



Determinants of Treatment Adherence Among Older Adults with Multimorbidity: A Literature Review Grounded in Social Cognitive Theory, the Health Action Process Approach, and Structural Equation Modelling

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Abstract: *Multimorbidity — the coexistence of two or more chronic conditions within an individual — has emerged as one of the most pressing public health challenges of the twenty-first century, particularly among ageing populations. Treatment adherence, a critical determinant of therapeutic outcomes, remains persistently suboptimal in this population, with non-adherence rates ranging from 25% to 76% across diverse clinical contexts. This literature review synthesises current evidence on the determinants of treatment adherence among older adults with multimorbidity through the integrative lens of three complementary theoretical frameworks: Social Cognitive Theory (SCT), particularly its Triadic Reciprocal Determinism (TRD) component; the Health Action Process Approach (HAPA); and Structural Equation Modelling (SEM). Empirical evidence on key psychosocial determinants — including medication literacy, inner strength, social support, and self-efficacy — is critically examined. The review identifies significant gaps in the existing literature, particularly the scarcity of studies that simultaneously model these constructs within a unified framework applied specifically to older adults with multimorbidity, and proposes directions for future research and intervention development.*

Keywords: Multimorbidity, Older adults, Treatment adherence, Social cognitive theory, Health action process approach, Structural equation modelling, Medication literacy, Self-efficacy

1. Introduction

The global demographic transition towards ageing populations has fundamentally reshaped the epidemiological landscape of chronic disease. As life expectancy continues to rise and medical advances enable longer survival with chronic conditions, an increasing proportion of older adults now live with multiple coexisting diseases — a phenomenon termed multimorbidity (Shao et al., 2024; Hafezparast et al., 2021). A recent systematic review estimates the global prevalence of multimorbidity at 37.2%, with more than half (51.0%) of adults aged 60 years and above affected (Chowdhury et al., 2023). In China, prevalence among older adults ranges from 61.7% to 86.3% depending on the population studied (Niu Yuxin et al., 2023), reflecting both the scale of the challenge and the heterogeneity of measurement approaches employed.

Within this context, treatment adherence — defined as the extent to which a patient's health-related behaviours align with medical recommendations (Haynes et al., 1979) — has emerged as a pivotal yet persistently underachieved therapeutic target. The World Health Organization has noted that improving adherence to existing treatments yields greater health benefits than developing new therapeutic approaches (Sabaté, 2003). Yet, non-adherence rates among chronic disease patients in developed countries average 50%, with even higher rates reported in developing nations (Wickersham et al., 2011). For older adults with multimorbidity, the challenge is compounded: managing multiple conditions requires simultaneous adherence to complex medication regimens, dietary modifications, lifestyle changes, and follow-up schedules, often in the presence of cognitive decline, polypharmacy, and limited health literacy (Liu Yujie & Yang Fangying, 2023).

Understanding the determinants of treatment adherence in this population requires more than single-factor models. The complexity of adherence behaviour — shaped simultaneously by individual cognition, social environment, and behavioural patterns — demands theoretically grounded, multidimensional frameworks. This review therefore adopts three complementary theoretical lenses: Social Cognitive Theory (SCT), with its core construct of Triadic Reciprocal Determinism (TRD); the Health Action Process Approach (HAPA), which provides a stage-based model of behaviour change; and Structural Equation Modelling (SEM), which offers the methodological capacity to test complex causal pathways involving latent and observed variables simultaneously. Through these frameworks, the review critically examines empirical evidence on four key psychosocial determinants — medication literacy, inner strength, social support, and self-efficacy — and identifies gaps that warrant further investigation.

2. Conceptual Evolution of Multimorbidity

The concept of multimorbidity has undergone substantial conceptual refinement since its inception. The term "comorbidity" was first introduced by Feinstein (1970) to describe "any additional disease that may have been present or developed during the clinical course of investigating patients with a primary disease." This definition, while foundational, was inherently disease-centric, privileging a single "primary" condition over all others. Kraemer (1995) subsequently subdivided comorbidity patterns into three non-random types — epidemiological, clinical, and familial — acknowledging that co-occurring conditions may exist independently or in combination. Hwang et al. (2001) further refined the concept, proposing that comorbidity refers to "the coexistence of an index disease with at least one chronic condition," while Bonavita et al. (2008) emphasised the quantitative dimension, defining comorbidity as the association of two distinct diseases in the same patient occurring at a rate higher than expected — thereby shifting attention from actual to expected prevalence.

The limitations of the comorbidity construct — particularly its implicit hierarchy of diseases — prompted Brandlmeier (1976) to propose the term "multimorbidity," defined as "a person suffering from multiple acute or chronic diseases simultaneously." Van den Akker et al. (1996) subsequently provided clearer definitional boundaries: comorbidity should retain Feinstein's original meaning, while multimorbidity encompasses "the coexistence of multiple chronic or acute diseases and other health conditions within an individual." Boyd et al. (2010) offered a particularly influential concise definition: "the coexistence of two or more chronic conditions, none of which need be more important than the others" — a formulation that underscores the patient-centred orientation essential for clinical practice and research.

The World Health Organization (2008) further broadened the conceptualisation by defining comorbidity as "the coexistence of two or more diseases, encompassing both chronic conditions and acute illnesses alongside functional impairments," explicitly shifting focus from diseases to the patient as a whole. This patient-centred perspective has been endorsed by bodies including the American Academy of Medical Sciences and the UK's National Institute for Health and Care Excellence (NICE). In the biomedical field, multimorbidity is typically defined as the coexistence of two or more chronic conditions (Porter et al., 2020), while the concept of Multiple Chronic Conditions (MCC) — defined by the US Department of Health and Human Services as an individual having two or more chronic health conditions simultaneously (Satariano et al., 2013) — serves a related but distinct administrative and epidemiological function.

Notably, the multimorbidity concept extends beyond mere numerical co-occurrence. Alfredsson and Alexander (2016) emphasised that due to the insidious onset, diversity, persistence, and slow progression of chronic diseases, the proportion of individuals with multimorbidity continues to rise, and the interactions between coexisting conditions — including competing treatment demands, drug–drug interactions, and cumulative symptom burden — create a clinical reality qualitatively different from the sum of individual diseases. This complexity is particularly pronounced among older adults, whose physiological reserves are diminished and whose capacity to manage complex regimens is constrained by cognitive, sensory, and functional limitations (Zheng et al., 2020).

3. Theoretical Frameworks

3.1 Social Cognitive Theory and Triadic Reciprocal Determinism

Social Cognitive Theory (SCT), proposed by Bandura (1986, 1997), provides the foundational theoretical architecture for understanding treatment adherence among older adults with multimorbidity. At its core lies Triadic Reciprocal Determinism (TRD) (Bandura, 1989), which posits that human behaviour emerges from the dynamic, bidirectional interaction of three determinants: personal factors (cognitive, affective, and biological), behaviour (self-regulation and action), and environmental factors (social, physical, and institutional contexts). Critically, these three components do not carry equal weight in every situation, and their relative influence varies across individuals and contexts (Benight et al., 2018).

The causal mechanisms within TRD operate in three directions. First, personal factors influence behaviour: an individual's knowledge, attitudes, and self-efficacy shape health-related actions, while behaviour feedback subsequently reshapes cognition. Second, behaviour and environment mutually influence each other: the environment enables or constrains behaviour, while behaviour modifies the environment. Third, environment and personal factors interact reciprocally: social support, healthcare access, and cultural norms shape individual beliefs, while individuals actively select and modify their environments. For older adults with multimorbidity, TRD offers a particularly apt framework because

it captures the simultaneous influence of intrapersonal resources (e.g., medication literacy, self-efficacy), environmental resources (e.g., social support, healthcare system characteristics), and behavioural patterns (e.g., self-monitoring, regimen complexity) on adherence outcomes.

Empirical support for TRD in health behaviour contexts is substantial. Islam et al. (2023) systematically reviewed 39 primary care interventions grounded in SCT and demonstrated that programmes centred on self-efficacy — supplemented by outcome expectancy, observational learning, and behavioural regulation — significantly increased moderate-to-vigorous physical activity, enhanced dietary behaviours, and markedly improved medication adherence among chronic disease patients. The authors further identified a chained pathway — "self-efficacy → behavioural intention → actual behaviour" — through which social support and environmental cues amplify intervention effects. Zhang Junjun et al. (2024) confirmed in a randomised controlled trial among 96 older adult hypertensive patients that SCT-based family support interventions enhanced health literacy, self-efficacy, and family support, producing significant blood pressure reductions. Guo Ying (2024) similarly demonstrated that family support interventions based on SCT effectively improved chronic disease health literacy, self-care capabilities, and family support levels among 60 older adult hypertensive patients.

However, a critical limitation of existing SCT-based research is its predominant focus on single chronic disease populations — hypertension, diabetes, or HIV — with few studies applying the TRD framework to older adults with multimorbidity specifically. Moreover, the simultaneous modelling of medication literacy, social support, and inner strength within a single TRD framework remains unexplored, representing a significant gap this review seeks to highlight.

3.2 The Health Action Process Approach

The Health Action Process Approach (HAPA), proposed by Schwarzer (1992) and refined in 2008, offers a complementary stage-based and continuum-based model of health behaviour change that is particularly relevant to understanding the intention-behaviour gap in treatment adherence. Unlike stage theories that assume discrete transitions, HAPA integrates stage-based and continuum-based elements, providing a detailed psychological account of how motivational intentions translate into sustained action (Scholz et al., 2008; Zhao et al., 2020).

HAPA delineates three sequential phases. The motivational phase involves the development of behavioural intention through risk perception, outcome expectancy, and behavioural self-efficacy. The volitional phase encompasses planning processes — behavioural plans (specifying when, where, and how to act) and coping plans (strategies for overcoming barriers) — which mediate between intention and action. The action maintenance phase denotes the translation of motivation into sustained behaviour through concrete plans and ongoing self-regulation. A distinctive feature of HAPA is its emphasis on two types of self-efficacy operating at different stages: task self-efficacy (confidence in initiating behaviour) and coping self-efficacy (confidence in maintaining behaviour despite setbacks) (Schwarzer et al., 2011).

International applications of HAPA have demonstrated its validity across diverse health behaviours. Asgari et al. (2021) confirmed its utility in predicting medication adherence among rheumatoid arthritis patients. HAPA-guided interventions for alcohol cessation, smoking cessation, and physical exercise have shown notable efficacy (Joveini et al., 2020). Among type 2 diabetes patients, Ranjbaran et al. (2020) identified behavioural intention, self-efficacy, and coping plans as significant determinants of medication adherence in a cross-sectional study of 734 patients, recommending the comprehensive HAPA model for intervention design.

Domestically, HAPA has been applied to older adult hypertensive patients (Zhang Xiangjing et al., 2021), diabetic patients (Qian Jinyan et al., 2023), and patients with sarcopenia (Sha Wenna et al., 2023), all demonstrating improvements in self-efficacy and health behaviour adherence. Notably, however, no domestic studies to date have applied HAPA to older adults with multimorbidity, representing a clear avenue for theoretical extension.

3.3 Structural Equation Modelling as a Methodological Framework

While SCT and HAPA provide theoretical explanations of adherence determinants, Structural Equation Modelling (SEM) offers the methodological capacity to test these theoretical models empirically. SEM encompasses a family of statistical techniques — including confirmatory factor analysis, path analysis, and latent growth models (Kaplan, 2008; Kline, 2023) — that can simultaneously estimate measurement models (relating latent constructs to observed indicators) and structural models (specifying causal relationships among constructs). A key advantage of SEM is its capacity to isolate measurement error from latent variables (Hancock, 2003), thereby yielding more accurate estimates of the relationships between unobservable constructs such as self-efficacy, inner strength, and social support.

In SEM, variables are classified as either exogenous (independent) or endogenous (dependent), and as either observed (directly measurable, e.g., age, gender) or latent (indirectly reflected through multiple indicators, e.g., intelligence, interpersonal skills) (Liu, 1999; Skrondal, 2011). This dual classification yields four variable types: exogenous observed, exogenous latent, endogenous observed, and endogenous latent — a taxonomy that enables researchers to model complex causal pathways involving both directly measured and theoretically inferred constructs.

Recent applications of SEM in adherence research have yielded compelling findings. Mao Weiwu et al. (2023) constructed an SEM among 924 older adult chronic disease patients, confirming that health literacy directly enhances social support and indirectly reduces frailty through the pathway "social support → depression → frailty." Huang et al. (2021) found among 483 type 2 diabetes patients that social support and self-efficacy exert both direct and indirect influences on medication adherence. Guo et al. (2023) employed SEM among 1,697 hypertensive patients in Shanghai, revealing that social support accounted for 65.5% of the total effect on adherence and exerted an indirect effect through health literacy, confirming a chained mediating pathway of "social support → health literacy → adherence." These studies collectively demonstrate SEM's capacity to quantify the net effects of individual–environment interactions on health outcomes, providing a methodological paradigm for integrating multiple adherence determinants within a single analytical framework.

4. Empirical Evidence on Key Determinants

4.1 Medication Literacy as a Foundational Determinant

Medication literacy — defined as an individual's ability to access, communicate, understand, calculate, and process specific medication information to make informed decisions ensuring safe and effective medicine use (Pouliot et al., 2018) — has emerged as a foundational determinant of treatment adherence among older adults with multimorbidity. The concept, first introduced by the American Medical Association in 1999 and refined through international consensus (Gentizon et al., 2022), encompasses not only the capacity to read medication labels but also the ability to manage situations involving inappropriate dosing, adverse reactions, and regimen complexity.

Empirical evidence consistently demonstrates a robust positive association between medication literacy and adherence. Jiang Min (2020) conducted a cross-sectional study of 239 patients with brittle diabetes, finding a significant positive correlation between medication literacy and adherence ($r = 0.682$, $P < 0.01$), with medication literacy emerging as an independent protective factor that jointly explained 81% of adherence variance alongside socioeconomic variables. Coskun and Bagcivan (2021) confirmed among 200 chronic disease patients in Turkey that for every one-point increase in medication literacy, the likelihood of achieving "high adherence" significantly increased ($OR = 1.35$, $P < 0.01$).

Among older adults with multimorbidity specifically, Wang et al. (2023) assessed 328 community-dwelling older adults using the Chinese Medication Literacy Scale and the Chinese Morisky Medication Adherence Scale, reporting an average adherence score of merely 4.85 ± 1.57 (on an 8-point scale), with 75.9% exhibiting low adherence. After controlling for confounders, each one-standard-deviation increase in medication literacy was associated with a direct increase of 0.268 units in adherence. Similarly, Du N. N. & Xia, Y. (2023) found among 287 acute ischaemic stroke patients that medication literacy remained an independent predictor of secondary prevention medication adherence after controlling for age, education, income, and adverse reaction history ($OR = 1.42$, $P < 0.01$). Zhang Mingjun et al. (2025) reported that among 195 hospitalised older adult coronary heart disease patients, each unit increase in medication literacy was associated with approximately 76% higher probability of good adherence ($OR = 1.76$, $P < 0.01$).

These findings collectively suggest that medication literacy operates as a proximal determinant of adherence: patients who accurately comprehend dosage, timing, and adverse reaction information are better equipped to execute medication regimens correctly, thereby reducing missed doses, overdosing, and unauthorised discontinuation. The scarcity of studies integrating medication literacy with adherence specifically among older adults with multimorbidity — as opposed to single-disease populations — represents a notable gap in the current evidence base.

4.2 Self-Efficacy as a Central Mediating Mechanism

Self-efficacy, defined by Bandura (1977) as an individual's conviction in their capacity to execute behaviours necessary to produce specific outcomes — colloquially, the belief that "I can do it" (Tang Dongling et al., 2010) — occupies a central position in both SCT and HAPA as a key mediator between knowledge/intention and actual behaviour. The construct encompasses two dimensions: efficacy expectations (subjective assessment of one's capability) and outcome expectations (projections regarding the consequences of action) (Sun Xiaomin & Xue Gang, 2008).

The Chronic Disease Self-Management Programme, pioneered at Stanford University, exemplifies the practical application of self-efficacy theory, using enhanced self-efficacy as an intermediary mechanism to improve health behaviours and quality of life. Empirically, Wang et al. (2023) demonstrated that health education grounded in behavioural goal attainment effectively enhanced self-efficacy, significantly improving medication adherence among 134 older adult diabetic patients. Yang et al. (2024) found positive correlations between inner strength, self-efficacy, and adversarial coping patterns among 191 peritoneal dialysis patients, suggesting that self-efficacy serves as a bridge between psychological resources and health behaviour.

Within the HAPA framework, self-efficacy operates differently across behaviour change stages: task self-efficacy drives intention formation, while coping self-efficacy sustains behaviour maintenance (Schwarzer et al., 2011). This stage-specific operation has important implications for intervention design — programmes targeting older adults with multimorbidity may need to strengthen different self-

efficacy components at different phases of the adherence process. Recent domestic research has progressively revealed self-efficacy's mediating role between medication literacy, social support, and treatment adherence (Wang et al., 2023), though the precise nature of these mediation pathways in multimorbidity populations remains insufficiently characterised.

4.3 Social Support as an Environmental Resource

Social support, conceptualised since the 1970s (Murphy, 1977; Cobb, 1976; Cohen, 1985), encompasses the various forms of assistance individuals receive from their social networks, including subjective support (perceived availability of support), objective support (actual support received), and support utilisation (active help-seeking behaviour) (Xiao Shuiyuan, 1994). For older adults with multimorbidity, social support functions as a critical environmental resource within the TRD framework, providing not only emotional comfort and practical assistance but also behavioural reminders, disease knowledge, and motivation to adhere to complex regimens.

Recent empirical evidence underscores the magnitude of social support's influence. Salinas-Rehbein et al. (2025) examined 200 type 2 diabetes patients in Chile using SEM and found that higher perceived social support correlated with greater adherence to healthy diets, regular foot care, and increased physical activity, with structural equation modelling confirming direct effects on multiple adherence behaviours. Pan et al. (2021) reported among 453 hypertensive patients in Xi'an that each additional unit of social support score increased adherence probability by 25% (OR = 1.25, $P < 0.01$), with social resource support (from community health institutions and professional teams) exhibiting the strongest correlation with adherence — stronger even than kinship or nuclear family support.

Guo et al. (2023) provided perhaps the most comprehensive evidence to date, employing SEM among 1,697 hypertensive patients in Shanghai to demonstrate that social support accounted for 65.5% of the total effect on medication adherence and exerted an indirect effect through health literacy, confirming a dual-benefit mechanism: social support directly reinforces adherence while simultaneously enhancing the cognitive resources (health literacy) that underpin it. The authors identified a chained mediating pathway of "social support → health literacy → adherence," suggesting that interventions targeting social support may yield multiplicative benefits by simultaneously strengthening environmental and intrapersonal determinants.

These findings carry significant implications for intervention design: establishing multidimensional social support networks encompassing family, friends, community, and healthcare systems should be a priority strategy for improving treatment adherence among older adults with multimorbidity in China, where family-centred care remains culturally salient but community-based support infrastructure is still developing.

4.4 Inner Strength: An Emerging Positive Psychology Construct

Inner strength, introduced in the early 1990s through research on female cancer patients (Roux et al., 2001), denotes the inherent potential within an organism to resist external pressures when confronting life's adversities. The construct encompasses five dimensions — Resilience, Creativity, Courage, Connection, and Flexibility — that interact synergistically to form a positive force originating from within (Jia Lin, 2015). Dingley (2003) identified four attributes among older adult female chronic disease patients: drawing strength from the past, doing one's best, receiving support from others, and cultivating spiritual beliefs. Boman et al. (2015) characterised inner strength as humanity's core energy

source for overcoming illness, while Ha et al. (2021) demonstrated it as a latent pathway influencing symptom experiences among breast cancer patients.

Empirically, Jiang Min (2020) found a highly positive correlation between inner strength and treatment adherence ($r = 0.682$, $P < 0.01$), with inner strength total score emerging as the strongest predictor of adherence ($\beta = 0.276$, $P < 0.001$) — second only to medication literacy in predictive magnitude. Each one-point increase in inner strength correlated with a 0.276-point rise in adherence scores. Notably, patients who received diabetes education demonstrated significantly higher inner strength scores, suggesting that health education improves adherence partly by bolstering psychological resilience.

Kang Junxian et al. (2024) reported that comorbid older adults exhibited significantly higher inner strength scores (74.85 ± 13.80) than the general population, positively correlated with physical functioning, overall health, and mental health. Besel et al. (2024) validated resilience — a core manifestation of inner strength — as an independent contributor to medication adherence among 80 rural older adult hypertensive patients in the northwestern United States ($\beta = 0.22$, $P < 0.05$), with SEM revealing partial mediation of the "perceived autonomy support $\rightarrow$ adherence" pathway. These findings suggest that inner strength operates not merely as a correlate of adherence but as an active mechanism through which individuals maintain self-management efficacy despite the specific challenges of rural settings — transport difficulties, financial pressures, and polypharmacy.

Despite growing international recognition, research on inner strength among older adults with multimorbidity remains limited, particularly in Chinese contexts. The construct offers a novel positive psychology perspective that complements the deficit-oriented focus of traditional adherence research, providing a scientific basis for developing resilience-enhancing interventions.

5. Discussion and Research Gaps

This review synthesises evidence from three complementary theoretical frameworks — SCT/TRD, HAPA, and SEM — to illuminate the multidimensional determinants of treatment adherence among older adults with multimorbidity. Several key insights emerge.

First, adherence in this population is fundamentally a multidimensional construct encompassing medication compliance, dietary adherence, physical activity, self-monitoring, and health education behaviours, with overall adherence rates remaining suboptimally low (25–76%) (Sabaté, 2003). The determinants operate at multiple levels simultaneously: intrapersonal factors (medication literacy, self-efficacy, inner strength), interpersonal/environmental factors (social support, family dynamics), and behavioural factors (self-regulation, planning, coping strategies).

Second, the three theoretical frameworks offer complementary rather than competing explanations. SCT/TRD provides the overarching architecture, explaining how personal, behavioural, and environmental factors interact dynamically. HAPA adds temporal specificity, delineating how motivation translates into sustained action through planning and coping processes. SEM provides the methodological capacity to test these theoretical propositions empirically, quantifying direct, indirect, and total effects among latent and observed variables simultaneously.

Third, medication literacy and self-efficacy emerge as the most consistently supported proximal determinants of adherence, with medication literacy operating as a foundational cognitive resource and self-efficacy serving as the motivational bridge between knowledge and action. Social support functions as a critical environmental amplifier, both directly reinforcing adherence and indirectly enhancing it

through health literacy. Inner strength, while less studied, represents a promising positive psychology construct that may explain individual variability in adherence maintenance under adversity.

However, significant gaps remain. First, the vast majority of existing studies focus on single chronic disease populations (hypertension, diabetes, COPD), with very few applying these frameworks specifically to older adults with multimorbidity — the population for whom the evidence is most urgently needed. Second, no study to date has simultaneously modelled medication literacy, inner strength, social support, and self-efficacy within a single TRD or SEM framework applied to this population. Third, while HAPA has been validated for single-disease contexts, its application to multimorbidity — where competing treatment demands and complex planning requirements may fundamentally alter the intention-behaviour pathway — remains entirely unexplored. Fourth, most evidence is cross-sectional, limiting causal inference; longitudinal studies examining how these determinants interact over time are scarce. Fifth, cultural context matters: the family-centred nature of Chinese healthcare, the role of community health institutions, and the specific challenges of rural-urban disparities all require culturally sensitive investigation that existing literature has not adequately addressed.

6. Conclusion

Treatment adherence among older adults with multimorbidity is a complex, multidimensional behaviour shaped by the dynamic interplay of cognitive resources, psychological capacities, social environments, and behavioural processes. Social Cognitive Theory, the Health Action Process Approach, and Structural Equation Modelling collectively provide a robust, complementary theoretical and methodological foundation for understanding and improving adherence in this population. Medication literacy, self-efficacy, social support, and inner strength each contribute uniquely to adherence outcomes, operating through both direct and indirect pathways. Future research should prioritise integrated, longitudinal designs that model these constructs simultaneously within multimorbidity populations, while intervention development should leverage the stage-specific insights of HAPA and the systemic perspective of TRD to design culturally appropriate, multi-level adherence programmes. Addressing the adherence challenge in older adults with multimorbidity is not merely a clinical imperative — it is a prerequisite for realising the health benefits of modern chronic disease management.

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