The impact of personal and cultural beliefs on medication adherence of patients with chronic illnesses: a systematic review. Patient Prefer Adherence. 2019;13:1019-1035.
6. Lee YM, Yu HY, You MA, et al. Impact of health literacy on medication adherence in older people with chronic diseases. Collegian. 2017;24(1):11-8. doi: 10.1016/j.colegn.2015.08.003.
7. Australian Institute of Health and Welfare. Older Australians [Internet]. Canberra: Australian Institute of Health and Welfare, 2024 [cited 2025 Apr. 6]. Available from: <https://www.aihw.gov.au/reports/older-people/older-australians>
8. Davodi SR, Zendehtalab H, Zare M, Behnam Vashani H. Effect of health promotion interventions in active aging in the elderly: A randomized controlled trial. Int J Community Based Nurs Midwifery. 2023; 11(1):34-43.
9. Andersson Sundell K, Jönsson AK. Beliefs about medicines are strongly associated with medicine-use patterns among the general population. Int J Clin Pract. 2016; 70(3):277-285.
10. Assari S, Bazargan M. Race/Ethnicity, Socioeconomic Status, and Polypharmacy among Older Americans. Pharmacy (Basel). 2019;25;7(2):41.
11. Chauhan A, Walton M, Manias E, et al. The safety of health care for ethnic minority patients: a systematic review. Int J Equity Health. 2020;19(1):118.
12. Pham TTL, Berecki-Gisolf J, Clapperton A, et al. Definitions of Culturally and Linguistically Diverse (CALD): A literature review of epidemiological research in Australia. Int J Environ Res Public Health. 2021;18(2):737.
13. Han HR, Kim KB, Kang J, et al. Knowledge, beliefs, and behaviors about hypertension control among middle-aged Korean Americans with hypertension. J Community Health. 2007;32(5):324–42.
14. Rovner BW, Casten RJ. Discordant health beliefs and telehealth use in African Americans with diabetes. J Am Geriatr Soc. 2021;69(6):1684–6.
15. Brown SA, Blozis SA, Kouzekanani K, et al. Health beliefs of Mexican Americans with type 2 diabetes: The Starr County border health initiative. Diabetes Educ. 2007;33(2):300–8.
16. Grzywacz JG, Arcury TA, Ip EH, et al. Cultural basis for diabetes-related beliefs among low- and high-education African American, American Indian, and white older adults. Ethn Dis. 2012;22(4):466–72.
17. Piette JD, Heisler M, Harand A, et al. Beliefs about prescription medications among patients with diabetes: variation across racial groups and influences on cost-related medication underuse. J Health Care Poor Underserved. 2010;21(1):349–61.
18. Weller SC, Baer RD, Pachter LM, et al. Latino beliefs about diabetes. Diabetes Care. 1999;22(5):722–8.
19. Akinlua JT, Meakin R, Freemantle N. Beliefs about hypertension among Nigerian immigrants to the United Kingdom: A qualitative study. PLoS ONE. 2017;12(1):e0170025.
20. Greenhalgh T, Helman C, Chowdhury AM. Health beliefs and folk models of diabetes in British Bangladeshis: A qualitative study. BMJ. 1998;316(7136):978–83.
21. Berg AO, Barrett EA, Nerhus M, et al. Psychosis: clinical insight and beliefs in immigrants in their first episode. Early Interv Psychiatry. 2018;12(1):87–96.

22. Rees G, Chong XL, Cheung CY, et al. Beliefs and adherence to glaucoma treatment: A comparison of patients from diverse cultures. *J Glaucoma*. 2014;23(5):293–8.
23. Eh K, McGill M, Wong J, et al. Cultural issues and other factors that affect self-management of type 2 diabetes mellitus by Chinese immigrants in Australia. *Diabetes Res Clin Pract*. 2016;113:64–72.
24. Soones TN, Lin JL, Wolf MS, et al. Pathways linking health literacy, health beliefs, and cognition to medication adherence in older adults with asthma. *J Allergy Clin Immunol*. 2017;139(3):804-809.
25. Krauskopf K, Federman AD, Kale MS, et al. Chronic Obstructive Pulmonary Disease Illness and Medication Beliefs are Associated with Medication Adherence. *COPD*. 2015;12(2):151-64.
26. Alzubaidi H, Mc Narmara K, Kilmartin GM, Kilmartin JF, Marriott J. The relationships between illness and treatment perceptions with adherence to diabetes self-care: A comparison between Arabic-speaking migrants and Caucasian English-speaking patients. *Diabetes Res Clin Pract*. 2015;110(2):208-17.
27. National Collaborating Centre for Primary Care (UK). *Medicines Adherence: Involving Patients in Decisions About Prescribed Medicines and Supporting Adherence* [Internet]. London: Royal College of General Practitioners (UK); 2009 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK55438/>
28. Danielson E, Melin-Johansson C, Modanloo M. Adherence to treatment in patients with chronic diseases: From alertness to persistence. *Int J Community Based Nurs Midwifery*. 2019;7(4):248–57.
29. Simpson SH, Eurich DT, Majumdar SR, et al. A meta-analysis of the association between adherence to drug therapy and mortality. *BMJ*. 2006;333(7557):15.
30. Kasahun AE, Sendekie AK, Mekonnen GA, et al. Impact of personal, cultural and religious beliefs on medication adherence among patients with chronic diseases at university hospital in Northwest Ethiopia. *Patient Prefer Adherence*. 2022;16:1787–803.
31. Wang KN, Tan ECK, Ilomäki J, et al. What is the best definition of polypharmacy for predicting falls, hospitalizations, and mortality in long-term care facilities? *J Am Med Dir Assoc*. 2021;22(2):470-1.
32. Pazan F, Wehling M. Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. *Eur Geriatr Med*. 2021;12(3):443-452. doi: 10.1007/s41999-021-00479-3.
33. Shahin W, Kennedy GA, Stupans I. The consequences of general medication beliefs measured by the beliefs about medicine questionnaire on medication adherence: A systematic review. *Pharmacy (Basel)*. 2020;8(3):147.
34. Seyed Kazem Malakouti, Javad Javan-Noughabi, Negar Yousefzadeh, et al. A systematic review of potentially inappropriate medications use and related costs among the elderly. *Value Health Reg Issues*. 2021;25:172–9.
35. Tian F, Chen Z, Zeng Y, et al. Prevalence of use of potentially inappropriate medications among older adults worldwide: A systematic review and meta-analysis. *JAMA Netw Open*. 2023;6(8):e2326910.
36. Clyne B, Cooper JA, Boland F, et al. Beliefs about prescribed medication among older patients with polypharmacy: A mixed-methods study in primary care. *Br J Gen Pract*. 2017;67(660):e507–18.
37. Reeve E, Wiese MD, Hendrix I, et al. People's attitudes, beliefs, and experiences regarding polypharmacy and willingness to deprescribe. *J Am Geriatr Soc*. 2013;61(9):1508–14.
38. Baker DW. The meaning and the measure of health literacy. *J Gen Intern Med*. 2006 Aug;21(8):878-83. doi: 10.1111/j.1525-1497.2006.00540.x.
39. Miller TA. Health literacy and adherence to medical treatment in chronic and acute illness: A meta-analysis. *Patient Educ Couns*. 2016 Jul;99(7):1079-1086. doi: 10.1016/j.pec.2016.01.020.
40. Gillespie R, Mullan J, Harrison L. Attitudes towards deprescribing and the influence of health literacy among older Australians. *Prim Health Care Res Dev*. 2019 Jun 20;20:e78. doi: 10.1017/S1463423618000919.
41. Eman R, Ieva S, Julie E.S, et al. The influence of beliefs and health literacy on medication-related outcomes in older adults: A cross-sectional study. *Res Soc Admin Pharm*. 2025. <https://doi.org/10.1016/j.sapharm.2024.10.003>.
42. Baker DW, Wolf MS, Feinglass J, et al. Health literacy and mortality among elderly persons. *Arch Intern Med*. 2007;167(14):1503-9. doi: 10.1001/archinte.167.14.1503.
43. Bauer AM, Schillinger D, Parker MM, et al. Health literacy and antidepressant medication adherence among adults with diabetes: the diabetes study of Northern California (DISTANCE). *J Gen Intern Med*. 2013;28(9):1181-7. doi: 10.1007/s11606-013-2402-8.
44. Chia LR, Schlenk EA, Dunbar-Jacob J. Effect of personal and cultural beliefs on medication adherence in the elderly. *Drugs Aging*. 2006;23(3):191-202.

APPENDIX

TABLE 1. SELECTED STUDIES ASSESSING THE EFFECTIVENESS OF BELIEF OUTCOMES ASSOCIATED WITH HEALTH PROMOTION AND DISEASE PREVENTION

S/N	Study and year	N	Participant/Population	Study type	Country	Key findings	Refs.
	Rovner & Casten, 2021 [14]	94	African American with diabetes at Thomas Jefferson University Hospital	Cross-sectional. (Telehealth)	USA	When compared to participants with fewer beliefs (n=45; 47.7%), those with two or more beliefs (n=49; 52.3%) reported worse diabetic self-care (lower DSC-R scores, 47.0 [SD 14.9] vs 55.5 [16.9], respectively)	[14]
	Brown et al, 2007 [15]	216	Mexican Americans with type 2 diabetes	Randomized controlled trial (Questionnaires)	USA	Each subscale Mean health belief scores increased for both intervention groups. For participants in the lengthier, extended program, improvements in health attitudes lasted longer at 12 months. The HbA1c levels at 12 months, were most significantly predicted by the health belief subscale control.	[15]
	Grzywacz et al, 2012 [16]	593	African American, American Indian, and White males and females from eight (8) South Central North Carolina Counties	Cross-sectional (Questionnaires)	USA	There is significant overlap in the ideas about diabetes held by African Americans, American Indians, and White people. Diabetes beliefs were most comparable in the areas of "symptoms" and "consequences" as opposed to "causes" and "medical management."	[16]
	Piette JD et al, 2010 [17]	806	African American and White diabetes patients	-	USA	The patients with diabetes have negative beliefs about their use of medications. The African Americans portrayed more negative beliefs/attitudes than White patients and were more	[17]

likely than White patients to report underuse related to the use of medicine (19% versus 13%; p5.02)

Weller SC et al, 1999 [18]	161	Latino adults from four diverse communities: Hartford, Connecticut; Edinburg, Texas; Guadalajara, Mexico; and rural Guatemala	-	USA (Hartford, Connecticut, Edinburg, Texas; Guadalajara, Mexico; and rural Guatemala)	The CCM facilitated the assessment of cultural beliefs regarding diabetes and its management. Above all, the cultural beliefs of Latinos about diabetes were concordant with the biomedical model. Higher acculturation, greater educational attainment, and higher diabetes prevalence were linked with greater cultural knowledge about the disease condition "diabetes".	[18]
Akinlua, Meakin, Freemantle, 2017 [19]	27	Immigrants of Nigerian descent	Qualitative (Interview)	UK	The meaning of the term "hypertension", "perceptions" of causation", "effects of hypertension", and "perceptions of treatment" were the four main categories in which participants stated their beliefs. The survey showed a variety of hypertension beliefs that included both conventional and culturally defined notions.	[19]
Greenhalgh et al, 1998 [20]	40	Diabetes patients from Bangladesh living in Britain and non-Bangladesh controls were gathered from primary care,	Qualitative (Semi-structured interviews, focus groups, and pile sorting exercise	UK	There was minimal indication of a fatalistic or deterministic approach [attitude] to prognosis. The majority of the informants appeared to be quite motivated to change their diet and follow the treatment plan. Barriers to behavior change that structural and material were at least as significant as those that were "cultural".	[20]

Berg et al, 2018 [21]	277	40 first- and 40 second-generation immigrants from Europe, America, and Oceania (n = 37), Asia including Turkey (n = 28) or Africa (n = 15) with Psychosis	Cross-sectional (Structured-clinical interview)	Norway	First-generation immigrants were less likely than the reference group to recognize psychotic symptoms [odds ratio (OR) 2.9; Wald = 8.977, d.f. 1, P = 0.003] and to perceive hospitalization (OR 5.2; Wald = 20.388, d.f. 1, P = 0.001) and treatment by a psychiatrist (OR 4.9; Wald = 6.609, d.f. 1, P = 0.01)] as less helpful. More alternative explanations were held by immigrants from Asia (OR 0.3; Wald = 6.567, d.f. 1, P = 0.010). In the reference group, there were noticeably greater correlations between clinical insight and socio-cultural values.	[21]
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NOTE: SD, standard deviation; CI, confidence interval; DSCI-R, diabetes self-care inventory-revised; HbA1c, haemoglobin-A1c; TB, tuberculosis; d.f., degrees of freedom; CCM, cultural consensus model

TABLE 2. SELECTED STUDIES ASSESSING THE EFFECTIVENESS OF BELIEF OUTCOMES ASSOCIATED WITH MEDICATION ADHERENCE

S/N	Study and year.	N	Participant/Population	Study type	Country	Key findings	Refs
	Rees G et al, 2014 [22]	475	White Americans, African Americans, white Australians, and Singaporeans of Chinese descent with glaucoma	Cross-sectional	Helsinki, Finland	White Australians and Americans significantly reported greater adherence (65.0%, 67.0% reported total adherence to medication) than Singaporeans or African Americans (57.0%, 48.0%, respectively; P<0.05). The belief about the treatment of glaucoma was predictive of medication adherence only in White Americans and Australian samples (P<0.05).	[22]
	Eh K et al, 2016 [23]	139	Australian Chinese immigrants in Royal Prince Alfred Hospital (RPAH), Sydney with T2D	Cross-sectional	Australia.	The patients were found to have low adherence to medications and poor general self-management practices. 24% of participants reported a belief shame surrounding the diagnosis of their diabetes. The participants (13.7%) reported incorporating traditional Chinese medicine into their treatment.	[23]

					Greater level of acculturation predicted good adherence to medications, while stronger beliefs in traditional Chinese medicine predicted poor adherence to medications.	
Soones TN et al, 2017 [24]	433	Hispanic and non-Hispanic blacks from hospital and community practices in New York, New York, and Chicago, Illinois with asthma		New York, and Chicago, Illinois, USA	The participants (36%) with less health literacy, had more beliefs and were more likely to have asthma misconception (P<.001), and its medications. Health literacy had an indirect (P = .002; β = 0.033), and direct (P < .001; β = 0.089) effect on medication adherence mediated by concerns. Neither illness beliefs (P = .143; β = 0.007), nor medication necessity (P = .138; β = 0.044;) indicated a mediational role between medication adherence and health literacy	[24]
Krauskopf K et al, 2015 [25]	188	Black and Hispanic adults from outpatient primary care and pulmonary clinics, the inpatient service of the Mount Sinai Medical Center (East Harlem, New York), Northwestern Memorial Faculty Foundation (Chicago, Illinois), and Mercy Family Health Center (Chicago, Illinois)	Observational	New York, and Chicago, USA	The nonadherent participants were more likely to be Hispanic or black (p= 0.001), had lesser years of formal education (p= 0.002), and to have reported minimal income (p= 0.002). In adjusted analyses, the concerns on COPD medicines predicted non-adherence independently (CI: 0.36-0.75, odds ratio: 0.52, 95%). In unadjusted comparisons, the participants with non-adherence reported having high concern about their COPD (Cohen's d = 0.43; p = 0.011), higher concerns about COPD medications (Cohen's d = 0.81; p < 0.001), and more emotionally affected by the disease (Cohen's d = 0.54; p = 0.001).	[25]
Alzubaidi et al, 2015 [26]	701	Caucasian English-speaking people and Arabic-speaking immigrants with T2D	Cross-sectional (Questionnaire)	Australia	Participants' evaluations of their condition and treatment, as well as their adherence to diabetes self-care activities, were significantly correlated. Poorer adherence to dietary advice, exercise, blood glucose testing, and foot care were highly significantly linked with ASPs' negative beliefs about diabetes.	[26]

When compared to ESPs, ASPs had significantly lower adherence to all facets of diabetes self-care, including dietary practices (P = <0.01; 95% confidence interval (CI) = -1.17, -0.84), exercise and physical activity (P = <0.001, 95% CI -1.14, -0.61), blood glucose testing (P = <0.001) and foot-care (P = <0.001). Only 11.2% of the ESPs had doubts regarding diabetes treatments that had been prescribed, compared to 52.8% of ASPs. 88.3% of ESPs, respectively, did not take their medication as directed.

NOTE: ASP, Arabic speaking participants; COPD, chronic obstructive pulmonary disease; CI, confidence interval

TABLE 3. SELECTED STUDIES ASSESSING THE EFFECTIVENESS OF HEALTH LITERACY OUTCOMES ASSOCIATED WITH MEDICATION USE.

S/N	Study and year	N	Participant/Population	Study type	Country	Key findings	Ref.
[43]	Bauer et al, 2013	1366	Individuals (Asians American, African American, Caucasian, Latino, Filipino, multiracial, and others/unknown) from specialty center or clinic	Observational study	USA	Patients [Asian American (n=69, 7.0%), African American (n=177, 18.0%), Caucasian (n=264, 26.8%), Filipino (n=72, 7.3%), Latino (n=250, 25.4%), Multiracial (n=113, 11.5%), other/unknown (n=39, 4.0%)] with health literacy limitations had significantly poorer adherence after adjusting for clinical covariates and sociodemographic, compared to those with no limitations, whether measured as early non-persistence (46 % versus 38 %, p < 0.05), non-persistence at 180 days (55 % versus 46 %, p < 0.05), or NPMG (41 % versus 36%, p < 0.01)	43

NOTE: NPMG, new prescription medication gap