

**A review of the attitudinal beliefs toward Traditional Chinese Medicine modalities by
patients with chronic pain conditions**

**Association between self-reported self-determination and hospitalization among adults 65
and older**

by

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Part I: A review of the attitudinal beliefs toward Traditional Chinese
Medicine modalities by patients with chronic pain conditions

ABSTRACT:

Background: A number of health care systems are expanding their Traditional Chinese Medicine (TCM) modalities, namely acupuncture, in part due to the possibility that these non-pharmacological complements to opioid prescription can alleviate opioid abuse in chronic pain populations. However, given the lack of a sufficient evidence-base, negative patient attitudes toward attempting TCM therapies may stall the expansion of these service offerings or inhibit positive health outcomes.

Objectives: I conducted a review of existing literature of the attitudes of patients with chronic pain conditions toward TCM modalities. Attitudes were preliminarily defined as any health belief that might inform patient uptake or maintenance of TCM therapy.

Methods: Following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for conducting reviews, I searched three databases using keywords and MeSH descriptors for chronic pain, health beliefs, and National Center for Complementary and Integrative Health (NCCIH)-defined TCM within the last 20 years. Data were then extracted from studies meeting eligibility criteria where studies must report attitudinal beliefs about TCM therapies among people in North America or Europe with chronic pain. I included only peer-reviewed, English-language articles. I excluded studies intentionally designed to survey a population of East Asian descent.

Subjects: Adults 18 years and over with a chronic pain condition residing in North American or European countries.

Results: A total of 19 articles were included in this report. Operational definitions of attitude were organized into 5 categories: 1) outcome expectancies for pain relief, reduced reliance on medication, and other factors; 2) efficacy beliefs toward the treatment modality; 3) willingness to

try or pay for TCM therapy; 4) fear-avoidance beliefs that deter attempts to use; and 5) desire to expand TCM services in health care. The majority of studies supported the hypothesis that more positive attitudes mediate successful treatment outcomes. Studies further identified moderators on patient attitude, specifically provider attitude, which may lead to both more positive or more negative patient attitudes.

Conclusions: The majority of chronic pain patients express willingness to try acupuncture and other TCM modalities and report positive expectancies for pain relief from these therapies. However, the lack of a standardized methodology for assessing patient attitudes, including outcome expectancies and efficacy beliefs, precludes robust comparison among studies even of similar design.

INTRODUCTION:

Over the last several decades, patients and providers in different health care settings have begun seeking out complementary and alternative medicines and therapies (CAM) with a history of use outside of Western medicine. The National Health Interview Survey (NHIS) 2012 found that 33.2% of American adults use some form of CAM, a 0.9% increase since 2002 [1]. CAM includes a range of provider-based therapies such as acupuncture and moxibustion (*zhēnjiǔ* 针灸) and cupping (*báhuǒguànr* 拔火罐儿), or services for which provider presence is not necessary, such as herbal medicine (*cǎoyào* 草药), and taichi (*táijíquán* 太极拳), all of which are based in Traditional Chinese Medicine (TCM). TCM refers to the institutionalized body of medical knowledge originating in the Sinosphere that has been developed over thousands of years of clinical use and application of East Asian medical and spiritual theory [2]. TCM has an importance presence in

modern health care systems in East Asian countries, including China, Taiwan, Korea, Japan, Singapore, and Hong Kong [3].

The predominance of evidence-based medicine in the United States has compelled TCM researchers and practitioners to validate clinical effectiveness, leading to an expanding field of research that translates Eastern theory to a Western conceptual framework. In the absence of a strong evidence base, enduring skepticism toward the analgesic benefit of TCM therapies leads to potential patient consumers and providers eschewing TCM modalities [4-6]. Nevertheless, TCM has found a strong foothold in populations with chronic conditions, especially to treat musculoskeletal and osteoarthritic pain, migraine, insomnia, and nausea caused by chemotherapy [7, 8]. As the burden of chronic disease continues to rise, patients and providers seek additional treatment pathways to supplement conventional Western medicine [9, 10]. TCM therapies are attractive due to their low cost and relatively low potential for abuse in comparison to some prescription pain relievers [11, 12].

This has driven interest in CAM in the United States from Medicare administrators and insurance companies and catalyzed multi-level investments to expand non-pharmacological service offerings in response to trends in opioid use, abuse, and related deaths [13, 14]. A joint initiative between the U.S. Department of Health and Human Services, the Department of Defense, and the Veterans Administration (VA) has recently invested \$81 million over 6 years to expand pain management services at VA Medical Centers, with particular attention focused toward TCM therapies like acupuncture and taichi [15]. Already, the expansion of CAM offerings has coincided with a successful decrease in opioid prescription rates constituting a 50 percent change at several dozen VA facilities since 2012 [16]. Because the risk of opioid overdose dramatically increases with every increase in opioid dosage, providers within the VA have opted for a harm reduction

approach in which a lower opioid dosage is combined with non-pharmacological therapies [17]. This is especially appropriate in this setting because although 44% of recently returned active-duty American soldiers report chronic pain and 15% use some level of opioids for pain management, only half of these patients report the moderate to severe pain for which opioid prescription is now recommended [18].

In 2015 in the general population, more than 60% of people who died from opioid-related overdoses had a chronic pain diagnosis. Additionally, nearly 50% had filled an opioid prescription for chronic pain in the month prior to death, indicating an urgent need to both reduce opioid prescriptions per new Centers for Disease Control and Prevention guidelines and find non-pharmacological CAM therapies [19]. Therefore, a large subset of the more than 117 million US residents with at least one chronic condition may benefit greatly from expansion of these non-pharmacological services [10]. Furthermore, service delivery schemes such as group-based, community acupuncture clinics may also be a viable and accessible health care tool at a time where the number of uninsured Americans is expected to rise [20, 21].

Several studies have demonstrated that poor beliefs in the efficacy of TCM modalities naturally deter TCM treatment-seeking in non-pain clinical cases [22]. Others have shown that more positive outcome expectancies are positive predictors of successful treatment, suggesting that attitudes and beliefs are vital components of positive outcomes independent of the treatment itself [23, 24]. Therefore, advocates of use of TCM as a biomedical tool for pain management may target health beliefs, attitudes, and outcome expectancies toward TCM in designing health promotion strategies. By assessing such determinants as outcome expectancy and efficacy beliefs, it is possible to gather qualitative data on patient attitudes toward TCM for chronic pain

management. TCM proponents may use this information to induce more popular acknowledgement of potential merits at its low price point.

Though several studies have been conducted to assess attitudes toward and willingness to use TCM modalities in East and Southeast Asian countries, fewer studies describe similar attitudinal beliefs in European or North American populations. Therefore, this review of existing literature seeks to compile assessments of attitudinal beliefs of potential health consumers toward TCM modalities in Western societies. This aggregated information may be used to describe and stimulate the uptake of non-pharmacological therapies like TCM in populations who may exhibit disproportionately high opioid addictive behaviors. It may further be used to design prospective interventions or focus groups on TCM.

METHODS:

Search Strategy:

I followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for conducting searches and reporting results in this paper. I searched three databases: PubMed, PsycINFO, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases. I developed a unique search strategy tailored to each database (Supplemental Table 1). All citations were filtered for English language and publication date from 01 January, 1999 so as to assess recent attitudes within the last 20 years of literature. Full-text articles were retrieved if a brief review of their citation (title and abstract) offered potential for inclusion.

Inclusion Criteria:

I selected studies for inclusion that met the following criteria: (1) the article reported attitudinal beliefs toward TCM; (2) the study population on whom qualitative or quantitative data was collected had a chronic pain condition (e.g., chronic low back pain, nonspecific chronic pain, headache, or osteoarthritis); (3) the study was conducted in a North American or European country; (4) the text was published in the English language; (5) the study must have been published in a peer-reviewed journal (i.e., grey literature was excluded); and (6) the study must not have intentionally included only patients with East Asian ancestry in its study population, regardless of study location. This final criterion assumes that some Americans and Europeans with East Asian cultural ancestry, especially those of recent emigration, likely have some familiarity with TCM traditions that may inhibit the generalizability of studies in which they are overrepresented.

Data Extraction:

A data extraction form was developed based on data extraction sheets from three previous scoping reviews [25-27]. The primary data extraction table (Table 1) included the following categories: article identifiers, country of study, primary TCM modality (further defined and described in Table 2), population of study receiving TCM therapy, and pain conditions. Two secondary data extraction tables offer additional information on the operational definitions of attitudes and methodologies for assessing attitude (Table 3), as well as the study design and summaries of key findings (Table 4).

Table 1: Characteristics of included studies

	First Author, Date	Journal	Location	Primary TCM Modality	No. receiving TCM therapy*	Pain Condition(s)	Ref.
1	Barth, J. (2016)	<i>Journal of Pain</i>	United States	acupuncture	885	headache, chronic low back pain	[29]
2	Bishop, F. (2015)	<i>Clin J Pain</i>	United Kingdom	acupuncture	485	chronic low back pain	[30]
3	Denneson, L. (2011)	<i>JRRD</i>	United States	acupuncture, herbal medicine	401	chronic low back pain	[31]
4	Donovan, E. (2017)	<i>Pain Medicine</i>	United States	acupuncture	24	nonspecific chronic pain	[32]
5	Dubois, J. (2017)	<i>BMC Complement Altern Med</i>	Switzerland	acupuncture	168	chronic low back pain	[33]
6	Eaves, E. (2015)	<i>BMC Complement Altern Med</i>	United States	acupuncture	64	chronic low back pain	[34]
7	Fleming, S. (2007)	<i>BMC Complement Altern Med</i>	United States	acupuncture	69	chronic low back pain	[35]
8	Gaul, C (2011)	<i>BMC Complement Altern Med</i>	Germany	acupuncture, "traditional Chinese medicine", herbal medicine	626	headache, chronic low back pain	[36]
9	Hopton, A. (2013)	<i>PLoS One</i>	United Kingdom	acupuncture	12	chronic low back pain	[37]
10	Hsu, C. (2014)	<i>BMC Complement Altern Med</i>	United States	acupuncture	64	chronic low back pain	[38]
11	Jones, S. (2016)	<i>JACM</i>	United States	acupuncture	88	nonspecific chronic pain	[39]
12	Kalauokalani, D. (2001)	<i>Spine</i>	United States	acupuncture	135	chronic low back pain	[40]
13	Kavadar, G. (2017)	<i>J Back Musculoskelet Rehabil</i>	Turkey	cupping, herbal medicine	500	chronic low back pain	[41]
14	Linde, K. (2007)	<i>Pain</i>	Germany	acupuncture	864	chronic low back pain	[42]
15	Sherman, K. (2004)	<i>BMC Complement Altern Med</i>	United States	acupuncture, taichi	249	chronic low back pain	[43]
16	Sherman, K. (2009)	<i>BMC Musculoskeletal Disorders</i>	United States	acupuncture	638	chronic low back pain	[44]
17	Thomas, K. J. (2006)	<i>Bmj</i>	United Kingdom	acupuncture	241	chronic low back pain	[45]
18	Wasan, A. (2010)	<i>J Pain</i>	United States	acupuncture	40	chronic low back pain	[46]
19	Weiss, L. (2013)	<i>J Altern Complement Med</i>	Germany	acupuncture	143	chronic low back pain	[47]

*In several studies, the sample size of the patient population listed represents those included within larger study populations who commented on CAM therapies other than the TCM modality listed

RESULTS:

After excluding within-database duplicates, I used the PRISMA method (Supplemental Figure 1) to reach my analytic sample. I first identified 72 total articles for abstract review. After excluding 40 citations that were duplicated across databases or otherwise did not meet inclusion criteria, I reviewed 32 unique full texts. Several articles were excluded because they either did not assess patient attitudes in some form or did not include information on how these attitudes were assessed. One study was determined to assess acute rather than chronic pain. Others were excluded because interventionists collected data on patient attitudes from qualitative interviews of providers instead of the patients themselves. One article was excluded based on its study population of East Asian descent. Nineteen studies met final inclusion criteria. The study findings presented in this paper are limited to those that are relevant to chronic pain patients' attitudes toward TCM modalities.

Countries represented:

Five countries are represented in these studies of attitudes toward TCM modalities within CAM service offerings. The United States is best represented (n=11, 58%) followed by the United Kingdom (n=3, 16%), Germany (n=3, 16%), Switzerland (n=1, 5%), and Turkey (n=1, 5%) (Supplemental Figure 2).

Types of TCM Modalities Used:

Extended descriptions and definitions of the four TCM modalities represented in these studies appear in Table 2. Acupuncture was by far the best represented TCM modality, appearing in 18 studies (95%). The other modalities for which attitudes were assessed were herbal medicine

(n=3, 16%), taichi (n=1, 5%), and cupping therapy (n=1, 5%) (Supplemental Figure 3). Additionally, one study assessed attitudes toward what was referred to only as “traditional Chinese medicine” broadly. A fifth modality, Chinese medical massage (*tuīná* 推拿), was considered for extraction given the presence of “massage” as a CAM modality throughout the literature. However, because none of the mentioned uses of “massage” were attributed to “Chinese medical massage”, it could not be assumed that they referred to the TCM practice as opposed to other body manipulation therapies.

Table 2: Description of Traditional Chinese Medicine modalities as defined by National Center for Complementary and Integrative Health (NCCIH) and represented in this review [28]

TCM Modality	Definition/Description
Acupuncture (<i>zhēn</i> 针)	Technique in which practitioners stimulate specific points (“acupoints”) on the body that lie along energy pathways (“meridians”), most often by inserting thin needles through the skin
Herbal Medicine (<i>cǎoyào</i> 草药)	Use of plants, minerals, and animal products as medicinal substances as described in various <i>Materia Medica</i> for pharmacological reference
Taichi (<i>táijíquán</i> 太极拳)	Practices that combine movements or postures with coordinated breathing and mental focus
Cupping (<i>báhuǒguànr</i> 拔火罐儿)	The use of heated suction devices on the back, neck, and shoulders

Types of Pain Conditions:

Patients experiencing chronic low back pain were included in 17 studies (89%). Other pain conditions included migraine or headache (n=3, 16%), nonspecific chronic pain (n=2, 11%), and osteoarthritis (n=1, 5%) (Supplemental Figure 4).

Table 3: Operational Definitions of Attitude and Methodology to Assess Attitudes by Study

	First Author, Date	Operational Definition of Attitude	Methods to Assess Attitude(s)	Ref.
1	Barth, J. (2016)	outcome expectancy, belief in efficacy of TCM modality	Patient Provider Expectation Clusters; patients and providers were characterized into 1 of 6 groups ("optimistic doubter", "realistic hopeful", etc.) based on a holistic assessment of questionnaire responses	[29]
2	Bishop, F. (2015)	outcome expectancy, belief in efficacy of TCM modality, fear-avoidance beliefs toward TCM modality	3-item expectancy subscale of the Credibility Expectancy Questionnaire, Devilly et al. (2000); 4 and 7-item subscales of the Fear-Avoidance Beliefs Questionnaire, Waddell et al. (1993)	[30]
3	Denneson, L. (2011)	willingness to try TCM modality, willingness to pay for TCM treatment	Four 2-part items to determine prior use and willingness modeled after Willingness to Try Checklist, Haythornthwaite et al. (2003)	[31]
4	Donovan, E. (2017)	fear-avoidance beliefs toward TCM modality	Thematic clustering of semi structured qualitative interviews guided by questions assessing background and beliefs about chronic pain and experience living with and treating chronic pain	[32]
5	Dubois, J. (2017)	belief in efficacy (perceived "usefulness") of TCM modality	Novel conceptual scale scored 0-10 for "usefulness" of modality	[33]
6	Eaves, E. (2015)	outcome expectancy (expected pain relief)	Novel mixed methods approach to qualitative analysis using guiding survey questions to assess outcome expectancies	[34]
7	Fleming, S. (2007)	outcome expectancy (perceived "helpfulness") of TCM modality	Treatment Outcomes in Pain Survey (TOPS)	[35]
8	Gaul, C (2011)	outcome expectancy (expected pain relief), belief in efficacy of TCM modality	Novel mixed methods approach to qualitative analysis using guiding interview questions to assess experience of chronic pain treatment and efficacy beliefs	[36]
9	Hopton, A. (2013)	outcome expectancy (expected pain relief, reduced reliance on medication), fear-avoidance beliefs toward TCM modality	Novel mixed methods approach to qualitative analysis using guiding interview questions to assess experience of chronic pain treatment and efficacy beliefs	[37]
10	Hsu, C. (2014)	outcome expectancy (expected pain relief), "hope" for outcome	Novel mixed methods approach to qualitative analysis using guiding interview questions to assess experience of chronic pain treatment and efficacy beliefs	[38]
11	Jones, S. (2016)	outcome expectancy (expected pain relief), "hope" for outcome , belief in efficacy of TCM modality	EXPECT Questionnaire, Jones et al. (2016); Credibility Expectancy Questionnaire, Devilly et al. (2000)	[39]
12	Kalauokalani, D. (2001)	outcome expectancy (perceived "helpfulness") of TCM modality	Novel conceptual scale scored 0-10 for expected "helpfulness" of modality	[40]

13	Kavadar, G. (2017)	belief in efficacy of TCM modality	Novel questionnaire using Likert Scale to assess benefits	[41]
14	Linde, K. (2007)	belief in efficacy of TCM modality, outcome expectancy (expected pain relief)	Two-item novel questionnaire	[42]
15	Sherman, K. (2004)	outcome expectancy ("helpfulness" for pain relief) of TCM modality, willingness to try TCM modality	Novel conceptual survey scored 0-10 for expected "helpfulness" of modality	[43]
16	Sherman, K. (2009)	outcome expectancy ("helpfulness" for pain relief) of TCM modality	Novel conceptual scale scored 0-10 for expected "helpfulness" of modality	[44]
17	Thomas, K. J. (2006)	outcome expectancy, belief in efficacy of TCM modality	Novel conceptual survey measuring expected pain relief based on SF-36 pain scores	[45]
18	Wasan, A. (2010)	outcome expectancy (expected pain relief)	Expectation for Relief Scale (ERS), Wasan et al. (2005); 0-10 scale of expected pain relief where a lower number indicates better outcome	[46]
19	Weiss, L. (2013)	desire to expand TCM service offerings, willingness to pay for TCM treatment	Novel conceptual survey with "Yes" or "No" responses to questionnaire items	[47]

Table 4: Study Design and Key Findings by Study

	First Author, Date	Study Design	Summary of Key Findings	Ref.
1	Barth, J. (2016)	questionnaire within RCT	More positive expectations for pain relief yielded better outcomes, suggesting treatment expectations predict therapy outcomes in acupuncture treatment. Patients whose outcome expectancies aligned better with those of their provider experienced better outcomes.	[29]
2	Bishop, F. (2015)	longitudinal questionnaire	Positive response expectancy helps to reduce perceptions of pain and promote placebo analgesia.	[30]
3	Dennesson, L. (2011)	cluster randomized clinical trial	TCM has broad appeal to Veterans. 88.8% of Veterans with chronic pain conditions were willing to try acupuncture and 90% were willing to try herbal medicine for pain. Potential mediators for this high willingness include low out-of-pocket costs and provider enthusiasm for CAM.	[31]
4	Donovan, E. (2017)	qualitative interview	Acupuncture causes anxiety and discomfort for some patients who then reject TCM therapy based on fear-avoidance principles.	[32]
5	Dubois, J. (2017)	cross-sectional survey	Perceived usefulness is derived from efficacy beliefs and outcome expectancies. Perceived usefulness scored on a 0-10 scale (10 being extremely helpful) by modality was 3.8 ± 3.2 for acupuncture and 3.9 ± 3.6 for Chinese medicinal herbs.	[33]
6	Eaves, E. (2015)	cross-sectional survey	Pre-treatment expectations of pain relief using acupuncture were high. Over time, patient expectations became more realistic and shifted toward greater acceptance of pain and need for long-term pain management strategies to mitigate acute flare-ups.	[34]
7	Fleming, S. (2007)	retrospective cohort survey	59.4% of patients who have used acupuncture at some point in their lives reported it was helpful.	[35]
8	Gaul, C (2011)	questionnaire-based survey	Among the subpopulation not using TCM, only 8.9% reported not believing in its efficacy. The remaining patients reported lack of knowledge or no reason at all for their lack of use. Those who pursued TCM cited a desire to "leave nothing undone" and expected improvements in their chronic conditions.	[36]
9	Hopton, A. (2013)	qualitative interview within RCT	The majority of patients reported satisfaction with the acupuncture they had received. However, only half of patients reported satisfaction with their chronic low back pain after acupuncture use. Fear of discomfort related to TCM modality is not a deterrent for use.	[37]
10	Hsu, C. (2014)	qualitative interview	Highlights the confusion among patients between "hope" and "expectations". The majority of patient expectations were self-described as "realistic" whereas their hopes were "optimistic". Overall, patient expectations were modest.	[38]

11	Jones, S. (2016)	questionnaire-based survey, 1 sample within RCT	The EXPECT questionnaire is a reliable and valid assessment tool for measuring patient expectations of treatment. Patient's evaluation of a TCM modalities "credibility" may be inconsistent with their expectation of pain relief.	[39]
12	Kalauokalani, D. (2001)	questionnaire-based survey within RCT	In both intervention and control groups, pain relief via acupuncture was observed for 86% of the participants with higher expectations of the TCM modality compared to only 68% of those with lower expectations. This suggests expectations significantly influence pain outcome independently of the treatment itself.	[40]
13	Kavadar, G. (2017)	retrospective cohort survey	The majority of patients using TCM reported belief in its efficacy after 12 months of use.	[41]
14	Linde, K. (2007)	questionnaire-based survey within RCT	For patients who consider acupuncture to be highly effective compared with those who are skeptical, the adjusted OR for having at least 50% improvement in the main outcome measure was 1.67 (95% CI 1.20–2.32). Positive attitudes toward acupuncture, as well as high personal expectations, were significantly associated with better outcomes.	[42]
15	Sherman, K. (2004)	qualitative interview	The majority of respondents held positive expectancies, though more positive expectancies were associated with greater knowledge of the modality. The majority of patients were willing to try acupuncture, and their willingness was mediated by cost and whether or not the treatment is recommended by a provider.	[43]
16	Sherman, K. (2009)	questionnaire-based survey within RCT	Pre-treatment expectations did not predict response for intervention or control groups.	[44]
17	Thomas, K. J. (2006)	questionnaire-based survey within RCT	Patients in the acupuncture group with a prior positive belief in the effectiveness of acupuncture fared little better than those randomized to usual care. This does not support the hypothesis that patient expectations can account for non-specific benefit outcomes of acupuncture.	[45]
18	Wasan, A. (2010)	questionnaire-based survey within RCT	More positive expectations were a significant predictor of greater pain relief in the true acupuncture intervention group.	[46]
19	Weiss, L. (2013)	questionnaire-based survey within RCT	The majority of patients (88%) expressed belief that TCM services should be integrated as standard care. A majority of patients also expressed willingness to pay for TCM treatments if necessary.	[47]

Overview of Measures Used to Evaluate Beliefs:

Operational measures used to represent attitudinal beliefs could be roughly sorted into one of five categories: 1) outcome expectancy; 2) efficacy beliefs; 3) willingness; 4) fear-avoidance; and 5) desire to expand TCM services in health care (Supplemental Figure 5). In the absence of a single, unified psychometric tool used to measure attitudinal beliefs, studies used a variety of analytic tools and operational definitions of attitude (Table 3).

Summary:

Attitudes were described either as outcome expectancies (including expected pain relief and expected reduction in reliance on medication), efficacy beliefs in TCM modality, willingness to try TCM modality, level of fear or discomfort toward TCM modality, or desire to see expanded TCM services offerings in health care generally. These measures all describe different components of attitude without making any comprehensive conclusions or assessments that include all of these components. For example, Hsu et al. note that the lack of a codified definition for attitude meant that patients would at times use hope for treatment and expectations of treatment interchangeably and at other times not [38]. Other studies introduced scales upon which patients score modalities based on “usefulness” and “helpfulness” [33, 35, 40, 43, 44]. However, these tools often lack the specificity needed to determine whether helpfulness may refer to relieving pain, promoting increased mobility, or other outcome measures linked to chronic pain.

Other key conclusions from this review include mixed results as to whether or not attitude toward TCM modality significantly mediates outcome. Several studies determined that patients who reported more optimistic outcome expectancies for acupuncture experienced better outcomes in pain management from acupuncture therapy [42, 46]. Similarly, those who reported higher

efficacy beliefs pre-trial experienced better outcomes [40]. Conversely, other studies found that there was either no significant relationship between pre-treatment expectations of acupuncture and outcomes or inconclusive, mixed results [43, 45]. Further inquiry is needed into the relationship between positive expectancies, efficacy beliefs, and outcomes. This is especially true for TCM therapies where positive attitudes may generate placebo analgesia and other analgesic mechanisms that cannot be explained physiologically. One study determined that the biggest determinant of an analgesic effect was high efficacy beliefs, regardless of whether patients received true or sham acupuncture [46].

An important moderator for patient expectations and attitudes was provider attitudes expressed to patients before and during treatment. Several studies noted the asymmetric knowledge between provider and patient regarding potentially viable TCM therapies and concluded that patients rely on providers to help shape their understanding of these modalities. One found that three-quarters of patients were very or somewhat likely to attempt a TCM modality to treat their chronic low back pain if their physician suggested it [33]. Consequently, by categorizing patient and provider opinions into clusters, Barth et al. (2016) noted that patient efficacy beliefs more or less conformed to those of their providers [29]. The flow of health information and opinion from provider to patient, dubbed the “therapeutic alliance”, could both heighten and lessen patient expectations [37]. In Sherman et al. (2004), even patients with low knowledge about or belief in TCM efficacy would attempt TCM therapy if their provider thought it was reasonable [38]. Other studies highlighted the impact of provider opinion on patient attitudes by describing instances where patients were encouraged by their providers to lessen their expectations to make them more realistic [34, 38]. Another study demonstrated that patients who used TCM on the recommendation

of their provider were more likely to perceive benefits than those who sought treatment independently [41].

DISCUSSION:

The primary objective of this literature review was to aggregate and analyze information on attitudinal beliefs toward TCM held by a chronic pain subpopulation. However, the feasibility of this review was made difficult due to the lack of a psychometrically-sound standard methodology for assessing attitudes. No two studies used the same methodology to assess attitudes, thus limiting the feasibility to compare both between studies and between patients in the same study. I posit that while perceived usefulness and perceived helpfulness are meant to imply efficacy beliefs and outcome expectancies, respectively, this vague language is likely to yield low reliability. When survey items are left open to respondent interpretation, data emerges that is either internally inconsistent or without an adequate assessment tool for analysis. For example, patients may report positive outcome expectancies for their TCM treatment plans while signaling low belief in the efficacy of the therapy itself [29, 39]. Similarly, patients may retrospectively report satisfaction with their TCM treatment, though this did not predict satisfaction with current pain status [37]. Linde et al. (2007) attempts to capture these various components in a simplified 2-item questionnaire where patients are asked: 1) “How effective do you consider acupuncture in general?” where answer options were “very effective, effective, slightly effective, not effective, don’t know”; and 2) “What do you personally expect from the acupuncture treatment you will receive?” where answer options were “cure, clear improvement, slight improvement, no improvement, don’t know” [42]. Therefore, although we may express measures of these various components separately, there is currently not a nuanced tool available to describe such attitudes

where patients have optimistic expectations for their treatment but little faith in the modality as a whole. Barth et al. offers a conceptual model for this phenomena where patients may be categorized as “optimistic doubters” or “unrealistic optimists”, thereby blending descriptors for attitude [29]. However, this study proposes no standard analytic tool for categorizing these attitudes. The EXPECT Questionnaire also attempts to mitigate this confusion by crafting a 13-item survey to gauge both expectations and hopes for treatment separately, where 10 scored items reflect expectations and 3 unscored items provide useful qualitative data on hopes [39]. However, the EXPECT Questionnaire must be implemented in further studies to determine reliability.

An under-researched and promising summation of attitude may be described as “willingness to try TCM ” or “willingness to pay for TCM if necessary ” which were profiled in only three (16%) of the included studies [31, 44, 47]. Willingness to pay may be a more robust measure of patient willingness because it positions TCM treatment as requiring active investment instead of passive receipt.

Given these issues, opportunities for future research involving attitudes toward TCM and other CAM therapies include:

- 1) Develop a standard methodology for describing and assessing attitudes. This assessment tool should carefully delineate between outcome expectancy and “hope for treatment” in order to make more direct logical conclusions about efficacy beliefs. It should also use standardized language that eschews vague descriptions such as “perceived helpfulness” or “perceived usefulness”. This language should accurately and specifically articulate the measure of interest in an accessible way to patient respondents. Studies assessing attitudinal beliefs may use either direct or indirect measurement tools for this purpose. Literature in this space has typically been dominated by the Likert Scale, a direct means of

measurement in which respondents indicate the degree to which they agree or disagree with pre-coded statements [41]. The Likert Scale is often criticized for its potential for experimenter and social desirability biases via leading pre-coded statements and a patient tendency to give socially desirable answers. It may also yield low reliability and vague, non-robust conclusions given its centering of a “neutral” space in which respondents may neither agree nor disagree. Indirect means of measurement alone, such as projective tests with incomplete stimuli, are not appropriate for this purpose due to their lack of objectivity and low reliability [48]. Recent studies have blended direct and indirect assessment tools to create sophisticated visual analogue scales that are less vulnerable to bias [48, 49]. To the best of my knowledge, no visual analogue scales have yet been developed to assess attitudinal beliefs toward therapy modalities. A visual analogue scale that is adapted for this purpose may allow for a more holistic assessment of patient attitudes with minimal confounders.

- 2) Evaluate changes in attitude following TCM initiation by conducting baseline and follow-up qualitative data collection on outcome expectancies, efficacy beliefs, or other operational definitions of attitude. Because many of the profiled studies included patient populations with mixed use of TCM and CAM modalities prior to study commencement, it is difficult to make claims about how attitudes toward TCM change over time.
- 3) Continue to investigate potential moderators for patient attitude such as provider attitude, demographics, education status, etc.

Limitations:

This brief scoping review has some limitations. As discussed above, there are numerous difficulties to making generalizability claims about attitude in the absence of a standardized and psychometrically sound assessment tool. Data may also become skewed through several phenomena, including patients acting upon social desirability bias when self-reporting or articulating more modest expectations so as to not “jinx” treatment [38, 41]. Additionally, I was only able to include literature published in the English language, which excludes the vast scholarship of CAM (outside the Sinosphere) published in German, Dutch, and other European languages. Similarly, given limited resources, the search strategy was incomplete compared to a systematic scoping reviews of similar research questions. In addition to missed, potentially relevant search terms, searching other databases such as the Cochrane Central Register of Controlled Trials. Furthermore, the grey literature may have yielded additional literature as chronic pain scholarship is enriched by anecdotal evidence which may not appear in peer-reviewed literature.

Conclusions:

As health care service delivery continues to transform into more patient-driven models of care, an increased sense of autonomy and a desire to leave nothing unturned may compel health consumers to attempt therapies outside of conventional medicine. Attitudinal beliefs toward these therapies can both predict attempted use and mediate more successful treatment outcomes. Therefore, while it remains necessary to expand or critique the evidence base of CAM modalities like TCM, it is also important for providers to treat patient perceptions as reality. This is especially true for chronic pain patients whose conditions of exclusion can often alienate them from

conventional therapies, as they may be less concerned with the analgesic mechanisms as they are the analgesic effect.

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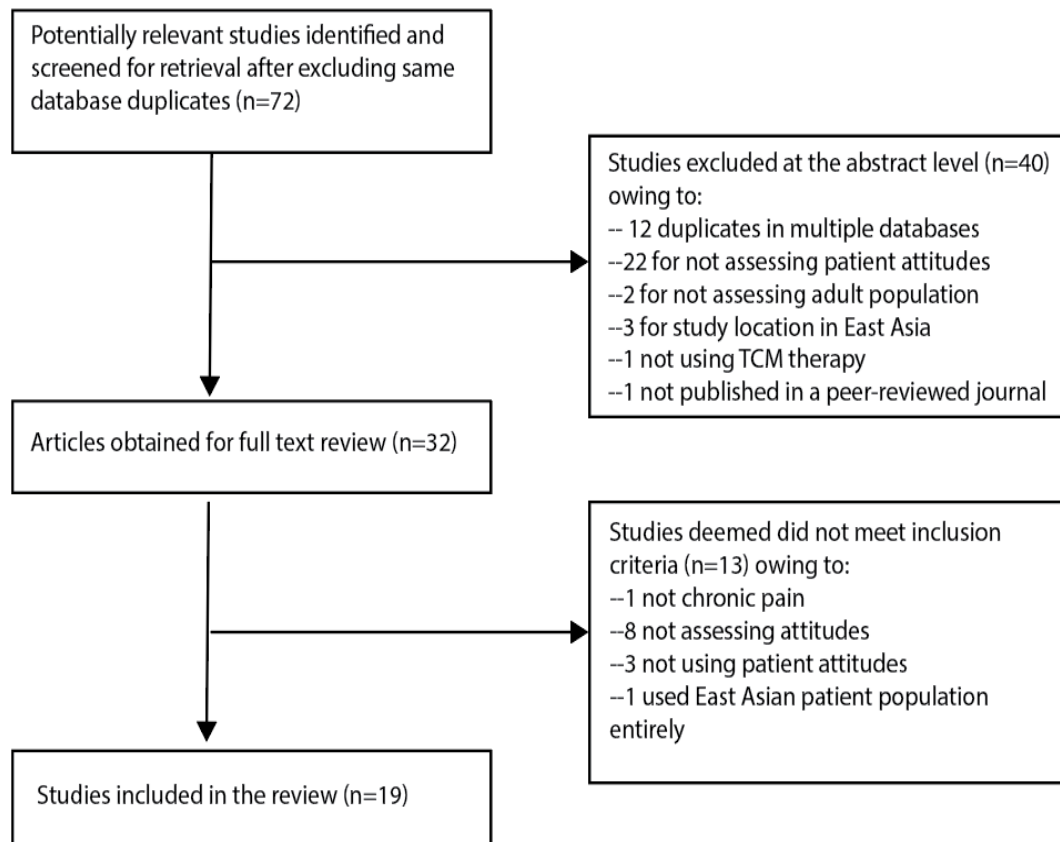
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APPENDIX:

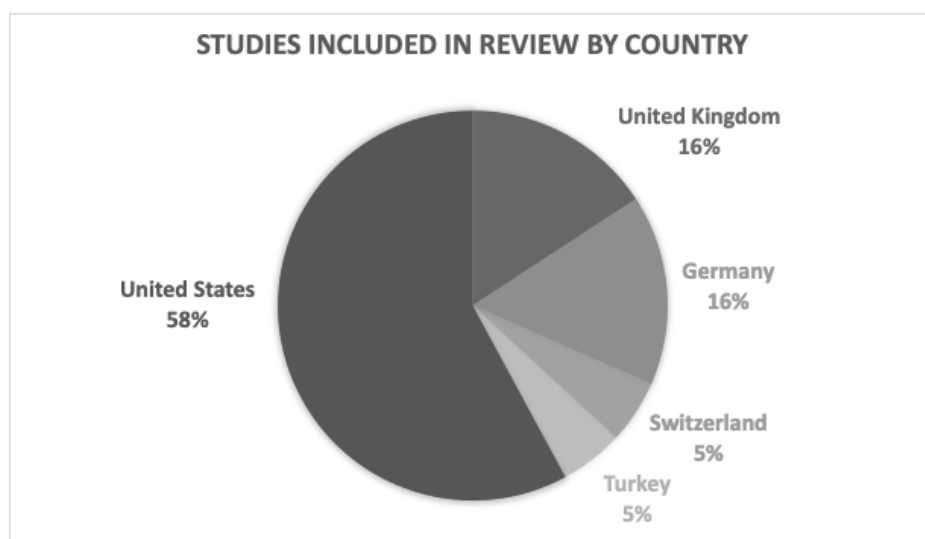
Supplemental Table 1: Search Terms, Search Dates, and Articles Identified by Database

Source	Search Terms	Years Searched	Unique Articles Identified
PubMed (MEDLINE)	(acupuncture[Text Word] OR ("acupuncture"[MeSH Terms] OR "acupuncture therapy"[MeSH Terms]) OR traditional Chinese medicine[Text Word] OR "medicine, Chinese traditional"[MeSH Terms] OR qigong[Text Word] OR "qigong"[MeSH Terms] OR tai chi[Text Word] OR "tai ji"[MeSH Terms] OR moxibustion[Text Word] OR "moxibustion"[MeSH Terms]) AND ("chronic pain"[MeSH Terms] OR chronic pain[Text Word] OR "fibromyalgia"[MeSH Terms] OR fibromyalgia[Text Word]) AND (attitude[Text Word] OR "attitude"[MeSH Terms] OR "culture"[MeSH Terms] OR belief[Text Word])	From 1 January 1999-2019	43
PsycINFO	TX acupuncture AND TX chronic pain AND TX attitudes	From 1 January 1999-2019	12
	TX traditional Chinese medicine AND TX chronic pain AND TX attitudes		
	TX acupuncture AND TX fibromyalgia AND TX attitudes		
	TX traditional Chinese medicine AND TX fibromyalgia AND TX attitudes		
CINAHL (Cumulative Index to Nursing and Allied Health Literature)	TX acupuncture AND TX chronic pain AND TX attitudes	From 1 January 1999-2019	17
	TX traditional Chinese medicine AND TX chronic pain AND TX attitudes		
	TX acupuncture AND TX fibromyalgia AND TX attitudes		
	TX acupuncture AND TX chronic pain AND TX beliefs		
	TX traditional Chinese medicine AND TX chronic pain AND TX beliefs		

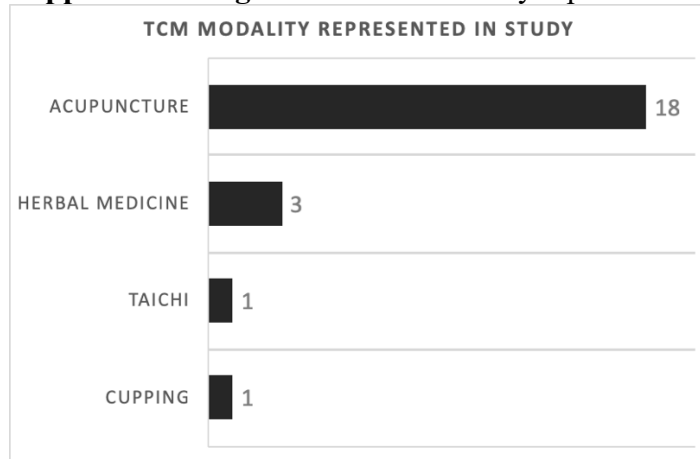
Supplemental Figure 1: PRISMA Flow-Chart Illustrating the Analytic Sample



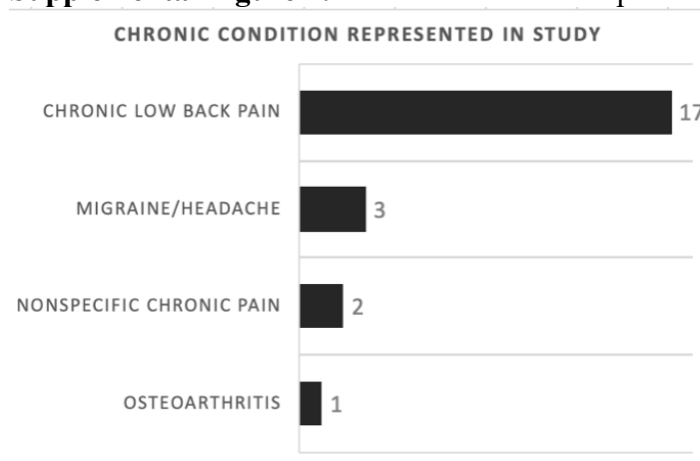
Supplemental Figure 2: Studies included in review by country



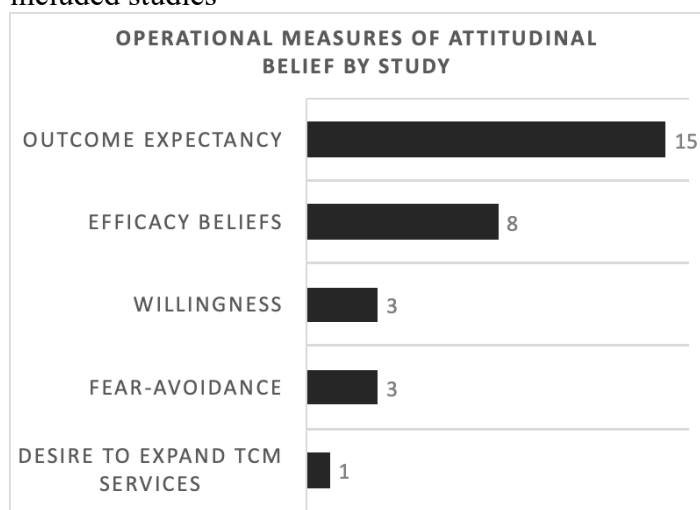
Supplemental Figure 3: TCM Modality represented in review by number of studies



Supplemental Figure 4: Chronic conditions represented in review by number of studies



Supplemental Figure 5: Operational measures of attitudinal beliefs by representation in included studies



Part II: Association between self-reported self-determination and
hospitalization among adults 65 years and older

ABSTRACT

Objective: To examine associations between level of self-determination and hospitalization among community-dwelling older adults.

Background: Self-determination, as a theoretical construct, describes one's ability to exercise autonomy over their own life and decision-making. Older adults may report significant declines in their self-determination as they age due to both the objective loss of functionality and misconceptions about the aging processes. Older adults who remain in perceived control of their decision-making report feeling younger and attaining greater longevity and quality of life. It is necessary to empower older adults and their social or health care networks to prioritize individual autonomy to preserve important identity factors and self-efficacy to take care of oneself through the later part of life.

Design and Sample: Secondary analyses were performed with data from the National Health and Aging Trend Study (NHATS) Rounds 5 and 6. The exposure variable was level of self-reported self-determination in making one's own decisions. The primary outcome variable was any hospitalization within the last 12 months as a proxy for morbidity. Secondary outcomes were death and non-retention in study during the year. Covariates included sex, race, age, marital status, Medicaid dual-eligibility, overall self-reported health status, dementia, and a derived measure of multimorbidity. Descriptive statistics and multiple logistic regression analyses were performed for a total of 5,620 community-dwelling older adults aged 65 and older.

Results: After fitting logistic regression and multinomial logistic regression models for the three outcomes, the log-odds parameter estimates suggested that one's likelihood of being hospitalized or dying increased as level of self-determination decreased. There was no significant association between self-determination and non-retention in the study for reasons other than death.

Discussion: These findings articulate the need to preserve older adults' autonomy over their health and health care decisions-making where appropriate. Potential interventions should raise individual self-efficacy to perform healthy behaviors and reduce paternalism in care while technological efforts should be made to preserve an individual's functionality in line with their perception of their health.

BACKGROUND

As people age, they often experience cognitive decline and decreased mobility that inhibit their ability to maintain their previous level of autonomy, here defined as having control over the decisions that affect one's health, lifestyle, and well-being. However, research suggests that autonomy declines with age due not just to an objective decline in functionality, but also the preconceived misconception that physical decrement is inevitable with age [1]. Harmful normative beliefs surrounding aging may prematurely strip older adults of their decision-making power irrespective of their physical and mental capacity by diminishing their self-efficacy to handle their own affairs.

Rotter's Social Learning Theory first described key constructs in human development where individuals are conditioned to expect certain outcomes that correspond to particular behaviors they may perform and choices they may make [2]. These outcome expectations and resultant behaviors develop in turn with one's personality traits, and though subject to change, are intrinsically tied to one's identity. An upheaval in ability to perform behaviors (due to objective functional status or subjective loss of perceived ability), as is often the case for aging adults, may thus be harmful to the individual's sense of self-empowerment and capability.

Bandura's subsequent Social Cognitive Theory similarly seeks to explain how people regulate their behaviors through control and reinforcement by describing a self-efficacy construct [3]. Low self-efficacy may disincentivize healthy behaviors (e.g., medication management, physical activity, and smoking cessation) and personal maintenance by lowering outcome expectations of performing said behaviors and reinforcing the belief that no matter one's actions or environmental situation, disablement is unavoidable [4]. Bandura's agentic theories of self-efficacy provide a conceptual model where individual's perceive fewer impediments and greater facilitators to health and perform healthier behaviors accordingly [5]. Perhaps a more salient pathway between perceived control and health outcomes are instances where caregivers, family members, and health care providers may misappropriate ageist misconceptions or self-assessment of their charge's faculty to exercise undue influence or control over their decision-making [6, 7].

Additionally, older adults who report feeling in more control of their decision-making are more likely to report feeling a younger subjective age [8]. Previous studies have identified subjective age as a predictor of mortality and a biopsychosocial marker of aging [9]. Self-Determination Theory describes how perceptions of autonomy by the individual "appear to be essential for facilitating optimal functioning of the natural propensities for growth and integration, as well as for constructive social development and personal well-being" [10]. Previous studies have shown autonomy, self-determination, and desired level of social integration to be associated with longevity [11] and quality of life [12, 13].

I posit this is because superficial or seemingly innocuous decisions made during one's daily life (e.g., clothes, meals, and opportunities for social engagement) correspond to deeply held personality traits and identity, and repeated loss of the locus of control over these identity factors may irreparably damage one's sense of self. Geriatric medicine and support networks for older

adults are replete with opportunity to better center the individual at the head of their decision-making team where appropriate. Health care providers and caregivers must prioritize efforts to sustain older individuals' sense of autonomy and locus of control as they age. This research seeks to further develop the evidence base linking older adults' perceived diminished control over their decision-making and personal autonomy to adverse health outcomes by analyzing the associations between a measure of self-determination and all-cause hospitalization.

METHODS

Data:

Data were obtained from Rounds 5 (2015) and 6 (2016) of the National Health and Aging Trend Study (NHATS)[14]. NHATS surveyors conduct annual, in-person interviews with respondents where they are asked questions regarding the disablement process, its consequences, and end-of-life care. Subjects must be 65 years or older and are sampled from the general Medicare population. The survey is longitudinal with the same cohort reporting for Rounds 5 and 6. I selected these two rounds because Round 5 is the most recently replenished cohort. For these analyses, I used the Sample Person (SP) and Tracker public use files. Subjects were matched across rounds by their participant ID.

In order to account for the expected loss of individual autonomy and the elevated risk of hospital admission and readmission for those in institutionalized care settings [15], the final analytic sample ($N=6,477$) was restricted to participants who resided in the community during the Round 5 survey wave. This excluded 1,264 participants living in institutionalized settings or without a valid response for residential setting. Also excluded were subjects who used a proxy in

Round 5, as the subjects' reports of their level of self-determination may be contaminated by their proxy respondents. Furthermore, the analytic sample only includes participants with valid response data for the categorical Round 5 self-determination variable.

To account for the complex survey design, I applied Taylor linearization Rounds 5-8 analytic weights using the stratum and cluster variables tied to the 2014 sampling frame. Subjects are weighted up to represent all Medicare beneficiaries ages 65 and older residing in the contiguous United States who were eligible for NHATS in September 2014.

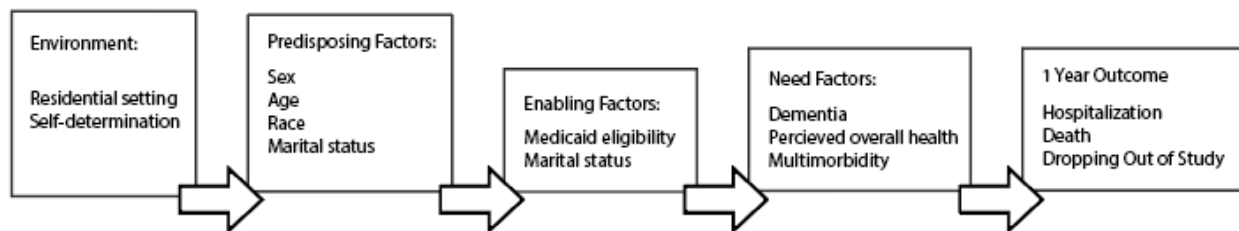
Measures:

The exposure measure uses a Round 5 NHATS item that asks to what extent respondents agree with the statement, "Other people determine most of what I can and cannot do", where valid responses are "agree a lot", "agree a little", and "agree not at all". I then operationalized level of self-determination into three categories: (1) "low self-determination", (2) "moderate self-determination", and (3) "high self-determination", to correspond to the three levels of agreement that others make the majority of a participants' decisions. Nonvalid responses were those coded "Refused", "Don't Know", and "Missing".

In order to select covariates, a literature review was conducted by searching PubMed for peer-reviewed publications in which older adult subjects were assessed for risk factors for hospitalization or quality of life-related health outcomes. Medical Subject Headings (MeSH) queries included "hospitalization", "inpatients", "personal autonomy", and "geriatrics", and were supplemented by keywords and phrases including "self-determination", "control beliefs", and "older adults". These results are reported in Table 1. All covariate data are from Round 5 and

presented using the Andersen Healthcare Utilization Model as a conceptual framework, visualized in Figure 1 [16].

Figure 1: Conceptual framework between self-determination and 1-year outcomes



Predisposing factors included in the final models are sex, race, age, and marital status. Enabling factors were Medicaid dual-eligibility status and marital status. Marital status is here described as both a predisposing and enabling factor due to my hypothesis that being married and living with a spouse act as protective factors against hospitalization. Medicaid dual-eligibility has been shown to be associated with higher rates of hospitalization and in-patient service utilization [17]. Need factors were dementia diagnosis, overall self-reported health status, and multimorbidity. Although the majority of subjects with dementia were excluded due to using a proxy respondent, those remaining in the sample may experience diminished personal autonomy due to standards of care for people with dementia. Overall self-reported health status describes a dimension of “perceived need” in Andersen’s model. Previous studies have indicated that poor self-rated health is significantly associated with reporting reduced self-determination [18]. Overall health status is derived from an NHATS item that asks, “Would you say that in general your health is excellent, very good, good, fair, or poor?”. I collapsed potential categories into “Excellent to Very Good”, “Good” and “Fair to Poor”. In order to assess multimorbidity, I created a composite score (0-9) using nine NHATS dichotomous indicators for chronic conditions (heart attack, high blood

pressure, arthritis, osteoporosis, diabetes, lung disease, stroke, and dementia). A score of three was selected as the optimal cutoff due to its robust predictive value for hospitalization outcome [19]. Potential concerns with this selection are addressed in the Limitations section.

The primary Round 6 outcome measure uses an NHATS item during Round 6 that asks “Have you had an overnight hospital stay since the time of the last interview/within the last 12 months?” Valid responses are “Yes” and “No”, and were operationalized into a dichotomous variable. Additionally, for the purposes of multinomial logistic regression, reasons for nonvalid responses in Round 6 were retained and coded as either death or dropping out of the study. These two secondary outcomes were included to gauge the predictive value of the exposure variable and covariates on four total outcomes. The dichotomous hospitalization outcome and two secondary outcomes are mutually exclusive.

Analytic Approach:

All analyses were conducted using Stata Statistical Software: Release 16 (2019) [20]. I first calculated the descriptive characteristics of subjects in the analytic sample using cross tabulations and report the sample *n* and survey weighted prevalences. I then calculated the descriptive characteristics of the sample against the following four potential one-year outcomes: (1) Experienced no hospitalization between Rounds 5 and 6 and was retained in study; (2) Experienced any hospitalization between Rounds 5 and 6 and was retained in study; (3) Died between Rounds 5 and 6 and was not retained in study; and (4) Dropped out or was lost to follow up between Rounds 5 and 6 due to reasons other than death. Nonvalid and missing responses for covariates were excluded from the sample for the purpose of regression analyses. Next, I conducted two regression models. The first is a logistic regression model presenting the survey weighted adjusted

log odds among the independent variable and covariates with the primary outcome measure (hospitalization). The second fits a multinomial logistic regression model to present the survey weighted log odds of the two secondary outcomes (death and dropped out).

RESULTS

Table 2 provides descriptive statistics of the subjects included in the sample, stratified by level of self-determination. Demographically, the sample population was comprised of predominately females (54.8%), non-Hispanic Whites (81.5%), and those aged 65 to 74 (59.4%). Those reporting a high level of self-determination were more likely to be younger (62.0%), married and living with their partner (59.5%), and not Medicaid eligible (90.8%). They were also less likely to report need, as the majority of those with high self-determination rate their overall health status as “Excellent to Very Good”, do not have a dementia diagnosis (98.9%), and have fewer than three comorbid chronic conditions (65.0%). Subjects with low self-determination were similarly found to on average younger (46.9%), married (54.0%), and not Medicaid eligible (72.6%), though they were less likely to be so compared to their high self-determination counterparts across all domains. Those reporting low self-determination were also far more likely to report need, with a greater proportion assessing their overall health as “Good” (36.0%) or “Fair to Poor” (35.3%) and nearly half reporting having three or more comorbid chronic diagnoses (49.1%).

Table 3 similarly presents descriptive statistics of the sample, now stratified by four potential one-year outcomes. There was an attrition rate of 12.7% between Round 5 ($N=8,334$) and Round 6 ($N=7,276$). The most common outcome ($N=4,361$) was to experience a hospitalization and remain in the sample. Across all outcomes, subjects were most likely to report high self-determination, though the proportion was highest among the group that was not

hospitalized (74.4%). Those who experienced any hospitalization were typically older and in poorer health during Round 5, with a small proportion (51.7%) aged 65 to 74 compared to the non-hospitalized group, 33.5% reporting “Fair to Poor” overall health, and 53.3% experiencing three or more comorbid chronic conditions.

Unsurprisingly, similar patterns to the hospitalized outcome group, albeit more exaggerated, are apparent among those that died. Those who died were older and in poorer health, with 30.85% of the group aged 85 or older, 50.61% reporting “Fair to Poor” overall health, and 58.60% experiencing three or more comorbid chronic conditions.

There are few distinguishing characteristics of the outcome group that dropped out compared to the characteristics of the other outcome groups. A notable exception is overall health status, in which those who were lost to follow-up were the only outcome group to report a plurality “Excellent to Very Good” overall health status (44.05%). This may suggest that those who perceive their health status more positively are less inclined to continue participating in a longitudinal study focused on their health and well-being.

Table 4 presents the results of both regression models for the three potential outcomes. After adjustment, the relative log odds of experiencing a hospitalization event increased by 0.26 if reporting low self-determination. Because this value is statistically significant at $p < 0.05$, this suggests that one’s likelihood of being hospitalized increases as self-determination decreases. For the primary outcome, race (Hispanic), age (75 to 84, 85+), marital status (Single/Divorced), overall health status (Good, Fair to Poor), and having three or more comorbid conditions, and Medicaid eligibility were all found to be significant moderating factors between self-determination and hospitalization.

A similar phenomenon is observed among those that died, as the relative log-odds of death compared to no hospitalization increase by 0.76 if reporting low self-determination. Among those who died, sex, race (Hispanic, other non-White), age (75 to 84, 85+), overall health status (Good, Fair to Poor), and having three or more comorbid conditions were all found to be significant moderating factors between self-determination and death.

There were no significant associations between Round 5 level of self-determination and dropping out of the study between Rounds 5 and 6.

DISCUSSION

In this study, I observe that among a national sample of Medicare beneficiaries, higher level of self-determination was associated with a lower odds of hospitalization or death during the year. These findings are consistent with my hypothesis that level of self-determination has value in predicting adverse health outcomes and death, thereby strengthening existing research that links self-determination and perceived autonomy to health through pathways that are not yet fully understood. Secondly, factors such as age, marital status, overall health status, multimorbidity, and Medicaid eligibility are shown to moderate the relationship between self-determination and hospitalization.

In this study, we established a link between self-determination and hospitalization, findings that may be used to promote psychosocial and behavioral interventions aimed at raising one's perceived control. Given the association between multimorbidity and hospitalization, interventions that improve self-efficacy may raise an individual's sense of control and help improve their health status via chronic condition management. For example, behavioral interventions targeting self-efficacy have been shown to improve management of chronic conditions such as hypertension,

arthritis, heart disease, and diabetes and reduce outpatient and inpatient service needs [21-26]. Such interventions should use programming that includes (i) skills mastery, (ii) modeling, (iii) specific goal-setting, and (iv) behavioral feedback to promote active behavior regulation [25, 27]. This may slow the disablement process or the degenerative effects of multimorbidity by heightening one's perceived control over their health outcomes and thus encouraging active participation in performing healthy behaviors. Interventions should also target modifiable social factors that influence health care decision-making among older adults, such as educating caregivers on how to reduce paternalistic care and promote autonomy. This may include strategies such as (i) consciousness-raising of paternalistic behaviors, (ii) role-play, and (iii) reinforcement of autonomist behaviors [28]. These strategies are consistent with the virtues of patient-centered care, including personhood, maximizing choice and autonomy, and nurturing relationships, all of which improve the psychological and physical health of older adults [29].

Although this study extols the power of self-determination to influence health, health cannot be improved by control beliefs alone. Other factors such as age, marital status, overall health status, and multimorbidity moderate the relationship between self-determination and health. The moderating effects of age, marital status, overall health status, and multimorbidity may be partially offset by improving mobility within one's environment and accessible technologies to improve one's capacity to independently manage chronic conditions. As such, these findings lend support for development of adaptive technologies and programs that offset declines in functionality and allow older adults to maintain greater agency for longer.

Similarly, environmental factors influencing hospitalization cannot be alleviated by empowerment interventions at the individual level. Potential disparities driven by access are represented in these findings where both the hospitalized group and group that died were more

likely to be Medicaid eligible. This may suggest that low-income status has some predictive value to the 1-year hospitalization and death outcomes. It may also indicate that dually-eligible older adults are more likely to utilize inpatient services compared to those who are only Medicare beneficiaries. This is consistent with several studies that have found dual eligibility to be positively associated with utilization of emergency room and hospital inpatient services [30, 31]. This phenomenon is likely driven by known health disparities among dual beneficiaries, who experience higher rates of chronic comorbid conditions and functional impairments [32]. Given these differences in the dual population, interventions specifically targeted to duals that focus on improving self-efficacy and beliefs about control are needed.

This study has several limitations. Potential disruptors to internal validity include that the time elapsed between the collection of self-determination and outcome data was only one year, which may not fully capture the health-related consequences of diminished personal agency. Future studies should consider data analyses at additional follow-up rounds, or consider whether those reporting moderate or low self-determination are more likely to report diminished or continually low self-determination in subsequent rounds. Furthermore, this study does not include a measure of functional status in the final regression models. This is because in a previous research study using Round 5 NHATS data, I found that the functional status variable (derived from three items that assessed the subject's need for help in eating, need for help in moving around indoors, and need for help in moving around outdoors) was too highly correlated with the overall health status and self-determination variables. Future studies may reintroduce a novel measure of functional status to assess its interactions with the exposure and outcome of interest. Finally, perceived overall health status as a proxy variable may not accurately represent the subject's

overall health. Additional analyses may verify whether the perception of one's health or its improvements correspond to objective health outcomes.

Additionally, this study may have limited generalizability, firstly because the NHATS collection instruments only survey diagnoses of seven common chronic disease diagnoses. As shown in Table 1, similar studies have used up to 29 separate chronic conditions to index multimorbidity. Additional cut-points for number of chronic conditions may also be assessed to determine the optimal number of conditions for statistical significance. Finally, although the hospitalization outcome is inversely associated with self-determination, we cannot determine the full extent of the relationship from this information alone. Because the hospitalization outcome variable is dichotomous, it does not provide information on the frequency of hospitalization after the subject's initial visit. A continuous variable denoting frequency of hospitalization may yield more robust findings. The study also does not differentiate between elective in-patient surgeries and acute or emergency hospitalization.

While strategies are needed to incorporate the concepts of self-efficacy and self-determination into care and interventions for older adults, these alone will not reduce the saliency of objective changes to physical and cognitive functionality. To maximize the potential to improve health outcomes by raising self-determination, midstream and upstream interventions and technologies meant to improve older adults' ability to manage themselves and their health into extended age should be implemented in conjunction with individual-level changes to care.

CONCLUSION

Self-determination is a useful predictor of adverse health outcomes among older adults. Interventions that target self-efficacy and control beliefs as key constructs may help to increase

longevity and mitigate adverse health outcomes as individuals age. Healthcare providers and caretakers should make every effort to employ a person-centered approach to aging, where older adults are encouraged and empowered to maintain their place at the head of their care decision-making team where appropriate.

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APPENDIX

Table 1: Characteristics of literature reviewed for covariate selection

First Author, Year	Journal	Location	Number in Sample	Sex	Age	Race	Marital Status	Medicaid eligibility	Perceived Health Status	Dementia	Number of Conditions Assessed for Multimorbidity	Reference
Amjad (2016)	<i>JAMA Internal Medicine</i>	United States	1,416,369	Yes	Yes	Yes	No	Yes	No	No	Unlimited ³	[33]
Berridge (2018)	<i>J Aging Health</i>	United States	6,459	Yes	Yes	Yes	Yes	Yes	No	Yes	8	[34]
Bilgili (2014)	<i>Archives of Geront & Geriatrics</i>	Turkey	300	Yes	Yes	No	Yes	N/A	No	No	N/A ¹	[35]
Brown (2019)	<i>JAMA Internal Medicine</i>	United States	5,540	Yes	Yes	Yes	Yes	No	No	No	10	[36]
Drageset (2009)	<i>Int J Nurs Stud</i>	Norway	227	Yes	Yes	No	Yes	N/A	Yes	No	18	[37]
García-Olmos (2019)	<i>PLoS One</i>	Spain	251	Yes	Yes	No	No	N/A	Yes	No	5	[38]
Kadu (2019)	<i>Canadian Geriatrics J</i>	Canada	48,601	Yes	Yes	No	Yes	N/A	Yes	Yes	Unlimited ²	[39]
Krumholz (2015)	<i>JAMA</i>	United States	68,374,904	Yes	Yes	Yes	No	Yes	No	No	12	[40]
Lee (2006)	<i>Int J Nurs Stud</i>	Korea	1,920	Yes	Yes	No	Yes	N/A	Yes	No	Unlimited ²	[41]
Lee (2019)	<i>JAMA Surgery</i>	United States	962,942	Yes	Yes	Yes	No	No	No	Yes	29 ⁴	[42]
Nunes (2017)	<i>Revista de saude publica</i>	Brazil	1,593	Yes	Yes	Yes	Yes	N/A	No	No	17	[19]
Shih (2015)	<i>J Gen Intern Med</i>	United States	120,957	Yes	Yes	Yes	Yes	Yes	No	No	17 ⁵ , 29 ⁴ , Unlimited ³	[43]
Siabani (2020)	<i>Adv J Emerg Med</i>	Iran	2,415	Yes	Yes	No	Yes	N/A	No	No	7	[44]
Tu (2006)	<i>Int J Nurs Stud</i>	Taiwan	102	Yes	Yes	No	Yes	N/A	No	Yes	N/A	[45]
Wadhera (2020)	<i>JAMA</i>	United States	71,017,608	Yes	Yes	Yes	No	No	No	No	20	[17]

¹ Includes a dichotomous variable of any chronic condition

² Includes a continuous variable of self-reported number of chronic conditions

³ Includes a continuous variable of CMS-HCC score derived from 9,000+ categorized ICD-10 codes

⁴ Includes a continuous variable of Deyo-Charlson index score

⁵ Includes a continuous variable of Elixhauser index score

Table 2: Descriptive statistics of characteristics of older adults living in the community, by level of self-determination, NHATS Round 5

Key: n (survey- weighted %)		Low self-determination (n=565)	Moderate self-determination (n=1,097)	High self-determination (n=3,958)	Total (n=5,620)
Hospitalized in the Last 12 months	<i>No</i>	393 (70.80%)	839 (78.38%)	3,129 (80.93%)	4,361 (79.62%)
	<i>Yes</i>	172 (29.20%)	258 (21.62%)	829 (19.07%)	1,259 (20.38%)
Sex	<i>Male</i>	230 (44.1%)	499 (48.38%)	1,671 (44.57%)	2,400 (45.24%)
	<i>Female</i>	335 (55.90%)	598 (51.62%)	2,287 (55.43%)	3,220 (54.76%)
Race	<i>White, non-Hispanic</i>	305 (65.75%)	754 (78.89%)	2,914 (83.98%)	3,973 (81.53%)
	<i>Black, non-Hispanic</i>	176 (14.18%)	225 (7.39%)	765 (7.57%)	1,166 (8.08%)
	<i>Hispanic</i>	57 (12.37%)	79 (8.90%)	180 (5.55%)	316 (6.73%)
	<i>Other non-white: American Indian, Asian, Native Hawaiian</i>	23 (6.86%)	34 (4.30%)	81 (2.49%)	138 (3.19%)
	<i>DK/RF</i>	4 (0.85%)	5 (0.52%)	18 (0.41%)	27 (0.47%)
SP Age at Interview	<i>65 to 74</i>	167 (46.88%)	384 (54.70%)	1,738 (62.00%)	2,289 (59.40%)
	<i>75 to 84</i>	261 (38.58%)	440 (32.06%)	1,597 (29.96%)	2,298 (31.06%)
	<i>85+</i>	137 (14.54%)	273 (13.24%)	623 (8.04%)	1,033 (9.54%)
Marital Status	<i>Married/Living with Partner</i>	256 (54.01%)	561 (58.87%)	2,065 (59.48%)	2,882 (58.92%)
	<i>Widowed</i>	201 (27.39%)	373 (24.88%)	1,167 (22.35%)	1,741 (23.24%)
	<i>Single/Divorced</i>	108 (18.59%)	163 (16.25%)	725 (18.17%)	996 (17.85%)
	<i>DK/RF</i>	--	--	1 (0.008%)	1 (0.006%)
Medicaid-dual eligibility	<i>No</i>	396 (72.59%)	900 (85.77%)	3,497 (90.81%)	4,793 (88.37%)
	<i>Yes</i>	154 (24.86%)	176 (13.17%)	396 (7.94%)	726 (10.31%)
	<i>DK/Missing</i>	15 (2.55%)	21 (1.06%)	65 (1.25%)	101 (1.32%)
Self-reported Overall Health Status	<i>Excellent to Very Good</i>	146 (28.80%)	342 (35.41%)	1,908 (53.70%)	2,396 (48.25%)
	<i>Good</i>	207 (35.91%)	414 (36.91%)	1,316 (30.26%)	1,937 (31.96%)
	<i>Fair to Poor</i>	212 (35.29%)	341 (27.67%)	731 (15.99%)	1,284 (19.75%)
	<i>DK/RF</i>	--	--	3 (0.05%)	3 (0.04%)
Diagnosed with Dementia	<i>No</i>	527 (94.81%)	1,041 (96.72%)	3,884 (98.86%)	5,452 (98.13%)
	<i>Yes</i>	38 (5.19%)	54 (3.20%)	72 (1.10%)	164 (1.83%)
	<i>DK</i>	--	2 (0.08%)	2 (0.04%)	4 (0.05%)
Number of comorbid chronic conditions	<i><3</i>	264 (50.88%)	524 (51.57%)	2,350 (64.97%)	3,138 (61.32%)
	<i>≥3</i>	301 (49.12%)	573 (48.43%)	1,608 (35.03%)	2,482 (38.68%)

Table 3: Descriptive Characteristics of Sample, 1-Year Outcome, NHATS Rounds 5 (2015) and 6 (2016)

Key: n (survey-weighted %)		No Hospitalization (n=4,361)	Hospitalization (n=1,259)	Death (n=233)	Dropped Out/ Lost to R6 Follow-Up (n=624)
Level of Self-Determination	<i>Low</i>	393 (7.35%)	172 (11.84%)	47 (21.20%)	60 (9.64%)
	<i>Moderate</i>	839 (18.27%)	258 (19.69%)	67 (27.53%)	138 (19.24%)
	<i>High</i>	3,129 (74.39%)	829 (68.48%)	119 (51.27%)	426 (71.12%)
Sex	<i>Male</i>	1,861 (45.08%)	539 (45.85%)	123 (54.19%)	258 (43.02%)
	<i>Female</i>	2,500 (54.92%)	720 (54.15%)	110 (45.81%)	366 (56.98%)
Race	<i>White, non-Hispanic</i>	3,120 (81.81%)	853 (80.43%)	157 (76.26%)	401 (73.19%)
	<i>Black, non-Hispanic</i>	869 (7.68%)	297 (9.62%)	56 (11.08%)	138 (9.72%)
	<i>Hispanic</i>	247 (6.85%)	69 (6.30%)	5 (2.39%)	50 (9.82%)
	<i>Other non-white: American Indian, Asian, Native Hawaiian</i>	104 (3.20%)	34 (3.14%)	13 (9.20%)	31 (6.51%)
	<i>DK/RF</i>	21 (0.46%)	6 (0.52%)	2 (1.07%)	4 (0.76%)
SP Age at Interview	<i>65 to 74</i>	1,844 (61.36%)	445 (51.72%)	40 (28.12%)	283(61.81%)
	<i>75 to 84</i>	1,760 (29.73%)	538 (36.25%)	100 (41.03%)	256 (31.82%)
	<i>85+</i>	757 (8.90%)	276 (12.03%)	93 (30.85%)	85 (6.37%)
Marital Status	<i>Married/Living with Partner</i>	2,289 (60.33%)	593 (53.40%)	99 (47.92%)	328 (61.34%)
	<i>Widowed</i>	1,318 (22.51%)	423 (26.09%)	94 (32.61%)	178 (20.94%)
	<i>Single/Divorced</i>	753 (17.16%)	243 (20.52%)	40 (19.46%)	116 (17.55%)
	<i>DK/RF</i>	1 (0.007%)	--	--	2 (0.18%)
Medicaid-dual eligibility	<i>No</i>	3,778 (89.71%)	1,015 (83.48%)	177 (74.38%)	524 (86.99%)
	<i>Yes</i>	505 (9.08%)	221 (15.13%)	43 (20.16%)	86 (11.26%)
	<i>DK/Missing</i>	74 (1.21%)	22 (1.39%)	13 (5.46%)	14 (1.75%)
Self-reported Overall Health Status	<i>Excellent to Very Good</i>	636 (18.19%)	74 (6.79%)	44 (17.07%)	235 (44.05%)
	<i>Good</i>	2,901 (65.56%)	722 (59.59%)	74 (32.32%)	210 (30.69%)
	<i>Fair to Poor</i>	822 (16.22%)	462 (33.53%)	115 (50.61%)	179 (25.26%)
	<i>DK/RF</i>	2 (0.03%)	1 (0.09%)	--	—
Diagnosed with Dementia	<i>No</i>	4,243 (98.44%)	1,209 (96.91%)	218 (94.66%)	594 (96.04%)
	<i>Yes</i>	114 (1.50%)	50 (3.09%)	15 (5.34%)	29 (3.61%)
	<i>DK</i>	4 (0.06%)	--	--	1 (0.35%)
Number of comorbid chronic conditions	<i><3</i>	2,600 (65.07%)	538 (46.67%)	98 (41.40%)	357 (61.43%)
	<i>≥3</i>	1,761 (34.93%)	721 (53.33%)	135 (58.60%)	267 (38.57%)

Table 4: Adjusted Log-Odds Parameter Estimates of Potential 1-Year Outcomes of Sample, NHATS Rounds 5 (2015) and 6 (2016)

Key: Adjusted log-odds (95% Confidence Interval)		Hospitalization (n=1,259)	Death (n=233)	Dropped Out/Lost to R6 Follow-Up (n=624)
Level of Self-Determination	<i>Low</i>	0.26 (0.00, 0.52)*	0.76 (0.25, 1.28)**	0.07 (-0.27, 0.40)
	<i>Moderate</i>	-0.09 (-0.35, 0.17)	0.27 (-0.20, 0.75)	-0.01 (-0.25, 0.24)
	<i>High</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
Sex	<i>Male</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
	<i>Female</i>	-0.18 (-0.36, 0.01)	-0.65 (-1.07, -0.24)**	0.12 (-0.12, 0.36)
Race	<i>White, non-Hispanic</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
	<i>Black, non-Hispanic</i>	-0.15 (-0.31, 0.02)	-0.11 (-0.54, 0.32)	0.26 (-0.02, 0.54)
	<i>Hispanic</i>	-0.55 (-0.96, -0.13)**	-1.69 (-2.78, -0.61)**	0.31 (-0.08, 0.69)
	<i>Other non-white: American Indian, Asian, Native Hawaiian</i>	-0.26 (-0.70, 0.18)	0.88 (0.16, 1.60)*	0.80 (0.37, 1.22)***
SP Age at Interview	<i>65 to 74</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
	<i>75 to 84</i>	0.26 (0.13, 0.39)***	0.94 (0.42, 1.46)***	0.03 (-0.15, 0.21)
	<i>85+</i>	0.31 (0.12, 0.50)**	1.91 (1.47, 2.35)***	-0.44 (-0.74, -0.13)**
Marital Status	<i>Married/Living with Partner</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
	<i>Widowed</i>	0.12 (-0.09, 0.32)	0.07 (-0.42, 0.55)	-0.11 (-0.40, 0.17)
	<i>Single/Divorced</i>	0.21 (0.01, 0.42)*	0.36 (-0.11, 0.84)	-0.08 (-0.39, 0.24)
Medicaid-dual eligibility	<i>No</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
	<i>Yes</i>	0.26 (0.01, 0.52)*	0.51 (-0.07, 1.08)	-0.11 (-0.42, 0.21)
Self-reported Overall Health Status	<i>Excellent to Very Good</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
	<i>Good</i>	0.47 (0.24, 0.70)***	0.81 (0.31, 1.30)**	0.13 (-0.12, 0.38)
	<i>Fair to Poor</i>	1.02 (0.81, 1.22)***	1.90 (1.41, 2.38)***	0.53 (0.25, 0.81)***
Diagnosed with Dementia	<i>No</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
	<i>Yes</i>	0.28 (-0.12, 0.69)	0.39 (-0.31, 1.08)	0.91 (0.39, 1.43)***
Number of comorbid chronic conditions	<i><3</i>	1.00 (ref)	1.00 (ref)	1.00 (ref)
	<i>≥3</i>	0.42 (0.25, 0.60)***	0.42 (0.07, 0.76)*	-0.02 (-0.27, 0.23)

Note: Multinomial logistic regression for death and dropped out, logistic regression for hospitalization. Base category is “No Hospitalization”. Nonvalid or missing responses were excluded from regression analyses.

* statistically significant at $p < .05$

** statistically significant at $p < .01$

*** statistically significant at $p < .001$