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Improving anti-hypertensive medication taking: The direct and interacting effects of perceived adherence difficulty, adherence knowledge, and commitment to adherence

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ABSTRACT

Background: Non-adherence to anti-hypertensive medications is prevalent, leading to increased hospital costs and preventable deaths and disabilities. Managing patient perceptions of adherence difficulties may be key to improving adherence.

Objective: This study examined the potential negative effect of patients' perceived difficulties with anti-hypertensive medication taking on adherence, along with whether and how that effect could be reduced through patient knowledge of and commitment to adherence.

Method: 10,867 adult U.S. residents diagnosed with essential hypertension and prescribed anti-hypertensive medications participated in a cross-sectional online survey using self-reported behaviors and perceptions. Stepwise regressions and mean difference analyses were performed.

Results: Perceived adherence difficulty was negatively associated with adherence behaviors ($b = -.443, p < .001$). This association was reduced by the moderating effects of adherence knowledge ($b = .035, p < .001$) and commitment to adherence ($b = .008, p = .037$), and their direct effects on adherence behaviors ($b = .075, p < .001$; $b = .095, p < .001$, respectively). Some differences by patient race-ethnicity and income were observed.

Conclusions: Perceived adherence difficulty inhibits medication adherence but is countered by adherence knowledge and commitment to adherence. To improve adherence, healthcare strategies should strengthen patient knowledge and commitment by developing medication routines, engaging in self-care and awareness, and receiving tailored counseling on disease management, among others.

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Hypertension; perceived adherence difficulty; adherence knowledge; commitment to adherence; medication adherence; socioeconomic characteristics

Background

About 1.28 billion adults worldwide have hypertension, a chronic medical condition that can lead to multiple adverse effects and accounts for about 10% of global healthcare expenditures [1]. Taking medications as prescribed is critical to control hypertension, reduce medical costs and prevent illness progression, hospitalization, and death [1,2]. However, globally, only 21% of patients have their hypertension well-controlled [1]. Recent healthcare management studies indicate that evidence on interventions to improve medication adherence tends to be low quality and often contradictory [3]. Most interventions address specific diseases, healthcare provider interactions [3], patient characteristics [4,5], or reminders [6], but not the underlying thought processes or cognitions that determine medication-taking [3].



Cognitions are 'all forms of knowing and awareness, such as perceiving, conceiving, remembering,

reasoning, judging, imagining, and problem solving' [7], and are distinct from yet influence dosage regimens and other health behaviors [8,9]. Understanding which patient cognitions encourage or inhibit adherence and how they do so offers a potential avenue to develop more effective ways of helping patients adhere to anti-hypertensive medications.

Patient cognitions

Three patient cognitions are especially relevant to medication adherence: perceived adherence difficulty, adherence knowledge, and commitment to adherence. The following section defines those cognitions and presents recent findings about their influences on adherence and health behaviors.

Perceived adherence difficulty refers to a person's thoughts about how challenging it is to take

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medications as instructed [10]. Studies show that difficulty perceptions form a mental barrier that discourages targeted behaviors [11], such as scheduling appointments and managing medication bills, thus lowering the quality of chronic disease care and physical and mental health [12]. Even when patients believe health tasks are important, perceived difficulty decreases satisfaction with the performance of those tasks [13]. Difficulty perceptions may dampen patients' interest in and willingness to follow physicians' medication instructions [14,15].

In contrast, other cognitions may enhance adherence and potentially counter perceived difficulty. One such cognition is **adherence knowledge**, or a patient's familiarity with and understanding of a prescribed medication plan [16]. According to the health literacy literature, adherence knowledge can propel a patient toward recommended treatments [3,17], whereas its lack can lead to problematic medication behaviors, including waiting for symptoms to appear before taking medications [18], skipping or altering doses based on personal preferences [19], or disagreeing with physicians about how therapies work [20,21]. Hence, knowledge of medication-taking requirements and processes may mitigate some difficulties patients associate with such tasks.

A second cognition that may increase adherence and lower the negative impact of difficulty perceptions is **commitment to adherence**. Commitment is 'one's attachment to or determination to reach a goal' [22], p.24, and supports adherence persistence in the face of distractions, life events, and situational changes over the course of a chronic condition [23]. Higher commitment to adherence may encourage patients to look past the immediate inconvenience and uncertainties of medications in favor of improved long-term health [24]. Prior research suggests that the commitment to managing health issues is a critical influence on mental and physical health [25]. Commitment also benefits goal attainment and changes habits that adversely affect health outcomes [26]. By committing to adherence, patients ward off doubts about the value of medications consumed [27], which may counteract the negative impact of perceived adherence difficulty on medication adherence [28].

Research gap

There is an important knowledge gap on whether and how all three cognitions independently, collectively, and interactively influence adherence to anti-hypertensive medications. Past studies have explored the effects of patient cognitions on various forms of adherence as well as health outcomes in different illness contexts. A sample of studies is provided in Appendix Table A1. For instance, perceived task difficulty has been found to negatively influence health tasks such

as adherence to social distancing guidelines [14] and to cognitive behavioral therapy [9]. However, difficulty depends on a person's knowledge about health tasks [29]. Other works have shown that general knowledge about hypertension as well as negative beliefs and concerns are tied to medication adherence [30]. Prior research has also highlighted the impacts of task commitment on exercise effectiveness, perception of injury, and social support [17]. While informative, these studies do not account for the effects on medication adherence outcomes of all three cognitions, which co-exist to varying degrees within a patient.

Furthermore, cognition-related adherence dynamics may be subject to socioeconomic differences since medication adherence varies by racial-ethnic, income, and other demographic groups [31,32]. Racial-ethnic minorities experience higher rates of non-adherence to anti-hypertensive and anti-hyperlipidemic medications compared to other groups [33]. Additionally, lower-income individuals more often cannot afford medications without sacrificing basic necessities [34], and less formal education may raise doubts about the necessity of medications and thus decrease adherence [35]. Therefore, it is important to examine possible differences in the above adherence cognitions by socio-economic characteristics for insights into more customized healthcare management strategies [22]. It appears that no study to date illuminates the joint roles of the three cognitions on anti-hypertensive medication adherence, while considering potential differences across race-ethnicity, income, and education.

Study aims and hypotheses

This study attempts to fill the above gaps. It is one of the first to explore the influences of all three cognitions (perceived difficulty, adherence knowledge, and commitment to adherence), alongside socio-demographic characteristics (race-ethnicity, income, and education) on anti-hypertensive medication adherence (see Table A1). As health services and systems continue to move from centralized, provider-centred care towards community and patient-driven care, it is crucial to understand patient behaviors, cognitions, and life circumstances in order to develop interventions empowering patients in their medication adherence journey.

This study aims to determine 1) whether there are relationships among the three patient cognitions and adherence behavior; 2) if so, what is the nature of the relationships; and 3) how the ties differ by socioeconomic group. To achieve these aims, a cross-sectional online survey was conducted among U.S. residents diagnosed with and prescribed medications for essential hypertension. Based on the reviewed literature, the following hypotheses were posited:

H1: Perceived adherence difficulty is negatively related to self-reported medication adherence.

H2: Adherence knowledge positively moderates the relationship between perceived adherence difficulty and self-reported medication adherence.

H3: Commitment to adherence positively moderates the relationship between perceived adherence difficulty and self-reported medication adherence.

Materials and methods

An online, cross-sectional survey was conducted in 2016 on a sample of 20,000 individuals diagnosed with hypertension. A highly experienced global research organization assembled the sample from a large standing panel of respondents volunteering and remunerated for participation in health studies. Information had been previously collected by the organization on panelists' health conditions and practices, making it feasible to identify and target hypertensive individuals for study participation and ensure a sufficient response rate. Reviews and meta-analyses have determined that response rates, sample psychometrics, insufficient effort responding, and content validity are similar whether recruited by panel administrators or researchers, and that online panel data, when appropriately and carefully recruited, is suitable for empirical research [36,37].

To be included, participants needed to confirm a) U.S. residence, b) age of 18 or above, c) diagnosis of hypertension, d) prescription for anti-hypertensive medication, and e) informed consent. A total of 10,867 completed surveys were returned. After the removal of duplicates and incorrect responses to validation questions, 10,805 responses remained. Sample characteristics are detailed in Table 1. An analysis of early versus late survey respondents determined there were no significant differences in key measures,

suggesting response bias was minimal (details provided upon request).

Measures

Measures were adopted or adapted for the survey and purified for reliability as indicated in Table 2. All measures were pre-tested twice on holdout samples of 50 respondents to assess survey clarity and logic. Measures proved to be sufficiently robust for use in the final survey. Attention check and qualification items are provided in the Appendix (Table A2).

Behavioral outcome variable

Adherence, a self-reported measure, was calculated by an average score of two items adapted from the AIDS Clinical Trials Group adherence study, a measure about whether respondents took HIV medications as instructed [38,39]. The AIDS study measure has been used in studies on medications to manage hypertension [40] and other comorbidities [41], and was adapted for anti-hypertensives in this study. Two scale items were removed through measurement purification due to low loadings. Although self-report measures may diverge from clinical adherence outcome data, evidence indicates they are a good approximation and appropriate for surveys. To reduce memory inaccuracies, adherence recall was limited to the past three days [40].

Patient cognition predictor variables

The cognition measures were adapted from consumer psychology research [42]. Perceived adherence difficulty was measured by an average score of four items on perceptions of how challenging and problematic it is to take medications as prescribed, adapted from a study on perceived decision task difficulty [43]. Adherence knowledge items were adapted from a measure of individual expertise and calculated by averaging items that measured the degree of knowledge about, familiarity with, and interest in taking medications as prescribed [44]. Commitment to adherence was taken from a study on continuance commitment and calculated by averaging items on commitment to following medication prescriptions as a life responsibility for personal health [45,46]. The measure was adjusted to focus on the negative consequences of discontinuing medications.

Socioeconomic variables

Three socioeconomic measures were used to assess potential differences in adherence-related cognitions: education, household income, and racial-ethnic background.

Table 1. Basic Sample Characteristics (n = 10,805).

Characteristics	Information	Frequency	Percentage
Sex	Female	6,549	60.6%
	Male	4,242	39.3%
	Non-binary	14	.1%
Racial-ethnic Background	Minority	3,109	28.8%
	White (non-Hispanic)	7,696	71.2%
Degree of Education	Some elementary	29	.3%
	Some high school	275	2.5%
	High school	2,168	20.1%
	Some college	2,522	23.3%
	Finished 2-year college degree	1,428	13.2%
	Finished 4-year college degree	2,980	27.6%
	Post baccalaureate	1,403	13.0%
Income	< \$20,000	1,724	16.0%
	\$20,000 to \$39,999	2,534	23.5%
	\$40,000 to \$74,999	3,127	28.9%
	\$75,000 to \$99,999	1,837	17.0%
	≥ \$100,000	1,583	14.7%

Table 2. Survey Measures.

	ITEMS	RELIABILITY
DEPENDENT VARIABLE SELF-REPORTED ADHERENCE [38]	Over the past 3 days, ... (1 = Never ... 5 = all of the time) <ul style="list-style-type: none"> I followed the prescribed schedule for taking my medications. I followed prescribed instructions for taking my medications, such as 'take with food' or 'on an empty stomach'. <i>Items collected but removed during analysis:</i> Over the past 3 days, ... (1 = None of the days, 2 = 1 d, 3 = 2 days, 4 = 3 days) <ul style="list-style-type: none"> I took all of my medication(s) on ... I took some but not all of my medication(s) on ... 	$r = .447$ ($p < .001$)
INDEPENDENT VARIABLE PERCEIVED ADHERENCE DIFFICULTY [43]	Taking my medication as prescribed is ... <ul style="list-style-type: none"> not at all difficult (1) ... extremely difficult (7) not at all challenging (1) ... extremely challenging (7) very easy to do (1) ... very hard to do (7) comes with no problems (1) ... comes with many problems (7) 	$\alpha = .958$
MODERATOR VARIABLES ADHERENCE KNOWLEDGE [44]	Compared to the average person ... (1 = strongly disagree, 7 = strongly agree) <ul style="list-style-type: none"> I do not know much about taking medications as prescribed. * I am very familiar with taking medications as prescribed. I am not knowledgeable about taking medications as prescribed. * I am very interested in taking medications as prescribed. I read about taking medications as prescribed (e.g. blogs, ads, flyers) all the time. 	$\alpha = .617$
COMMITMENT TO ADHERENCE [45,46]	Please indicate how much you agree or disagree with the following statements (1 = strongly disagree, 7 = strongly agree). <ul style="list-style-type: none"> Too much in my life will be disrupted if I drop my medications now. Right now, staying with my medications is a matter of necessity as much as desire. Stopping my medications would threaten my health. It would be personally costly if I did not take my medications as prescribed. If I stopped taking my medications, those who care about me would suffer. 	$\alpha = .854$
SOCIOECONOMIC VARIABLES RACE-ETHNICITY INCOME	0 = Racial-ethnic Minority, 1 = White (non-Hispanic) Last year, what was your total household income? <ul style="list-style-type: none"> Less than \$20,000 \$20,000 to \$39,999 \$40,000 to \$74,999 \$75,000 to \$99,999 \$100,000 or more 	-
EDUCATION	What's your highest education level? <ul style="list-style-type: none"> Some elementary Some high school High school Some college Finished 2-year college degree Finished 4-year college degree Post baccalaureate 	-

Note: * represents reverse coding for analyses

Data analysis

After measurement purification, convergent and discriminant validity tests were performed. The Heterotrait-Monotrait ratio of correlations (HTMT) values were below .900 for all measures, establishing discriminant validity. In addition, independent samples t-tests of early versus late respondents were performed to assess response bias and found that the two groups did not differ on major measures at the alpha significance level of $p < 0.05$. Subsequently, stepwise regressions were performed using IBM SPSS (v.28.0), beginning with the independent and socioeconomic variables (Model 1), and then adding the moderating variables (Model 2). Each model was significant. The added moderations significantly increased the variance explained, indicating the regressions were

overall statistically robust. Thereafter, univariate tests were carried out to identify differences in self-reported adherence and adherence difficulty by racial-ethnic background and income (education was removed as later explained).

Results

Regression results

Regression analysis results are presented in Table 3. Model 1 included the three cognitive predictor variables (perceived difficulty, adherence knowledge, and adherence commitment) and socioeconomic variables (education, household income, and race-ethnicity). Model 2 added the two moderators (adherence knowledge and commitment to adherence). Results of Model 1

Table 3. Regression Results on Self-reported Adherence.

	Model 1			Model 2		
	<i>b</i>	<i>t</i>	<i>p-value</i>	<i>b</i>	<i>T</i>	<i>p-value</i>
Racial-ethnic Background	.052**	2.899	.004	.050**	2.828	.005
Annual Household Income	.027**	3.755	<.001	.025**	3.535	<.001
Education	.005	.808	.419	.005	.748	.454
Perceived Adherence Difficulty	-.243**	-52.320	<.001	-.443**	-15.536	<.001
Commitment to Adherence	.182**	26.339	<.001	.095**	8.032	<.001
Adherence Knowledge	.094**	12.773	<.001	.075**	6.333	<.001
Perceived Adherence Difficulty x Commitment to Adherence				.008*	2.088	.037
Perceived Adherence Difficulty x Adherence Knowledge				.035**	9.229	<.001
R ²	.532			.538		
F	711.899			550.005		

Note: *b-values* are unstandardized, * $p < .05$, ** $p < .01$

showed that perceived adherence difficulty significantly lowered adherence ($b = -.243$, $p < .001$). Furthermore, both adherence knowledge ($b = .094$, $p < .001$) and commitment to adherence ($b = .182$, $p < .001$) significantly increased adherence. Results of Model 2 showed adherence knowledge significantly and positively moderated, or attenuated, perceived adherence difficulty's effect on adherence ($b = .035$, $p < .001$). Commitment to adherence also significantly and positively moderated perceived adherence difficulty's association with adherence ($b = .008$, $p = .037$).

Socioeconomic factors

The three socioeconomic factors were also incorporated in Models 1 and 2. In Model 1, race-ethnicity ($b = .052$, $p = .004$) and income ($b = .027$, $p < .001$) were significantly related to self-reported adherence, but education was not ($b = .005$, $p = .419$). The significant roles of race-ethnicity ($b = .050$, $p = .005$) and income ($b = .025$, $p < .001$) but non-significance of education ($b = .005$, $p = .454$) held in Model 2. Age

was studied as a supplemental socio-demographic characteristic, but like education was found to be non-significant in the regressions.

To understand the roles of race-ethnicity and income in the above regression results further, mean differences in adherence and perceived difficulty were calculated between groups based on these two characteristics. Education was excluded because of non-significance in the regressions. Adherence means were found to be significantly higher among non-Hispanic Whites than racial-ethnic minorities at all income levels, with differences wider at lower income levels (Table 4a). Perceived adherence difficulty means were greater for racial-ethnic minorities than non-Hispanic Whites at all except the highest incomes. These differences were larger at lower than higher household incomes (Table 4b).

Discussion

Taking anti-hypertensive medication inconsistently or incorrectly remains a major healthcare cost

Table 4. Adherence and Perceived Difficulty by Racial-Ethnic Background and Income.

a. Self-reported Adherence					
Income	Racial-ethnic background	Self-reported Adherence mean	Lower CI bound	Higher CI bound	Mean difference and <i>p</i> value (White non-Hispanic – Racial-Ethnic Minority)
< \$20,000	Minority	3.930	3.863	3.998	.228** ($p < .001$)
	White (non-Hispanic)	4.158	4.111	4.205	
\$20,000 - 39,000	Minority	3.979	3.923	4.035	.245** ($p < .001$)
	White (non-Hispanic)	4.224	4.186	4.263	
\$40,000 – \$74,999	Minority	3.982	3.929	4.036	.245** ($p < .001$)
	White (non-Hispanic)	4.227	4.193	4.261	
\$75,000 – \$99,999	Minority	3.872	3.801	3.942	.102* ($p = .016$)
	White (non-Hispanic)	3.974	3.930	4.018	
≥ \$100,000	Minority	3.996	3.909	4.083	.102* ($p = .038$)
	White (non-Hispanic)	4.100	4.054	4.145	
b. Perceived Adherence Difficulty					
< \$20,000	Minority	2.500	2.350	2.649	-.356** ($p < .001$)
	White (non-Hispanic)	2.144	2.041	2.246	
\$20,000 - 39,000	Minority	2.548	2.424	2.671	-.501** ($p < .001$)
	White (non-Hispanic)	2.047	1.962	2.132	
\$40,000 – \$74,999	Minority	2.835	2.717	2.952	-.643** ($p < .001$)
	White (non-Hispanic)	2.191	2.117	2.265	
\$75,000 – \$99,999	Minority	3.313	3.159	3.468	-.213* ($p = .022$)
	White (non-Hispanic)	3.100	3.003	3.197	
≥ \$100,000	Minority	3.022	2.830	3.213	-.091 ($p = .411$)
	White (non-Hispanic)	2.931	2.831	3.031	

Note: * $p < .05$, ** $p < .01$

and concern. In order to improve adherence and reduce the negative consequences of nonadherence, it is of utmost importance to understand the role of patient cognitions in medication taking [2,19]. To the best of our knowledge, this study is the first to examine three specific adherence-related cognitions, alongside key socioeconomic characteristics, to determine the effects on adherence to anti-hypertensive therapies. The study showed that perceived adherence difficulty inhibited adherence behavior, a finding consistent with research on the impact of difficulty in chronic illness management [9,14]. Promisingly, this study also determined that two patient cognitions, adherence knowledge and commitment to adherence, can support medication adherence. They were found to have a direct, positive effect as well as an indirect effect by moderating perceived difficulty. The indirect path indicated that knowledge and commitment interacted with perceived difficulty and thereby reduced some difficulty perceptions.

Based on these findings, healthcare strategies should be directed towards elevating adherence knowledge to ameliorate the negative perspective of seeing medication adherence as a challenge. Healthcare service providers sometimes overestimate patients' medical literacy, yet limitations in knowledge affect medical experiences [18]. An avenue for increasing adherence knowledge is for healthcare systems to provide patient education forums [47], such as group classes (in person or virtual) with built-in buddy systems that deliver easy-to-grasp information on the disease and medications, combined with approaches to create positive and healthier lifestyles, including managing daily stress.

The findings likewise point to the value of designing healthcare interventions that strengthen patient commitment to adherence. Possibilities include counseling to engage cognitive behaviors and self-care processes, so patients are more aware of and accept the confines of living with a chronic condition, including by persevering with medications [48]. Nonetheless, medication adherence is an intricate, multifactorial task that cannot be improved using a one-size-fits-all approach [49]. A meta-analysis found that while education initiatives improve adherence [50], a Cochrane review pointed to the greater effectiveness of mixed educational and behavioral interventions [49]. We thus recommend healthcare organizations and healthcare professionals integrate patient education into healthcare services to increase adherence knowledge and develop counseling programs with both educational and behavioral components to elevate commitment to adherence. More holistic, multifaceted solutions would strengthen the two cognitive levers of knowledge and commitment for improved medication consumption.

This study also found that socioeconomic groups experienced different levels of adherence and

perceived difficulty [31,51]. Specifically, non-Hispanic Whites and higher-income persons reported stronger adherence, while racial-ethnic minority and lower income persons indicated greater perceived difficulty with this task. Socioeconomic differences should not be discounted as they can point towards structural and systemic disadvantages [32,52]. Based on our findings, identifying which specific adherence challenges individuals face should be used to develop tailored and thus more effective solutions [20,32]. This study highlighted healthcare management opportunities to improve adherence, particularly among persons with income constraints and racial-ethnic minority status, by cultivating adherence knowledge and commitment. Because smartphone usage and reliance are higher among such persons, phone apps may be an especially useful channel to overcome adherence hesitations and develop medication routines [16].

Arguably, adherence behavior may have changed since initial data collection, due to the Covid-19 pandemic, which substantially affected access, continuity, and provision of health services as well as the availability of medicines [53]. However, the evidence is mixed about whether the pandemic has systematically altered medication adherence behaviors among patients with chronic illnesses. Some studies have identified significant negative changes in adherence [54] and increased barriers to medication consumption during the pandemic, related to concerns regarding contracting an infection, limited access to healthcare, and medication shortages [53]. Other research presents evidence for positive effects on adherence [55], potentially stemming from the rise of telemedicine consultations and expanding roles of community pharmacists [53]. Yet, most of the identified barriers and facilitators to adherence during the pandemic are external factors unlikely to influence the cognitive model proposed in this study. Future research may examine such factors in addition to the cognitive and socio-demographic variables explored here.

By designing and delivering services and programs that strengthen patient adherence knowledge and commitment, healthcare managers and clinicians can reduce the negative impacts of perceived difficulties around dosage regimens. Future investigations could examine strategies to integrate provider-patient relationships and health records as resources, and to assess and strengthen patient cognitions in a joint effort to support and improve adherence. Studies have found that a positive perceived provider-patient relationship can lead to more optimal adherence and improved patient outcomes [56]. Finally, further research could be performed to examine other patient cognitions as avenues of strengthening adherence, such as self-efficacy and internal locus of control [17,57], as well as the impact of environmental factors,

such as living in a pharmacy desert or in geographical areas with lower access to healthcare [52].

Study limitations

First, the study used an online survey and thus excluded individuals with limited computer access. Surveys also have the limitation of indirectly capturing variables and relationships through subjective self-assessment. Future studies should incorporate in-person surveys, longitudinal secondary data, and experiments to determine causality [49]. Second, the study used self-reported measures. Although such measures are traditionally used in survey research, future studies can integrate additional measures, such as pill counts, to triangulate and validate self-reported adherence. Third, more granular explorations of racial-ethnic groups, such as identifying African American patients and distinguishing their responses from other groups, would aid insights into health inequalities and adherence. Fourth, research and interventions may consider social determinants of health and health-related social needs such as the built environment [52] or social support [17], both of which have been found to influence health behavior. Even small geographic areas of counties, zip codes, and neighborhoods can significantly vary in health outcomes such as life expectancy [58]. Despite these limitations, this study demonstrates the relevance of critical cognitions and socioeconomic factors to adherence behaviors.

Conclusion

This study underscores the opportunities for healthcare managers to leverage patient cognitions to increase rates of anti-hypertensive medication adherence, thereby lowering medical expenditures and improving health outcomes. The current study fills critical knowledge gaps in the extant literature on the combined and co-present roles of three cognitions and three socio-demographic features in promoting or inhibiting chronic illness medication consumption. The findings provide scholarly and managerial contributions by showing that all three cognitions matter, and more specifically that the difficulty of taking medications as instructed is counteracted by improving patient knowledge of and commitment to the practice of following prescription therapies. Furthermore, these dynamics apply across a range of socio-demographic characteristics, though individuals with lower incomes and in racial-ethnic minority groups suffer from greater non-adherence.

Disclosure statement

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Ethical approval

Ethical approval for the study was obtained from the centralized ethics and institutional review board at the University of Illinois at Chicago. The institutional review board is under United States federal regulation and fully accredited by the Association for the Accreditation of Human Research Protection Programs, Inc.

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pathways through which a person's life context influences their ability to manage their chronic illnesses and use healthcare - focusing on individuals who are adversely impacted by systemic racism and classism.

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Appendix

Table A1. Literature Overview*.

Study	Condition or Therapy	Method	Outcome Variable	Difficulty	Knowledge	Commitment	Socio-Demographics	Results
Current study	Hypertension	Cross-sectional survey	Self-reported medication adherence	X	X	X	X	Knowledge and commitment can mitigate the negative effect of difficulty on self-reported medication adherence.
Adinkrah et al., 2020 [30]	Hypertension	Cross-sectional survey	Self-reported medication adherence		X			Higher hypertension knowledge was associated with higher medication adherence.
Andrabi et al., 2022 [29]	Chronic illness	Systematic review	Task difficulty	X	X			Perceived task difficulty was dependent on a person's knowledge about the task.
Bieleke et al., 2023 [14]	COVID-19	Experimental study	Social distancing guidelines adherence	X				Perceived task difficulty was negatively associated with adherence.
Gordon et al., 2021 [28]	HIV	Randomized controlled trial	Adherence readiness and adherence		X	X		Knowledge and commitment were positively associated with ART readiness and ART adherence.
Marks et al., 2023 [9]	Chronic illness	Systematic review	Adherence to CBT	X				Perceived content and therapy difficulty negatively influenced CBT adherence.
Snyder et al., 2020 [15]	Dialysis	Retrospective cohort study	Dialysis outcomes	X				Reported task difficulty was not consistently associated with clinical outcomes.
Svingen et al., 2021 [17]	Physiotherapy	Qualitative interview study	Injury, social support, exercise effectiveness, self-efficacy		X	X		Perception of injury, exercise effectiveness, and social support were linked with commitment to therapy while knowledge was linked to self-efficacy.

*A sample, and not exhaustive list, of studies on the role of patient cognitions in adherence and other health outcomes.

Table A2. Attention Check and Qualification Items.

	ITEMS
ELIGIBILITY CRITERIA	
Residence	Do you currently live in the US? • Yes No
Age	How old are you? • 18 years and older Younger than 18
Diagnosis of Hypertension	Do you have hypertension (high blood pressure)? • Yes No
Prescription for Hypertension	Have you been prescribed to take any medications for hypertension? • Yes No
ATTENTION CHECKS	
Check 1	The current year is ... • 2014 • 2015 • 2016 • 2017
Check 2	Please select the color green among the following options: • Pink • Gold • Brown • Clear • Green
CONFIRMATION QUESTIONS	
Diagnosis of Hypertension	Which of the following chronic medical conditions do you currently have? • Asthma • Diabetes • Hypertension • High Cholesterol • Open option: other chronic conditions
Prescription for Hypertension	How long in years and months have you been prescribed medications for hypertension? • Hypertension medication years • Hypertension medication months How many different medications are you prescribed to take for your hypertension (high blood pressure)?