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Mixed-Methods Study of Disability Self-Management in Mexican Americans With Osteoarthritis

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Background: Health disparities in osteoarthritis (OA) outcomes exist both in the occurrence and treatment of functional limitation and disability for Mexican Americans. Although the effect of self-management of chronic illness is well established, studies demonstrate little attention to self-management of function or disability, despite the strong potential effect on both and, consequently, on patients' lives.

Objective: The purpose of this study pilot was to develop and test key variable relationships for a measure of disability self-management among Mexican Americans.

Methods: In this sequential, two-phased, mixed-methods, biobehavioral pilot study of Mexican American women and men with OA, a culturally tailored measure of disability self-management was created, and initial relationships among key variables were explored.

Results: First, a qualitative study of 19 adults of Mexican American descent born in Texas (United States) or Mexico was conducted. The Mexican American Disability Self-Management Scale was created using a descriptive content analysis of interview data. The scale was tested and refined, resulting in 18 items and a descriptive frequency of therapeutic management efforts. Second, correlations between study variables were estimated: Disability and function were negatively correlated. Disability correlated positively with social support and activity effort. Disability correlated negatively with disability self-management, pain, and C-reactive protein. Function was positively correlated with age, pain, and depression. Liver enzymes (alanine transaminase) correlated positively with pain and anxiety.

Discussion: This mixed-methods study indicates directions for further testing and interventions for disability outcomes among Mexican Americans.

Key Words: arthritis ● Mexican Americans ● movement ● self-management

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The most common type of arthritis, osteoarthritis (OA), is a chronic inflammatory condition with resultant functional limitations (Arthritis Foundation, 2022; Centers for Disease Control and Prevention, 2023). Often requiring use of self-management strategies and/or joint replacement surgery, OA is responsible for incurable, degenerative disease of the joints (Arthritis Foundation, 2022). OA affects over 32 million persons in the United States and costs over $8,000/year per patient—$3,000 in direct costs for medicines and medical care and $5,000 in indirect costs related to work lost (Centers for Disease Control and Prevention, 2023). Of those, there are approximately 6 million persons with posttraumatic OA because of injury and repetitive joint trauma, requiring bracing and/or supportive accommodations for walking, such as with a cane or walker (Thomas et al., 2017).

One in six persons of Hispanic background experiences disability, and OA is a leading cause of their functional limitations (Reyes & Katz, 2021). Hispanics with OA report severe limitations, levels of which are significantly worse among

those who are fluent in Spanish only (Reyes & Katz, 2021). Among aging Mexican Americans (MA), the burden of OA can lead to disability, for example, loss of social role performance, accompanied by loss of function, depression, and pain (Harrison, Taylor, et al., 2023). Typical strategies for chronic disease self-management, although helpful in the context of chronic disease (Bhattacharya, 2012), are inconsistently effective in managing disability (e.g., social role performance) and function (movement and activities of the body) among people with OA (Lorig et al., 1993). The average life span for Hispanics is expected to remain high (Hill & Artiga, 2023), indicating an increased need for long-term care and support for age-related conditions that cause disability, such as that found with OA functional limitations (Garcia et al., 2017). Studies indicate that people of Hispanic background do not access self-management training programs, physical therapy, and pain management resources at the same rate as that of non-Hispanic Whites (Reyes & Katz, 2021).

Despite evidence suggesting improvement in pain, function, and social participation for people with OA who receive total joint replacement (TJR), there remain ethnic and racial disparities in the rates of TJR (Harrison, 2011; National Institutes of Health, 2002). Little knowledge is provided on preferences, experiences, and treatments of OA for the Hispanic populations (Harrison, 2011; Katz, 2016; Katz et al., 2011). The problem of high rates of OA pain with disparities in treatment (Katz, 2016; Katz et al., 2011; Reyes & Katz, 2021) results in loss of social roles and functional limitations among the MA population. Self-management interventions are a major nonpharmaceutical model for managing chronic conditions, primarily diabetes. A large gap in the literature is the lack of chronic disease self-management concepts and measures for MAs.

Before further work can be done, an understanding and measure of disability self-management for MAs is required. The importance of self-management to the health of people with chronic illnesses and disabling conditions in an ever-shifting healthcare delivery system has been documented (see Lorig et al., 1993; McIntyre et al., 2020; Mullen et al., 1987; Ryan & Sawin, 2009). People with disabling conditions are known to benefit from nonpharmaceutical, selective self-management interventions, including exercise for people with multiple sclerosis (Stuifbergen et al., 2016), behavioral/psychological strategies in spinal cord injury (McIntyre et al., 2020), and lifestyle for OA (Ginnerup-Nielsen et al., 2019). Although Barlow et al. (2002) and Lorig et al. (1993) describe self-management as an individual process of monitoring lifestyle in collaboration with knowledgeable others, it is the family of the MA individual who has primary influence in the context of disability (Harrison, 2009b; Harrison, Taylor, et al., 2023). That is, although the individual may be the focus of medical intervention, the family functions as a system, enabling the individual with a disability to monitor psychological, emotional, and biobehavioral aspects of disability and engendering the best function necessary for a high-quality life (Harrison, 2009a; Harrison, Blozis, et al., 2023).

A large gap in the self-management literature is the lack of a measurement tool focusing on the MA self-management process, specifically for OA. Although many studies have used the Health Education Impact Questionnaire (heiQ; Osborne et al., 2007) with valid and reliable outcomes, it focuses on the outcomes instead of self-management. Furthermore, the heiQ measures general individual behaviors but does not address these within the family.

The current study aimed to theoretically synthesize and expand the literature with empirical evidence into a concept and measure of disability self-management in MA with OA-related mobility limitations within the context of their life course disability experiences (Harrison, 2009b; Harrison, Taylor, et al., 2023). Building on a previous 4-year ethnographic study of disability-related health disparities in MAs with functional limitations (Harrison et al., 2008) and/or disability (Harrison, Blozis, et al., 2023), we included family self-management (Ryan & Sawin, 2009) for the purpose of synthesizing evidence into a disability self-management measurement tool specifically for this population. Prior to this work, there were no known studies of disability family self-management for the MA population.

METHODS

The purpose of this mixed-methods study was to examine the effects of disability self-management in MAs with OA, a situation in which family ethnicity is essential to the cultural management strategies used to inform biopsychosocial disablement outcomes. This required a pilot study using mixed methods for scale development and quantitative investigation. A mixed-methods, qualitative–quantitative sequential study was used within a quantitative post-positivist epistemological framework (Morse, 2009). This design required use the of questionnaires, topical interviews, blood samples, and field notes. Qualitative methods helped to advance conceptual clarity, cultural application, and measurement refinement. Quantitative methods refined conceptual measures and evaluated reliability and relationships for validity. The pilot study was critical for establishing incremental potential for the feasibility of research into disability self-management (Lewis et al., 2021).

Two separate samples of MAs were recruited from the community to participate in qualitative interviews ($N = 17$) for concept development and quantitative measurement ($N = 67$), testing, and refinement. After creating a constellation of items based on concept development, associations between the items and biobehavioral measures were assessed. Disablement of the individuals was posited to vary according to biological, social, cultural, and psychological variables, as well as disability self-management—specifically in the context of OA.

Ethical Study Review

The study was reviewed by The University of Texas at Austin Institutional Review Board.

PHASE 1. DISABILITY SELF-MANAGEMENT CONCEPTUAL DEVELOPMENT

The first phase of the pilot mixed-methods study was to acquire an understanding of the construct of disability self-management from literature with a focus on MAs (Figure 1). Next, we used knowledge as a scaffold to deductively organize data and inductively apply the data to the lives of MAs with OA. Finally, we generated 53 different testable statements from the interviews that coincided with aspects of the framework; we systematically refined these to 18 items based on expert knowledge in disability, Mexican and MA heritage, OA, aging, and self-management. This process was conducted following the epistemological view of post-positivist perspectives to inform concept development for measurement (Morse, 2009).

Sample Recruitment

MA women and men with disabilities because of OA were recruited in ethnically and geographically diverse areas of Texas; Texas and California have the first and second largest percentages of people identifying as Hispanic/Latino (U.S. Census Bureau, 2021).

The research team used purposeful recruitment of MA women and men with a multipronged approach. Contacts known to the first author who were willing to participate or tell others about the study were notified. Contacts within the community known to the research team were notified through word of mouth and flyers. Flyers were distributed in grocery stores, laundry facilities, senior centers, and areas known to be frequented by the MA community.

Participants were eligible if they met the following criteria: functional limitation in upper and/or lower body mobility, age of 40 years or older, English speaking or Spanish speaking, OA diagnosis, self-reported physician diagnosis, residence in the community, and MA ethnicity. Each eligible and interested person was mailed a letter describing the interview study, along with demographic questionnaires and a consent form for review. The letter asked whether they remained willing to talk about their experiences. After having an opportunity to review the materials for approximately 1–2 weeks, participants were contacted to answer any preliminary questions and set a time for an initial interview with the first author (principal investigator [PI]) of the study.

Most interviews took place in the participants' homes; however, other accessible sites at the university included a reserved classroom and a first-floor research office belonging to the PI. At the beginning of the initial interview, the consent form was reviewed in detail, signed by each participant, and witnessed by the PI. Each interview participant was offered $50 in cash as compensation for expenses, time, and inconvenience. Participants could stop the interview and/or leave the study at any time without repercussion.

Data Collection

Field notes and demographic sheets were collected during participant meetings, followed by interviews.

Field Notes Descriptive field notes were written prior to and after each meeting to help contextualize the observations, experiences, and discussions that were relevant but were not captured in audio recordings. The field notes were essential for understanding the home environment and using different sources of self-management that could prompt future discussions of how everyday items in the environment are used to improve disability.

Demographic Sheets The demographic background of each participant interviewed included age, gender, ethnicity, race, education, marital status, employment status, age started working, insurance, height, weight, number of children/grandchildren, and home ownership status.
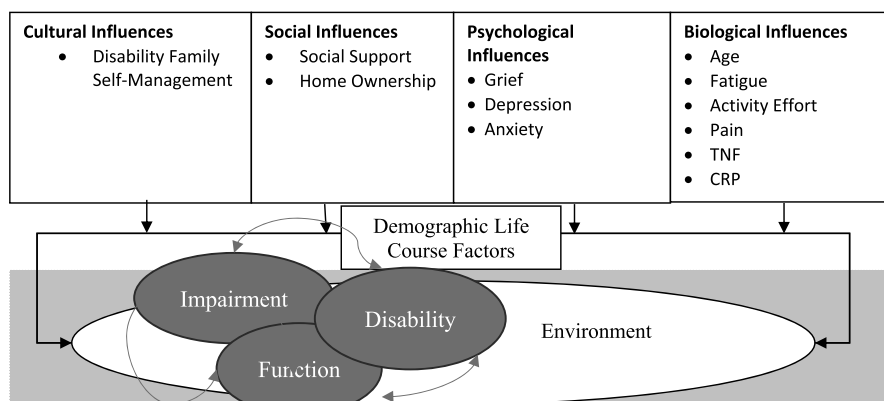

FIGURE 1. Empirical indicators of disablement interactions over the life course for Mexican American men and women.

Interviews One interview using a semistructured guide was conducted with each participant. The interview topics included influences on function/disability, positive emotions, cognition, health, and relationships and technology, people, and care providers that improve mobility/function/health.

Data Management

Digital interview recordings were transported in a locked briefcase by the first author. Recordings were uploaded, transcribed verbatim by professional transcribers, and downloaded for storage on password-secured computers in a locked office. All data were de-identified for privacy and security purposes. The demographic survey responses were entered into an Excel file. Data were transferred and analyzed with IBM SPSS Statistics (Version 29.0).

Analysis

Descriptive statistics were used to characterize each sample. Field notes and interviews were transcribed verbatim, compiled into text, and analyzed for multidimensional concept of disability self-management using categorical content analysis. The process began with a deductive framework based on the definitions of self-management, impairment, functional limitation, and disability. This literature formed a sensitizing framework for understanding the larger concepts. After content was categorized by descriptions related to each concept, an inductive process within each concept was initiated. Content was reduced into smaller meaning units and then rebuilt to understand the meaning of (family) self-management of function to improve social participation (e.g., disability) based upon the interview text using methods described by Elo and Kyngäs (2008). Next, exemplar statements about the concept were refined and understood using a within-category inductive process and, once refined, were pulled for testing as scale items. This was a descriptive process, letting the words of the participants lead the way to item development.

RESULTS

Of the 19 participants, the majority were women ($n = 14$) with children ($n = 14$) and grandchildren ($n = 9$); they ranged in age from 46 to 81 years. All participants had been married at some point in their lives, from 3 to 62 years. The majority lived alone in a home they owned ($n = 10$), whereas seven of the participants rented a home or apartment; one participant lived with family, and another reported that her family paid for her to live in her home alone. Nine were employed, and 10 were unemployed. Two of those who were unemployed were seeking employment, and six who were employed were working 40 or more hours per week. The majority stated their parents were U.S. citizens (78%), whereas the majority also stated they had one or more grandparent(s) who were Mexican citizens (60%).

The participants were diagnosed with OA from 45 to 71 years of age and lost function at 40–67 years of age. Two participants could not remember a specific age when their pain, stiffness,

and loss of movement began. Their body mass index ranged from 20 to 52. The categories for disability self-management reflected an integration of the extant literature and the empirical descriptions provided by participants in Table 1, along with definitions and items generated from the interviews and field notes. The types of treatments mentioned by individuals were also collected and listed, serving as a template for how arthritis may be managed in the MA population (Table 2). The following findings begin with the construct of disablement (disability, function, and impairment), which gives context to the influence of disability self-management. Figure 1 depicts the theoretical development of disability self-management (Ryan & Sawin, 2009) in relationship to disablement over the life course for MAs with functional limitations.

Disablement

Impairment causing disability in MAs aging with OA was considered from a holistic perspective of psychological, social, cultural, and biological status (see Figure 1). Based on Brandt and Pope's (1997) and Nagi's (1964) models of disablement, we expand the concept into a multidimensional interactive process over the life course. Impairment, functional limitations, and disability are understood from a feminist biopsychosocial theory (Rice et al., 2021) of shifting, nonnormative body perceptions/images (Harrison, Blozis, et al., 2023) that are influential—especially when life course role demands are high and complex with cultural specifications (Harrison, 2011).

> I would start doing something. I don't remember what. Well, probably the, the bathtubs and, uh, vacuuming or getting under my cabinets to reach for, uh, pots and pans. Then it would hurt for me to get up, and I just didn't understand, you know, why I was just, I would have to pull myself up by then.

Andrea responded with therapy, but nothing stopped the continual cycle.

> I continued the physical therapy. I think for maybe three months. And it would help, but then, of course, it just kept coming back. And I just didn't understand it. And I just don't remember, uh, falling at that time or anything.

As demands in areas of mental and physical impairment increased in the bio-psycho-sociocultural environment, the individual adapted through use of accommodations that enabled social adaptation or else experienced loss. The concepts did not always develop linearly with increasing intensity of the problem but shifted with time.

Impairment

To understand cellular-level changes that indicate combined reasons for risk, we measured alanine aminotransferase (ALT) levels. The level of ALT is an indicator of liver function. The risk of liver disease—genetically tied to the MA population (Shaheen et al., 2021)—is of disproportionately elevated risk among MAs in the United States; it is the sixth leading cause

TABLE 1. Categorical Concepts, Subcategories, Definitions, and Items Proposed From the Qualitative Investigation

Categorical concepts	Subcategories	Definition	Item example
Connections	Family connection	Belief in ability to manage life events and personal needs within the family	My family helps me to live a good life with my limitations.
	Linguistic connections	Belief in ability to reach out to someone that shares language	Someone who lives near me shares my native language.
Reciprocity	Helping others/payback	Belief in ability to contribute to community and family	In the last three months…I did things to help others in my neighborhood.
Advocacy	Self-advocacy	Belief in ability to manage benefits	I have learned what my rights are as a U.S. citizen.
Creativity	Valued expressions of emotions	Belief in ability to create expressions of happiness or joy	I listen to music, talk to someone, or do something else I enjoy every day.
	Valued self-expressions	Belief in ability to create valuable talents or products	In the last three months…I have a skill or talent another person valued.
	Expressions of self through environment	Belief in ability to create an environment conducive to abilities	My house is arranged so I can move easily.

of death for Latinos, and the third leading cause among Latin American males (Flores et al., 2018). Times of stress, physical burden, pain, anxiety, and depression may result in despair and the use of risky solutions to problems (Brignone et al., 2020). Hence, ALT was selected as an impairment indicator for the MA population within the context of disablement.

Functional Limitations

A functional limitation is a change or loss of physical performance usually brought about by injury or disease. In this definition of functional limitation, we imply accomplishment of an intended act using the physical body as planned based on the individuals' baseline assessments. At times, function was without challenge, their abilities without question, at other times, as Cynthia stated:

My knees would just give out on me and just like—I couldn't catch myself. And then one time I fell at [the store], too—the same—just because my knee gave out. It just bended, I fell to the floor on my knee. There were certain limitations in terms of the distance I could walk, where I—at some point, I would feel tired—over the course of time—[distance] diminished. I was able to walk blocks, then I was able to walk one block, and then, you know, and then now, you know, a block would be very difficult for me.

Disability

Disability is defined by the loss of social role performance. This is based on the social model of disability. Often, people with disability state that, regardless of levels of impairment or functional limitation, they have the potential to change their

TABLE 2. Scales, Number of Items, and Reliability Used to Assess Psychological, Cultural, and Social Predictors Among Mexican Americans With Osteoarthritis for Phase 2

Scale	Concept	Influence	Items	Alpha
CESD-10	Depression	Psychological	10	.67
Fatigue Promise Scale	Fatigue	Biological	8	.927
Grief Inventory	Grief	Psychological	19	.941
Anxiety	Anxiety	Psychological	7	.847
Activity Effort	Pushing beyond sustainable limits	Biological	8	.833
Personal Resource Questionnaire	Social support	Social	15	.905
Disability Self-Management	Individual and family management of disability	Cultural	18	.859
Function	Health Assessment Questionnaire		10	.88
Disability	CHART-SF		20	ICC = .93
Pain	McGill Pain Questionnaire	Biological	23	.89

Note. CESD-10 = Center for Epidemiological Studies–Depression Scale, 10-item version; CHART-SF = Craig handicap assessment and reporting technique; ICC = intraclass correlation coefficient.

environment and enact agencies to improve their lives. Disability is not a functional limitation. If, for instance, a person with a degenerative functional limitation can create an environment that accommodates their intentions, then they are not disabled. For instance, Cirilo stated:

> When I added the cane to my walking, uh, at that point. I was starting to feel like I was unbalanced a little bit and getting more tired, and when I added the cane, I was able to maintain, walking the blocks and everything.

Society can create barriers to people's ability to work, engage in recreational activities, get married, and so on (Brandt & Pope, 1997). Personal care help, built environments, accommodations, and mechanically engineered body parts can eliminate, reduce, or create barriers. When, for instance, an MA man described fishing knee-to-hip deep in the ocean as a gendered role that was no longer possible (Harrison, Taylor, et al., 2023), he was, by his estimation, disabled. The following is an example of barriers:

> I didn't think I could make that step with the pain and—and then, I didn't think I could walk around the car. And so, I kind of knew that quickly once I came over here. So, I contacted my friends and said I wasn't going to be able to make lunch. So, um, I have somebody that does some cleaning for me, and she has a key to my house—I didn't even think I could walk back to open the door if I had to.

Disability Self-Management

For this study, disability self-management comprised four conceptual categories. These included "knowing my strength and rights," family connections, and creativity. The concept of disability self-management is the strategic solution for novel problems because of changes in physical function.

Advocacy Advocacy was a way for an individual to manage the social response to the functional limitation that occurred. If a man or woman knew their relative strengths and potential challenges, they could overcome them by highlighting their strengths; they could always adapt to changing circumstances if they knew the rules or laws supporting their strengths. For instance, Allysa stated that she knew she was potentially vulnerable to discriminatory action by employers, but she also knew how to do the jobs she applied for. This helped her to overcome potential problems and manage social role performance.

> I didn't have discrimination as a result of my disability because I was well-qualified to do work, and I—I think—I'm a female, I'm Latina, and I have a disability, so you can choose what you're going to discriminate against, but I think it was hard for them. You know, I made a good interview and, I would always get jobs.

Reciprocity For a reciprocal relationship to occur, the participants needed a support system. They described building a group of people who would be available to support different types of needs. "And so—so, I'll get her a little gift, you know, when she comes, and it's not a nothing, 'Here's—thank you for this.' It's just, 'I found this that I like for you.'" This might be practical construction within the home, caregiving, transportation, and a litany of activities. Also, no one individual could be called upon too often for any favor. It was made clear that the support team had to be cared for in return by the participant. For instance, Stephanie stated:

> And really, that's where my support system was kind of born from there, to, um—and, because, you know, at some point, they were like, 'If there's anything that you need, just let me know. Just contact me.' And I didn't wanna have, um—I wanted to have a handful of people versus just one so I didn't have to go to the well that often, to one person, um, and that they would be willing to come out and help me to do different things.

Connections The way a family member shared their values and support was critical for the men and women. The family was the string that held each person up as they faced new challenges. Maria described how her father inspired her by stating:

> Very early on in my life, I had responsibility as the oldest in the family. He [father] gave me the sense that I was a responsible person. He gave me the sense that I could do things and that I was responsible. "You're the leader, you know. You have all these siblings, but you're the leader." And he told them the same thing. He said, "She is—you know, when I'm not here, she's in charge, and you have to listen to her. She's like me."

The connection and passing of strength from one family member to another was also found in Maria, who missed the language of her family when ascertaining the best course of action. She lacked transportation to stay in contact with friends who spoke Spanish. She said that she always took direction from her father in Mexico when learning to navigate the world.

Creativity Creativity is the innovative creation of solutions when faced with difficulties caused by a functional limitation, such as OA. This develops out of a willingness to try options presented through trial and error. For instance, Hildago stated:

> I didn't really notice a big change. I'm not against it; um, I just haven't been doing it regularly. Um, I did try acupuncture. Um—again, I didn't notice a big change or a big difference for me. Um, it was expensive.

Creativity blossomed regardless of their spiritual and religious beliefs. Allysa stated that her belief in God was not a substitute for doing for herself. Stephanie stated that she believed that God helped with her soul, behavior, and morality; she did not expect a cure for her arthritis.

It's like one of these—God helps those who help themselves. It's not just going to happen by itself. I mean, yes, I could pray, but I also—you know, um, try to take care of the—the physicality of whatever it is that I need.

Creativity has three domains: creative emotions, creative expressions, and creative solutions.

Expression of Emotions

Expression of Emotions Expression of emotions refers to how the women and men discussed creating a new emotional response when faced with difficult and/or painful movements. These responses would reshape their minds and then result in a push toward a more beneficial pattern of behavior. This was sometimes a distraction, at other times a reframing of perspective, but always a novel emotional response to a repetitive problem. This new way of feeling about the problem lifted them toward a new behavior. These were emotional sparks of innovation; they did not begin with cognition.

I focus on it, you know. I mean, we can—I guess we can all get into—depressive states or whatever. I—I try not to. I don't feel like I do. You know, I refocus. I refocus onto other things. That's what the swimming is, too. I mean, the swimming helps a lot with that. I tell people I have to focus on not drowning.

This was also clear when Adelphia stated that she would lose her memory in times of stress or high levels of pain. She was at the grocery store and could not remember the personal identification number attached to her credit card. She said, "Then you got to calm down, you got to relax. And just breathe. And, um. Just say, 'I'm sorry. Hold on. It's in the cash register.' Then I got it. It came back." The best self-care was the decision to be a caregiver to herself and nurture an emotional kindness within.

Expressions of Self

Expressions of Self Expressions of self were seen when participants discussed how to adapt to the world through interactions with their environments. It was important for the participants to solve their problems and adapt the best fit using their own solutions.

Nobody knows you better than you, you know? I don't wanna—uh, I don't wanna shelter myself. That's why even when I was not able to completely go out and do everything, I still pushed myself to go out so that, you know—And how am I going to know what I need unless I go out? I was never going to know about that step unless I pushed myself to go out, and then to try it, go out and then come back in.

Expression of Solutions

Expression of Solutions Expressions of solutions were things that the participants or their families did to solve their own impairment issues with intrinsic and extrinsic value to themselves and/or to other people. They valued the ability of self and others with arthritis to continue to work and produce solutions, to be known for continuing to help themselves or others. Adelphia said, "And this (salve) is totally something different. But I mix it with the Arnica, and it works good on my knees." This handmade salve with herbs would relieve her pain so she could walk. Mario said he valued it when people demonstrated their ability to keep going:

I go to this lady; I don't know if you ever heard—I don't know what you call it in English—it's a curandera [healer]. She learned all this in Mexico. Because during the war, she used to take care of all the broken bones and you know, or sprains and all that stuff so she knows a lot. And she knows where the problem is and stuff like that. You—when she touches your back or whatever, you can feel her hands. They're strong. But, um, she also says she has arthritis. But, um, I mean, she goes on. She's got to make some money somehow, so she does that to make money.

Julio stated, "You just need to do what you need to do to survive, to be self-sufficient." It could be something as straightforward as saying, "It won't go back into place. It will not. I must be playing with it in order for to put it back in place, in order to put the weight back on it." The seemingly simplistic statement was critical to understanding how the participants managed to function and go to work, attend leisure activities, or simply get out of bed. They did not rely on routine medical management, but they did try over-the-counter medications. They did what they needed to get through their days.

The team generated 52 items from the qualitative data as preliminary items ranging from *very true of me* to *very false of me*. After reviewing the items with content experts, the items were narrowed to 18 items, which were used to capture the concepts of disability self-management previously described. Items were eliminated because of awkward wording, failure to capture disability self-management (as opposed to self-management of chronic illness), or failure to capture self-management (as opposed to health promotion with disability).

PHASE 2. DISABILITY SELF-MANAGEMENT MEASUREMENT, SCALE REFINEMENT, AND TESTING

The next phase of the pilot study involved a different sample to test the newly developed disability self-management scale for MAs. To gain a clear understanding of how disability self-management may influence disablement among people with OA, we used a set of biological and behavioral variables for testing associations.

After developing the new measure of disability self-management and incorporating relationships between variables as seen in Figure 1, we explored the relationships among disability self-management, disablement (e.g., disability [Craig handicap assessment and reporting technique, CHART-SF; Whiteneck et al., 1987, 2004], function [health assessment

questionnaire, HAQ; Fries et al., 1980], impairment [ALT], biological status C-reactive protein [CRP], tumor necrosis factor [TNF]-alpha, pain, and fatigue), psychological status (depression, anxiety, grief), social status (home ownership, education, social support), and cultural influence (activity effort). Age in years, age in years at time of OA onset, and gender, factors known to influence disablement, were also included. Using these variables, we tested the following research question: "What are the associations among biological, psychological, cultural, and social status measures and disablement in MAs with mobility limitations because of OA?" Disability self-management is hypothesized to be associated with disablement variables (disability [CHART-SF], function [HAQ], impairment [ALT]).

For Phase 2, participants were surveyed in communities where they were asked to be available at the data collection site, including their home or the home of a neighbor/friend who also wished to participate; participants were asked to prepare for completing surveys and provide fasting biological samples. Each participant was compensated $50 in cash for their time, inconvenience, and effort.

Parameters of eligibility for participation included functional limitation in upper and/or lower body mobility, age of 40 years or older, English speaking or Spanish speaking, diagnosis of OA self-report physician diagnosis, residing in the community, and MA ethnic heritage.

Data Collection

Data collection was completed in participants' homes with the presence of at least one registered nurse (RN) and one data collection assistant. A team of two data collectors was sent to obtain written informed consent, answer questions, collect biological data, and complete behavioral surveys. We followed directions from a previous pilot feasibility study on how to work in homes with vulnerable populations with disability (e.g., see Walker et al., 2015). Data collectors entered homes with the survey instruments, consent forms, written directions with reminders to ensure standardized sequence and completion of data collection, blood sample containers/kits, a rolling cart with safety equipment, and a cooler for blood sample storage. Table 2 lists the instruments, number of scale items, and score reliabilities.

The participants were given the opportunity to independently complete surveys in large font, with the research assistant available for clarification during the data collection process. The biological data collection was done after the participants completed the survey battery. To ensure an understanding of the sequence of biobehavioral data collection, verbal instructions were given, and questions were answered. The battery was placed into file folders separate from the consent forms to protect participants' confidentiality.

RN data collectors were limited to three different RNs, who were trained prior to data collection, accompanied by a research assistant; they provided a cart with safety/cleaning materials, blood drawing equipment, and survey collection files. After consents were completed, a maximum of 20 ml of blood was drawn from each participant by an RN using standard phlebotomy procedures. Samples were drawn for ALT, CRP, and TNF; these were spun, CRP put on ice, and sent to a private laboratory for analysis. Samples were marked with ID, date, and time (Table 3).

Data Analysis

Maximizing likelihood estimation using SAS (Version 9.4) obtained zero-order correlations between study variables. The missing data percentage per variable ranged from 0 to 30%. Multiple imputation (to produce 30 imputed data sets), assuming data were missing at random, was applied using PROC MI, and the resulting correlations were aggregated using PROC MIANALYZE. Fisher's z-coefficient for each correlation and the corresponding p-value and S-value were calculated. S-value is the Shannon information calculated as a transformed p-value: $-\log_2$ (p-value; Greenland, 2019). For a given p-value, the corresponding S-value can be interpreted as how surprised one would be to see a certain number of heads in a row from a fair coin tossing. A p-value of .05, for example, has an S-value of 4.3, and with rounding, this p-value should seem about as surprising as seeing four heads in a row from fair coin tossing.

RESULTS

The sample of 67 MA women and men is described in Table 4. Phase 2 was stopped with over 25 participants remaining on our list for inclusion; afterward, participants were turned away. One participant was later excluded because of being Latino but not of Mexican heritage. Their use of different therapeutic options was incorporated into the Disability Self-Management Scale, as provided in Table 4. The most frequently used treatment for OA was reported as prescription medications ($n = 41$), followed by lotions ($n = 15$) and herbs ($n = 9$). Five percent ($n = 3$) had visited a *curandero* in the past, whereas 27% ($n = 8$) were willing to try in the future.

For this pilot, interest was in the magnitude of the correlations between study variables (Table 5). The strongest were as follows: Disability was correlated with function ($r = -.38$, $p = .013$, $S = 6.2$), social support ($r = .44$, $p = .002$, $S = 8.8$), activity effort ($r = .37$, $p = .016$, $S = 5.9$), and home ownership ($r = .34$, $p = .028$, $S = 5.2$). Relatively weak correlations were seen between disability and disability self-management ($r = -.30$, $p = .12$, $S = 3.1$), pain ($r = -.29$, $p = .059$, $S = 4.1$), and CRP ($r = -.29$, $p = .10$, $S = 3.3$), each of which had relatively large p-values and small S-values. Function was correlated with age ($r = .37$, $p = .009$, $S = 6.8$), pain ($r = .31$, $p = .035$, $S = 4.8$), and depression ($r = .28$, $p = .051$, $S = 4.3$). Liver enzyme (ALT) was correlated with pain ($r = .34$, $p = .028$, $S = 5.2$) and anxiety ($r = .31$, $p = .050$, $S = 4.3$). Disability self-management was associated with CRP ($r = .41534$,

TABLE 3. Biobehavioral Measures Descriptive Statistics: Phase 2

Variable	n (%)	M	SD	Minimum	Maximum
Age at time of interview	65 (97)	62.45	11.06	40	83
Age at time first employed	62 (93)	16.21	5.42	5	50
Age at time of diagnosis	49 (73)	50.41	14.34	17	76
TNF-alpha	55 (82)	1.90	0.86	0.9	5.4
CRP	55 (82)	4.51	6.17	0.3	34.1
ALT	47 (70)	15.17	9.56	3	61
Disability (CHART-SF)	59 (88)	87.73	12.62	47.5	100
Function (HAQ)	65 (97)	0.85	0.73	0	2.63
Disability self-management	61 (91)	75.21	18.34	43	122
Depressive symptoms	62 (93)	10.82	4.78	2	22
Social support	64 (96)	86.69	16.10	33	105
Fatigue	64 (96)	55.74	9.32	33.4	76.8
Grief	65 (97)	20.57	16.45	0	70
Anxiety	64 (96)	5.31	4.76	0	20
Activity effort	64 (96)	22.53	5.17	10	32
Pain intensity	64 (96)	2.62	1.45	1	5
Gender[a]	64 (96)	.72			
Own home[b]	64 (96)	.64			
Education[c]	67 (100)	.84			

Note. TNF = tumor necrosis factor; CRP = C-reactive protein; ALT = alanine aminotransferase; CHART-SF = Craig handicap assessment and reporting technique; HAQ = health assessment questionnaire.
[a] Gender = 0 if male, 1 if female.
[b] Own home = 0 if not a home owner, 1 if own home.
[c] Education = 0 if less than high school diploma/GED, 1 if high school diploma/GED or higher.

$p = .01$, $S = 7.02$) and with social support ($r = -.58581$, $SE = 0.161556$, Fisher's $z = -0.67127$, $p < .0001$, $S > 13.28771$).

DISCUSSION

The feasibility of research on disability self-management in the MA population was supported. This sequential, mixed-methods, biobehavioral exploration of disability in the lives of MA women and men aging with OA provides novel promise for future study and intervention, providing preliminary evidence for future studies. Scale creation based on qualitative interviews with satisfactory reliability supported relationships between disability self-management and disability.

Important relationships between biological influences (CRP, pain, age) on function that correlated with disability (social role performance) deserve further exploration. If diminished function is self-managed in a detrimental manner, it

TABLE 4. Therapeutic Options for Care Among Mexican Americans With Osteoarthritis

	Use of therapies for OA								
	Willing to try in future		Has tried in past		Frequency of use				
Types of therapy	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Never n (%)	Rare n (%)	Some n (%)	Often n (%)	Always n (%)
Curandero (healer)	18 (27)	47 (70)	3 (5)	62 (95)	62 (95)	1 (2)	2 (3)	0 (0)	0 (0)
Western medical doctor	58 (87)	7 (10)	56 (91)	6 (9)	6 (9)	3 (5)	9 (13)	10 (15)	37 (57)
Medical doctor from Mexico	17 (25)	48 (72)	6 (10)	59 (90)	59 (90)	1 (2)	4 (6)	0 (0)	1 (2)
Chiropractor	40 (60)	24 (36)	21 (32)	44 (68)	44 (68)	8 (12)	7 (11)	1 (2)	5 (7)
Massage therapist	48 (72)	17 (25)	31 (48)	34 (50)	34 (50)	12 (19)	13 (20)	2 (3)	4 (6)
Physical therapy	54 (86)	11 (16)	23 (34)	46 (61)	23 (34)	13 (14)	22 (33)	6 (9)	5 (8)
Oils	50 (75)	15 (22)	33 (48)	33 (52)	33 (52)	4 (6)	13 (20)	9 (14)	5 (8)
Salves	37 (58)	27 (42)	25 (35)	42 (63)	42 (63)	4 (6)	14 (21)	4 (6)	1 (2)
Prescriptions	61 (94)	4 (6)	64 (96)	1 (2)	1 (2%)	1 (2)	9 (13)	13 (20)	41 (61)
Teas	52 (81)	12 (19)	45 (69)	20 (31)	20 (31)	7 (11)	22 (34)	8 (12)	8 (12)
Tobacco	8 (13)	56 (88)	7 (11)	57 (85)	57 (85)	1 (2)	2 (3)	2 (3)	2 (3)
Lotions	56 (86)	9 (13)	65 (80)	13 (20)	13 (20)	1 (2)	23 (35)	13 (20)	15 (23)
Herbs	50 (77)	15 (23)	34 (52)	31 (48)	31 (48)	4 (6)	13 (20)	8 (12)	9 (14)

TABLE 5. Maximum Likelihood Estimated Zero-Order Correlations Between Study Variables After Multiple Imputation ($N = 67$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Disability																		
2. Function	-.38																	
3. Age1	.30	-.23																
4. Age2	-.14	.37	.29															
5. Disability SM	-.30	-.03	.03	-.14														
6. Depression	-.06	.28	-.03	-.06	-.18													
7. Grief	-.14	.11	-.06	-.08	.12	.59												
8. Anxiety	-.24	.20	-.18	-.21	.09	.56	.42											
9. TNF	-.21	-.06	-.22	.04	-.02	-.16	-.13	-.20										
10. CRP	-.29	.19	-.03	.11	.42	-.04	.09	.36	.22									
11. ALT	-.03	.09	-.05	-.16	.08	.30	.35	.31	.19	.44								
12. Fatigue	-.16	.21	-.28	-.09	.18	.35	.36	.28	-.06	.10	-.01							
13. Activity effort	.37	-.10	-.04	-.05	-.24	-.05	-.03	.04	-.13	-.13	-.09	-.03						
14. Pain	-.29	.31	-.47	.11	.16	.34	.39	.34	.19	.32	.34	.40	-.04					
15. Age3	-.21	-.04	.04	.16	-.05	-.21	-.18	-.14	.26	.23	-.18	-.10	-.27	-.12				
16. Social support	.44	-.07	-.06	-.07	-.59	.17	-.02	-.15	-.02	-.40	-.17	.08	.24	-.14	.13			
17. Education	.07	.06	-.06	-.10	.33	-.15	-.10	-.05	.02	.08	.20	.07	-.08	.03	-.33	-.22		
18. Gender	-.20	.24	-.00	.28	-.09	.08	.03	.03	.18	.16	.06	.08	-.03	.16	.14	.03	-.09	
19. Own home	.34	-.21	.43	.39	-.13	-.18	-.25	-.32	-.09	.00	-.18	-.11	.20	-.09	.00	.15	-.09	.02

Note. SM = self-management; TNF = tumor necrosis factor; CRP = C-reactive protein; ALT = alanine aminotransferase. Education = 0 if no high school diploma/GED and 1 = high school diploma/GED or higher; Gender = 0 if male and 1 if female; Own home = 0 if not a homeowner and 1 if homeowner. Age1 = age in years at OA diagnosis; Age2 = age in years at time of interview; Age3 = age in years when first employed.

may create health disparities and, subsequently, higher impairment (Brignone et al., 2020). Testing this conceptual model using a larger sample with moderating effects would be foundational for interventions.

Disability (social role performance) was correlated with activity effort (pushing beyond levels of comfort/pain/fatigue). The positive association indicated that more MA women and men with OA pushed themselves despite pain/fatigue the more social roles they reported, a benefit we found in a previous study of people with post-polio (Harrison, 2009a). Impairment (ALT) was additionally associated with their pain and anxiety.

The level of pain in OA was associated with anxiety and ALT in this sample. The ways in which people care for themselves in the face of increasing pain and worse function may affect health. Knowledge of a group's willingness to try different kinds of therapies will help us tailor interventions to preferences.

This work to develop and measure the concept tailored to the needs of a minority population stems from more than a decade of research. Using this context, disability self-management was created but only found to be weakly associated with disability (i.e., social roles participation) and not with impairment or function; however, we theorized it would be associated with both disability and function. A positive correlation between disability and disability self-management would be a positive indicator that teaching disability self-management to stay in social roles may be beneficial, particularly considering the correlation between disability and social support; this is worth exploring in larger samples. Given findings in MA women (Harrison, 2011) and men (Harrison, Taylor et al., 2023) with age, future interventions may test associations between disability self-management, social support, inflammation, and disability.

Studies of disability self-management might include measures of telomere and epigenetic indicators of biological age, not relying purely on chronological age. Studies show promising results with epigenetic indicators of biological aging, which may be more sensitive to interventions (Kane & Sinclair, 2019; Mukherjee & Harrison, 2024), such as disability self-management. The link between age and OA has been attributed to joint degeneration over time (van der Kraan & van den Berg, 2008), and the heterogeneity in OA cannot be explained by chronological age alone (Loeser et al., 2012). Accelerated epigenetic aging has been associated with age-related aspects of function (Maddock et al., 2020; Simpkin et al., 2017). Biological aging involves complex molecular mechanisms to regulate inflammatory and repair response in the cell (Jylhävä et al., 2017). One such mechanism is DNA methylation, an epigenetic process involving adding methyl groups at cytosine-guanine dinucleotides (Rakyan et al., 2011).

Limitations

The sample size for this pilot study was a limitation. Our staff from the MA community, community advisory board of people with disabilities, and people from the MA community with disabilities were essential. Home and community data collection of complex data when working with adults aging with a disability is complex but essential for progress (Walker et al., 2015).

Conclusion

Our team conceptualized disablement with interacting levels of impairment, function, and disability, with disability as an indicator of social participation. We created and assessed the Mexican American Disability Self-Management Scale using valid indicators within the MA population. Preliminary data add evidence for using biobehavioral indicators to study outcomes in this understudied population. Future studies are needed to test these complex, interrelated variables using a larger community living sample.

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