

## Review Article

# Evidence to Improve Physical Activity among Medically Underserved Older adults: A Scoping Review

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## Abstract

**Background and Objectives:** Participation in leisure physical activity (PA) and engagement in PA interventions among older adults is influenced by socioeconomic status (SES), race/ethnicity, and environment. However, studies of PA for medically underserved older adults have not yet been systematically evaluated. The objective of this study is to map the nature and extent of research conducted on PA participation, interventions, and components of effective leisure PA programs for medically underserved older adults.

**Research Design and Methods:** The five-stage approach was used to conduct this scoping review. We searched PubMed, CINAHL, and Cochrane Library for peer-reviewed studies published between 2006 and 2016. Data extracted from selected studies included study population, study type, purpose of intent, evidence level, barriers to PA participation, and components of PA intervention.

**Results:** Three hundred and ninety-two articles were identified, and 60 studies were included in the final data charting. Existing literature showed that most studies remained descriptive in nature, and few intervention studies have achieved a high level of evidence. Among 21 intervention studies, only 4 were explicitly conducted for older adults. Culturally adapted materials, race/ethnicity-specific barriers and facilitators, and form of intervention were important components for intervention programs.

**Discussion and Implications:** Findings indicate that more studies are needed to reduce health disparities related to PA participation for medically underserved older adults. Intervention components such as race/ethnicity-relevant barriers and facilitators and culturally sensitive materials are also needed for PA interventions targeting underserved older adults in order to provide evidence for best practices.

**Keywords:** Cultural competency, Health disparity, Poverty

The health benefits of leisure physical activity (PA) programs for older adults are well established (Ashworth, Chad, Harrison, Reeder, & Marshall, 2005; Pahor et al., 2014). PA has been shown to reduce the risk of falls (Gillespie et al., 2012) and hip fractures (Rong et al., 2016), and prevent or delay the onset of chronic diseases (Lafortune et al., 2016) such as type 2 diabetes and cardiovascular disease (Ashworth et al., 2005). PA also improves balance (Howe, Rochester,

Neil, Skelton, & Ballinger, 2011), functional activity performance (Liu & Latham, 2009), and subjective well-being (Acree et al., 2006). Older adults who reside in medically underserved areas are often overlooked in PA research.

Medically underserved older adults are individuals with minority ethnic/racial backgrounds, physical disability, or low socioeconomic status (SES; Mendoza-Vasconez et al., 2016; Taylor, Baranowski, & Young, 1998). Indicators

of low SES include lower income (e.g., personal or family income reaches the federal poverty level), lower educational attainment (e.g.,  $\leq 9$  years of education, equivalent to having less than high school diploma), and/or a lower occupation ranking, based on educational requirements and monetary payoffs or public opinion in the United States (Braveman & Gruskin, 2003; Ferraro & Shippee, 2009; Ma, Siegel, Ward, & Jemal, 2018; Preston & Taubman, 1994; Ryan & Bauman, 2016). These indicators are commonly used to identify underserved populations in leisure PA/exercise studies (Hillier-Brown et al., 2014).

Underserved children, adolescents, adults, and older adults spend significantly less time in leisure PA compared to their counterparts with higher SES (Cohen et al., 2013; Fleming et al., 2007; Macera et al., 2003). According to Healthy People 2020, only 12.7% of older adults in the United States meet the Federal Physical Activity Guideline (U.S. Department of Health and Human Services, 2016). Despite individuals with lower SES tend to have higher work-related PA (Saffer, Dave, Grossman, & Leung, 2013), adults with a lower income, lower education level, or a minority ethnic/racial background were less likely to meet this guideline: 11.8% for those under the poverty threshold, 8.9%–13.2% for adults without a high school diploma, and 14.7%–20.8% for adults who are a member of minority race/ethnic group, whereas non-Hispanic white ethnicity had the highest rate, 23.2% (U.S. Department of Health and Human Services, 2016). This is a serious health disparity, because medically underserved older adults have fewer resources to engage in leisure PA or exercise programs (Brownson, Baker, Housemann, Brennan, & Bacak, 2001; Cohen et al., 2013; Gordon-Larsen, Nelson, Page, & Popkin, 2006).

Medically underserved older adults are less likely to benefit from evidence-based PA programs due to lack of exposure and access (Cohen et al., 2013; Fleming et al., 2007; Macera et al., 2003). They are also more likely to live in neighborhoods that they perceive to be unsafe, resulting in their spending less time being physically active in the community (Brownson et al., 2001). As described in Cumulative Inequity Theory, continued lack of access or knowledge to resources over time results in disadvantage at each life stage (Ferraro & Shippee, 2009). Addressing these inequalities among the underserved older adult population is important when designing PA interventions (Taylor et al., 1998).

Although many studies have successfully distinguished the components of efficacious PA interventions for older adults, few have explicitly addressed the impact of SES on PA interventions (Howe et al., 2011; Kendrick et al., 2014; Müller-Riemenschneider, Reinhold, Nocon, & Willich, 2008). Past systematic reviews and meta-analyses commonly studied older adults as a homogenous group without reviewing how SES may influence the effects of a PA program (Beishuizen et al., 2016; de Labra, Guimaraes-Pinheiro, Maseda, Lorenzo, & Millán-Calenti, 2015;

Zubala et al., 2017). For example, a meta-analysis conducted by Beishuizen et al. (2016) found that web-based interventions could increase time spent on PA for older adults. However, access to reliable internet service, computers, and comfort with using technology differ by SES (Yu, Ellison, McCammon, & Langa, 2016). More attention is needed to determine how SES impacts the effectiveness of PA interventions, which may influence dissemination and implementation of interventions (Onken, Carroll, Shoham, Cuthbert, & Riddle, 2013). Consideration of SES during the planning phase of health interventions has led to better health outcomes for older adults with low SES (Kong, Tussing-Humphreys, Odoms-Young, Stolley, & Fitzgibbon, 2014). However, this approach has yet to be systematically evaluated for leisure PA interventions. More studies are needed to capture and describe the body of work on what leisure PA interventions have been purposefully designed for medically underserved older adults. Therefore, the aim of this review was to explore key aspects of leisure PA interventions for medically underserved older adults.

## Methods

The scoping review approach of Levac, Colquhoun, and O'Brien (2010) was used to conduct this review. The procedure starts with a systematic search of published literature evaluating PA participation or interventions for medically underserved older adults; next mapping the characteristics of identified studies, including study population, design type, and evidence level, and finally, identifying key elements for developing effective interventions to improve PA participation among this population.

### Identifying the Initial Research Question

The focus of our review was to explore leisure PA interventions for medically underserved older adults. We aimed to identify the landscape of studies involving medically underserved populations and PA or PA interventions using the following initial research questions: (a) what is the existing evidence on leisure PA participation and interventions for medically underserved older adults? and (b) what are the components of effective leisure PA programs for this population?

### Identifying Relevant Studies

PubMed, CINAHL, and the Cochrane Library were searched for studies published between 2006 and 2016 with full text available in English. The search strategy for databases was developed in consultation with a research librarian, and duplicates were removed before review. Search terms are listed in Table 1.

Articles were included if they met four criteria: (a) participants or a subgroup of participants aged 60 years and over; if a study did not have a clear cutoff age limit of 60 years

**Table 1.** Search Terms

Construct	Search terms
Medically underserved older adults	“Vulnerable populations” OR “poverty area” OR “medically underserved areas” OR “poverty” OR “rural areas” OR “suburban areas” OR “urban area” OR “racial or ethnic minority groups”
Physical activity	“Exercise OR physical fitness” OR “leisure activity” OR “health promotion” OR “health services” OR “physical activity” OR “activity therapy” OR “physical fitness” OR “patient education” OR “exercise therapy” OR “home health care”

and over, we determined that they had a subgroup of older adult participants if the mean age was  $50 \pm 10$  years. Studies in which age was considered a covariate were also included. (b) Participants or a subgroup of participants in the study resided in a medically underserved area, had low income, or included older adults from a minority ethnic/racial group. (c) The focus of the study was PA intervention or PA-related outcomes. (d) The population under study resided in the community and not in an institutional setting (e.g., nursing home or assisted living facility). Studies were excluded if any of the above conditions were not met.

### Study Selection

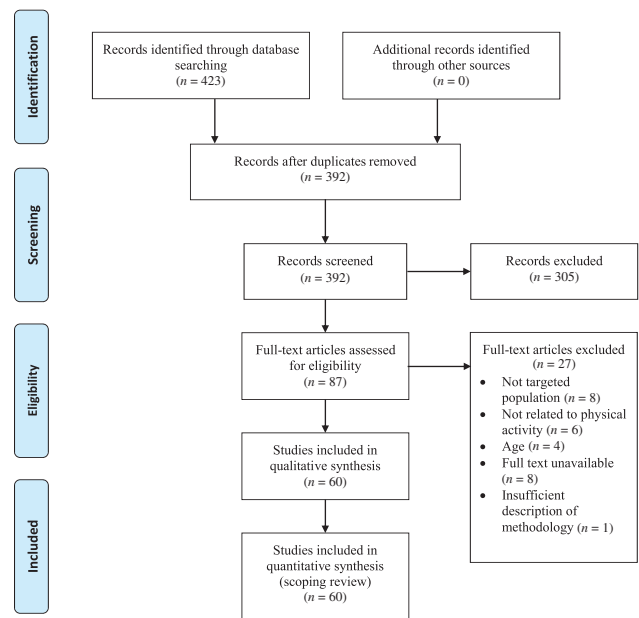
A total of 423 articles were identified with the search terms (Figure 1). After removing duplicates, 392 went through title and abstract review and yielded 87 articles for full text review. Two of the authors (K.J. and Y.H.) independently reviewed titles and abstracts using prespecified inclusion and exclusion criteria. After three iterations of independent review, consensus was achieved between both reviewers for full-text review.

The 87 articles were searched for full text and were reviewed for data extraction. Of these, 60 articles met all inclusion and exclusion criteria. Reasons for excluding articles are presented in Figure 1.

### Data Extraction

To identify common themes and research gaps within the reviewed literature, a standard spreadsheet was developed to extract data from all articles included for review. Data extracted included year of publication and study location, study population, study design and purpose, evidence level, barriers and facilitators of PA, and characteristics of PA intervention studies. Other than items listed above, characteristics of PA intervention studies included cultural adaptation materials, and interventions specifically for medically underserved older adults.

To classify a study's evidence level, the Oxford Center for Evidence-Based Medicine (OCEBM) guidelines were used to map levels of evidence (OCEBM Levels of Evidence Working Group, 2011). These guidelines allow clinicians and researchers to evaluate the rigor of results reported by different types of research study designs. Evidence levels range from I to V. Level I represents the most unbiased information derived from local and current random sample

**Figure 1.** Flow chart of search results included.

surveys, systematic reviews of randomized control trials (RCTs), or RCT studies. Level II represents systematic reviews of surveys, or RCT/observational trials with dramatic effects. Level III studies include survey studies with nonrandom samples or nonrandomized controlled cohort/follow-up studies. Level IV includes case-series or case-controlled studies. Level V represents opinions from experts without critical appraisal. On the basis of study quality, the level may be graded down from higher level to lower level.

### Summarizing and Reporting Findings

Thematic analysis is necessary in synthesizing results in scoping reviews (Arksey & O'Malley, 2005). We used content analysis to review the purpose of the study, barriers and facilitators of PA, and culturally adaptive materials. Reviewers (Y.H. and K.J.) developed a coding structure based on analysis to categorize relevant factors. The coding structure was discussed and agreed upon with the principal investigator (S.S.), who is experienced in qualitative research. Two reviewers (K.J. and Y.H.) extracted and coded data and compared results to synthesize factors.

Finally, we summarize the results from data extraction in addition to the four PA intervention studies designed for medically underserved older adults in the results.

## Results

We identified 60 articles related to PA participation and medically underserved older adults.

### Years of Publication and Study Location

Thirty-five studies (58%) were published between 2006 and 2010, while 25 studies (42%) were published between 2011 and 2016. The majority of studies had been conducted in the United States (80%,  $n = 47$ ). The remaining studies occurred in the United Kingdom (13%,  $n = 8$ ), Brazil (3%,  $n = 2$ ), Canada (2%,  $n = 1$ ), Israel (2%,  $n = 1$ ), and Belgium (2%,  $n = 1$ ; [Supplementary Appendix 1](#)).

### Study Population

Of the 60 studies included, 12 recruited participants from the general adult population, while 9 studies recruited individuals with a specific condition or disease such as diabetes, systematic heart failure (Bell et al., 2013; Bell et al., 2007; Mier, Medina, & Ory, 2007; Pullen et al., 2010), breast cancer (Spector, Deal, Amos, Yang, & Battaglini, 2014), systemic lupus erythematosus (Yuen, Breland, et al., 2013; Yuen, Holthaus, Kamen, Sword, & Breland, 2011; Yuen, Wang, et al., 2013), or myocardial infarction or coronary revascularization (Jolly et al., 2007). Twelve studies mentioned that participants resided in specific geographic areas (e.g., medically underserved area, communities with high deprivation level, or neighborhood with low walkability). Eighteen studies mentioned “low income” in their descriptions of participants.

When classifying participants into racial or ethnic minority groups, 27 studies focused on African Americans, comparing their health outcomes to Caucasians; 6 studies focused on Hispanics and Latinos; 13 studies included multiple racial or ethnic groups; 5 studies grouped all non-white participants into a single category; 1 study indicated immigrants instead of specific racial or ethnic groups; and finally, 1 study included participants who were Arabs and Israelis. Six studies did not mention race; these were mainly conducted in the United Kingdom or Belgium. These studies did not use race or ethnicity as a proxy for SES.

### Study Design and Purpose

The 60 studies included 11 RTCs, 9 quasi-experimental studies, 2 cohort studies, 17 correlation/prediction studies, 1 methodology study, 8 qualitative studies, and 12 descriptive survey studies.

Studies were categorized into three domains based on their purpose: (a) descriptive studies surveying existing PA participation among older adults, (b) exploratory studies seeking to clarify the relationship between PA and other factors such as health outcomes, and (c) PA intervention studies ([Table 2](#)).

Most descriptive studies utilized surveys or interviews to understand factors related to PA participation. Some studies examined both leisure PA and work-related PA (Bennett, Wolin, Puleo, & Emmons, 2006; Cohen et al., 2013; Ottenbacher et al., 2012; Slattery et al., 2006). These studies indicated that the patterns of leisure PA differed from household- or work-related PA among medically underserved older adults compared to their counterparts. Lower education level and lower income were associated with higher levels of total PA and household- or work-related PA, but not leisure PA (Bennett et al., 2006; Cohen et al., 2013; Slattery et al., 2006). One study found that higher total PA was associated with a lower 3-year risk of mortality among medically underserved Mexican Americans over age 75 (Ottenbacher et al., 2012). Qualitative studies used interviews or focus groups to describe the attitudes of specific populations toward PA participation (Bowling, 2009; Clark et al., 2008; Corwin, Laditka, Laditka, Wilcox, & Liu, 2009). These studies found that medically underserved older adults were less likely to associate healthy aging with PA or exercise.

Most exploratory studies used correlation or regression design and used PA participation as one of the correlational factors, including PA and mortality or disease development (Booth et al., 2013; Ottenbacher et al., 2012), PA and various health outcomes (e.g., obesity, diet; Dubbert et al., 2010; Netz, Goldsmith, Shimony, Arnon, & Zeev, 2013; Nguyen, Markides, & Winkleby, 2011; Orzech, Vivian, Huebner Torres, Armin, & Shaw, 2013; Tamers et al., 2014; Winston et al., 2015), PA and environmental factors (e.g., crime rate, walkability, neighborhood safety; Fox et al., 2011; Johnson-Lawrence et al., 2015; Lovasi, Neckerman, Quinn, Weiss, & Rundle, 2009; Marlier, Cardon, De Bourdeaudhuij, & Willem, 2014; Mason, Kearns, & Livingston, 2013; Powell-Wiley et al., 2014; Roman, Knight, Chalfin, & Popkin, 2009; Shigematsu et al., 2009; Yu et al., 2011), and barriers and facilitators of engaging in PA or a PA program (Jones, Jolly, Raftery, Lip, & Greenfield, 2007; Lattimore et al., 2011; Mier et al., 2007; Pekmezi et al., 2013). Last, experimental intervention studies were found to focus on the feasibility or efficacy of a PA intervention.

### Level of Evidence

Fifty-five quantitative studies were evaluated using the OCEBM guidelines for evidence level: 12 studies were rated as Level I, 5 were Level II, 23 were Level III, 9 were Level IV, and 4 were Level V. All Level I studies were secondary analyses of data obtained from cross-sectional studies using random sample surveys or censuses.

### Barriers and Facilitators to PA Participation

Barriers and facilitators to PA participation was a theme that emerged from the thematic analysis. Four studies specified barriers and facilitators to PA among medically

**Table 2.** Descriptive Information and Main Themes of Studies Included in This Scoping Review

Study design	Main theme	Intervention/approach	Purpose
Descriptive ( <i>n</i> = 16)	Prevalence of PA ( <i>n</i> = 9)	Survey to determine PA participation ( <i>n</i> = 8)	<ul style="list-style-type: none"> <li>• Prevalence of complementary therapy including exercise among older adults (Arcury et al., 2015)</li> <li>• Total PA participation among low-income housing residents measured by a pedometer (Bennett et al., 2006)</li> <li>• Southern U.S. community cohort study about leisure, work, or household PA (Cohen et al., 2013)</li> <li>• Exercise and diet behaviors of Native Hawaiians in California (McEligot et al., 2010)</li> <li>• Factors associated with a short physical performance battery among African Americans (Miller, Wolinsky, Andresen, Malmstrom, &amp; Miller, 2008)</li> <li>• Prevalence of counseling about PA received by medically underserved patients (Schrop et al., 2006)</li> <li>• Difference in total or specified PA (leisure, household, or work) participation between Hispanic and non-Hispanic women (Slattery et al., 2006)</li> <li>• Prevalence of meeting recommended PA guidelines among Asian Americans (Yi et al., 2015)</li> <li>• Prevalence of health equipment use among rural older adults with diabetes to perform PA at home (Bell et al., 2007)</li> </ul>
	Depict population perceptions related to PA participation ( <i>n</i> = 4)	Survey of home equipment use among different SES and racial groups to facilitate PA ( <i>n</i> = 1)	<ul style="list-style-type: none"> <li>• Perceptions of active aging (Bowling, 2009)</li> <li>• Perceptions of health self-management (Clark et al., 2008)</li> <li>• Attitudes toward aging well (Corwin, Laditka, Laditka, Wilcox, &amp; Liu, 2009)</li> <li>• Factors for developing a neighborhood program to enhance PA participation (Griffin, Wilson, Wilcox, Buck, &amp; Ainsworth, 2008)</li> </ul>
	PA program evaluation ( <i>n</i> = 3)	Recruitment, retention and adherence rates to PA programs ( <i>n</i> = 1)	<ul style="list-style-type: none"> <li>• Recruitment and attrition rates of a walking program targeting African American women (Wilbur et al., 2006)</li> </ul>
	Exploring associations between PA and mortality or disease development related to PA ( <i>n</i> = 2)	Perceptions of services promoting PA programs ( <i>n</i> = 2)	<ul style="list-style-type: none"> <li>• Trust and adherence to physician and health professional recommendations for diet and PA among rural older adults (Bell et al., 2013)</li> <li>• Perceptions of a PA referral service (Wormald et al., 2006)</li> </ul>
Exploratory ( <i>n</i> = 23)	Exploring associations between PA and mortality or disease development related to PA ( <i>n</i> = 2)	Cohort studies to explore the relationship between mortality/disease development and PA participation ( <i>n</i> = 2)	<ul style="list-style-type: none"> <li>• Development of diabetes is related to neighborhood walkability and PA participation (Booth et al., 2013)</li> <li>• Total PA, including leisure, household, and occupational activity, predicts all-cause mortality among Mexican Americans (Ortenbacher et al., 2012)</li> </ul>
	Exploring associations between PA and other health-related factors ( <i>n</i> = 21)	Correlation studies with PA or PA-related factors and health-related outcomes ( <i>n</i> = 6)	<ul style="list-style-type: none"> <li>• Relationship between PA participation and weight among African Americans (Dubbert et al., 2010)</li> <li>• Loneliness and PA (Netz et al., 2013)</li> <li>• Physician counseling on PA and comorbidity of chronic conditions among obese Mexican Americans (Nguyen et al., 2011)</li> </ul>

Table 2. Continued

Study design	Main theme	Intervention/approach	Purpose
			<ul style="list-style-type: none"> <li>• Relationships between diet, PA, SES, and multiple racial/ethnic groups (Orzech et al., 2013)</li> <li>• Concerns about PA participation are associated with elevated BMI among low SES groups (Tamers et al., 2014)</li> <li>• Associations between social network membership and diet, PA, and weight loss goals (Winston et al., 2015)</li> <li>• Perceptions of neighborhood characteristics and PA (Fox et al., 2011)</li> <li>• Perception of neighborhood walkability on PA (Florindo, Salvador, Reis, &amp; Guimaraes, 2011)</li> <li>• Neighborhood involvement and residential density on PA (Johnson-Lawrence et al., 2015)</li> <li>• Neighborhood walkability on BMI (Lovasi et al., 2009)</li> <li>• Presence of a community sports program on sports participation in disadvantaged urban communities (Marlier et al., 2014)</li> <li>• Crime rate and perceived neighborhood safety on frequency of walking (Mason et al., 2013)</li> <li>• Relationships between perceived living environment and PA, health, and obesity (Roman et al., 2009)</li> <li>• Neighborhood deprivation on weight change (Powell-Wiley et al., 2014)</li> <li>• Age-related differences among perceived neighborhood environment and PA (Shigematsu et al., 2009)</li> <li>• Social networks and leisure-time PA among people living in disadvantaged areas (Yu et al., 2011)</li> <li>• Behaviors associated with non-adherence to a PA program among cardiac patients (Jones et al., 2007)</li> <li>• Barriers and facilitators to participation in a home PA program (Lattimore et al., 2011)</li> <li>• Motivators and barriers to PA among Mexican Americans with type 2 diabetes (Mier et al., 2007)</li> <li>• Barriers during a culturally adapted, computer-tailored PA intervention for African American women (Pekmezci et al., 2013)</li> <li>• Process of implementing a home Wii Fit program for African American women (Yuen, Breland, et al., 2013)</li> <li>• Effect of a brief cognitive-behavioral feedback intervention on rates of attendance at an introductory PA session (Mihalko et al., 2006)</li> <li>• Pilot study of a home-based individually tailored physical activity printed materials for African American women (Pekmezci et al., 2013)</li> <li>• Intervention consisting of changes to diet, PA, and medication adherence (Resnick et al., 2009)</li> </ul>
		Correlation studies with PA or PA-related outcomes and environmental factors ( $n = 10$ )	
	Barriers and facilitators associated with participation in PA programs ( $n = 5$ )		
Intervention ( $n = 21$ )		Feasibility study of an intervention to increase PA participation among medically underserved adults or specific racial/ethnic groups ( $n = 5$ )	

**Table 2. Continued**

Study design	Main theme	Intervention/approach	Purpose
Efficacy study of a PA intervention for medically underserved populations or specific racial/ethnic groups ( <i>n</i> = 8)	<ul style="list-style-type: none"> <li>• Feasibility of an on-site group intervention program for African American urban older adults (Stineman et al., 2011)</li> <li>• Testing feasibility of a 10-week home-based exercise program using the Wii Fit system among African American women (Yuen et al., 2011)</li> <li>• Comparison of a fully supervised center-based PA program to a minimally supervised home-based PA program (Almeida et al., 2013)</li> <li>• Walking program for African American women (Banks-Wallace, 2007)</li> <li>• Telehealth for weight control among African American women (Gerber et al., 2013)</li> <li>• Tailored social media platforms and text messaging intervention to promote PA among African American women (Joseph et al., 2015)</li> <li>• Multicomponent weight loss program including PA (Murphy &amp; Williams, 2013)</li> <li>• Yoga therapy for African American heart failure patients (Pullen et al., 2010)</li> <li>• Home-based PA program for African American breast cancer survivors (Spector et al., 2014)</li> <li>• Testing a behavior change intervention with positive affect and self-affirmation among overweight underserved adults (Winston et al., 2015)</li> </ul>	Effectiveness study of a PA intervention for medically underserved populations or specific racial/ethnic groups ( <i>n</i> = 8)	<ul style="list-style-type: none"> <li>• Comparison of a home-based rehab program with a hospital-based rehab program (Jolly et al., 2007)</li> <li>• A culturally adapted, computer-tailored PA intervention for Latinas (Pekmezci et al., 2012; Pekmezci et al., 2009)</li> <li>• Multicomponent intervention targeting diet, PA, and medication adherence (Resnick et al., 2014)</li> <li>• Telephone-based intervention to increase PA among obese African American women (Rimmer, Hsieh, Graham, Gerber, &amp; Gray-Stanley, 2010)</li> <li>• Effect of yoga on diabetic patients in multi-ethnic boroughs (Skoro-Kondza et al., 2009)</li> <li>• Culturally adapted walking program for African American women (Wilbur et al., 2008)</li> <li>• Effect of a walking program on depressive symptoms (Wilbur et al., 2009)</li> </ul>

Note: BMI = Body mass index; PA = Physical activity; SES = Socioeconomic status.

underserved older adults (Jones et al., 2007; Lattimore et al., 2011; Mier et al., 2007; Pekmezi et al., 2013). Of these, two focused on African Americans (Pekmezi et al., 2013; Yuen, Breland, et al., 2013), one on Mexican Americans with diabetes (Mier et al., 2007), and one between African American and Caucasians (Lattimore et al., 2011).

Common barriers to PA participation in these studies included lack of time due to work or other responsibilities, lack of motivation, negative prior experiences with PA, environmental barriers (e.g., lack of transportation), personal barriers (e.g., lack of financial resources), social barriers (e.g., lack of support from family members, lack of appropriate peers or accountable partners), and health-related issues (e.g., pain, fatigue; Table 3). Barriers associated with specific racial/ethnic groups included hair grooming concerns for African American women, different preferences for PA than those offered, and unrelatable program materials, such as having different ages, races, or body types than those represented in program materials (Pekmezi et al., 2013).

Few studies reported on facilitators of PA participation. Mier et al. (2007) conducted a qualitative exploratory study of PA participation among Mexican Americans with type 2 diabetes, while Pekmezi and colleagues (2013) explored PA participation among African American women in the Deep South of the U.S. Facilitators to PA participation mentioned in these two studies include increased health literacy (e.g., understanding that increased PA improves health; Mier et al., 2007) and social factors (e.g., support from a religious group; Pekmezi et al., 2013).

## Characteristics of PA Intervention Studies ( $n = 21$ )

### Year of Publication and Study Location

Of the 21 PA intervention studies, 10 (48%) were published between 2006 and 2010, and 11 (52%) were published between 2011 and 2016. The majority occurred in the United States (86%,  $n = 18$ ), two occurred in the United Kingdom (10%,  $n = 2$ ), and one occurred in Brazil (4%,  $n = 1$ ).

### Study Populations

Of the 21 intervention studies, most included older adults with minority background and/or low income ( $n = 16$ ), while 5 recruited individuals with a specific condition or disease such as systematic heart failure (Pullen et al., 2010), breast cancer (Spector et al., 2014), systemic lupus erythematosus (Yuen, Breland, et al., 2013), or myocardial infarction/coronary revascularization (Jolly et al., 2007). Three studies mentioned participants living in a specific geographic area (Fox et al., 2011; Jolly et al., 2007; Skoro-Kondza, Tai, Gadelrab, Drincevic, & Greenhalgh, 2009), five mentioned low income or low-income housing (Almeida et al., 2013; Banks-Wallace, 2007; Resnick et al., 2014; Resnick et al., 2009; Wilbur et al., 2006), and one study mentioned low education level to describe participants (Almeida et al., 2013).

Of the 15 studies including participants who belong to a minority race or ethnic group, 7 intervention studies focused on African Americans (Gerber et al., 2013; Murphy & Williams, 2013; Pekmezi et al., 2013; Pullen et al., 2010; Spector et al., 2014; Wilbur et al., 2008; Yuen, Breland, et al., 2013) and 2 on Hispanic or Latino ethnicity (Pekmezi et al., 2012; Pekmezi et al., 2009).

### Study Design and Purpose

The 21 studies included 8 RCTs, 9 quasi-experimental studies, 2 correlation/prediction studies, 1 methodology study, and 1 descriptive survey study.

The PA intervention studies can be grouped into five types: (a) PA education programs, (b) walking programs, (c) community-based group PA programs, (d) home-based PA programs, and (e) multicomponent programs combining at least two different intervention approaches, such as walking with a community-based group in addition to a home-based program. The range of sample sizes ranged from 10 to 525 participants (mean = 116,  $SD = 132$ ). Seven studies had large, robust sample sizes (>200 participants). Only one study justified its sample size with power analysis. The time length of interventions ranged from a single 30-min phone call to six consecutive months of providing flyers with tailored PA information. The median intervention period was 12 weeks. The efficacy and effectiveness of intervention studies were difficult to compare due to the varied outcome and intervention designs (Supplementary Appendix 2).

### Level of Evidence Supporting PA Interventions

Among the 21 included intervention studies, 3 were rated Level II using OCEBM guidelines, 11 were Level III, 6 were Level IV, and 1 was Level V. Four were pilot studies examining the feasibility of a new intervention, eight were efficacy trials evaluating the initial impact of an intervention, and nine were pragmatic trials testing the effectiveness of interventions in a less controlled research environment (Supplementary Appendix 2).

### Culturally Adapted Materials

Culturally adapted materials for intervention studies were a theme that emerged from the thematic analysis. Only five intervention studies adapted materials or methods to address barriers to PA participation for specific groups of participants (Joseph et al., 2015; Pekmezi et al., 2012; Pekmezi et al., 2013; Pekmezi et al., 2009; Wilbur et al., 2008). Joseph et al. used culturally adapted messages delivered through social media and text messages targeting African American women. Pekmezi and colleagues conducted three studies utilizing a computer-adapted PA intervention among multiple underserved racial/ethnic groups (Pekmezi et al., 2012; Pekmezi et al., 2013; Pekmezi et al., 2009). Wilbur et al. conducted a home-based walking study for African American women and utilized African American role models and staff from the targeted



**Table 3.** Barriers and Facilitators for PA Participation Among Medically Underserved Older Adults

Theme	Health	Motivation	Previous exercise experience	Environmental barriers	Social barriers
Jones et al., 2007	Other responsibilities	Lack of motivation		Lack of transportation, overcrowded facility	Lack of age-appropriate peers
Lattimore et al., 2011	Work and family constraints	Lack of interest or knowledge	Negative perceptions or experience	Weather, transportation, and safety concerns	Lack of peer partner, lack of person to hold oneself accountable
Mier et al., 2007	Lack of time	*Sense of well-being		Transportation and safety concerns	*Family support
Pekmezi et al., 2013	Physical pain, depression, and being overweight Low health literacy Work and other roles	Lack of knowledge, perception of already getting enough PA in daily life Hair concerns *Don't want to let others down *Sense of commitment to help others	Negative experience, fear of injury	Lack of health clubs	Lack of social support
Yuen, Wang, et al., 2013					

Note: \* Indicates facilitators for PA participation. PA = Physical activity.

communities for the treatment group. These studies demonstrated good feasibility among African Americans and Latinos, but they resulted in only small to nonsignificant improvements in PA-related outcomes.

Adaptations to materials and methods included translating materials, hiring staff representing the target population, and tailoring materials to a specific racial/ethnic group. Tailoring materials may include all or part of the following: providing health information to the targeted racial/ethnic groups (e.g., obesity prevalence and increased risk among African Americans), presenting culturally relevant and acceptable PA activities (e.g., reframing PA to include activities that do not require a gym membership, such as walking or dancing), and addressing concerns of and barriers for a specific racial/ethnic group (e.g., hair concerns or body shape preference).

### Interventions Targeting Medically Underserved Older Adults

Among 21 intervention studies, only 4 specifically targeted underserved older adults aged 60 years and above (Almeida et al., 2013; Mihalko, Wickley, & Sharpe, 2006; Resnick et al., 2009; Stineman et al., 2011). Of these four studies, three were pilot feasibility studies (Mihalko et al., 2006; Resnick et al., 2009; Stineman et al., 2011), and one was an efficacy trial (Almeida et al., 2013).

Resnick and colleagues (2009) conducted a single-group pretest–post-test study of a multicomponent intervention incorporating diet, PA, and medication management within 22 low-income African American older adults. PA-related outcomes after 12 weeks included reduced systolic and diastolic blood pressure and an average attendance rate of 60% across 36 sessions.

Stineman and colleagues (2011) conducted an RCT ( $n = 204$ ) of a falls reduction program incorporating PA for older African Americans at high risk for falls. Feasibility outcomes included a 31% recruitment rate, 90% retention rate, 66% attendance at all four weekly on-site group classes, and less than 1% adherence to home-based exercise recommendations after 6 months. The program had no significant effects on PA-related outcomes, including weight, blood pressure, gait speed, and health-related quality of life at 6-month follow-up.

Mihalko and colleagues (2006) conducted an RCT ( $n = 79$ ) of a single 30-min cognitive-behavioral program centered on risk perception to increase PA participation among older adults residing in independent living communities. A small group of African American older adults was included in this study ( $n = 4$ ). The program achieved a 60% recruitment rate, and the number of participants receiving the cognitive-behavioral intervention who subsequently attended a community-based PA session was significantly higher compared to control group members.

Last, one efficacy study was conducted by Almeida and colleagues (2013), an RCT ( $n = 76$ ) of a home-based PA program compared to a center-based PA program and

nonexercise controls for medically underserved older adults in Brazil. Compared to nonexercise controls, both home-based and center-based groups showed significant improvements in balance and gait speed after the 4-month intervention. Almeida and colleagues (2013) concluded that the home-based program was a rational and economical alternative to a center-based program.

## Discussion

Findings of this scoping review show that few studies of leisure PA interventions have been conducted with high levels of evidence among medically underserved older adults with minority ethnic/racial backgrounds, physical disability, or low SES. Effectiveness studies were low in number, especially for older age groups.

Descriptive and exploratory studies continue to comprise the majority of research on PA participation in underserved populations. The main purpose of these studies was to find factors related to PA participation. Identified descriptive and exploratory studies used SES and/or race/ethnicity for grouping participants to evaluate PA variables. These studies also explained lower PA engagement as a health disparity observed between different SES and racial/ethnic groups (Braveman, 2012; Braveman, Egerter, & Williams, 2011). Indeed, lower income and lower education level are associated with lower participation in leisure PA (Yi, Roberts, Lightstone, Shih, & Trinh-Shevrin, 2015). However, the benefits of PA do not exclusively come from leisure activity, but also from work- or household-related PA; underserved populations may engage more in these forms of PA (Bennett et al., 2006; Cohen et al., 2013). These findings align with other health inequality studies, suggesting that a target health outcome may be confounded with other social determinants such as race/ethnicity background, SES, and environmental factors (Bambra, Hillier, Moore, Cairns-Nagi, & Summerbell, 2013; Hillier-Brown et al., 2014).

On identifying the target population, the question of who are medically underserved older adults is important itself. "Medically underserved" is an umbrella term defined by the U.S. Department of Health and Human services that includes, but is not limited to, low SES populations, racial and ethnic minorities, and people who live in health-professional shortage areas. Low SES is often mentioned in studies that describe medically underserved populations; however, no clear-cut definition of low SES exists in health studies (Braveman & Gruskin, 2003; Nuru-Jeter et al., 2018). In 60 studies identified, we found lower income, lower education level, residency in a specific deprived area, and/or specific racial or ethnic groups were used to select and describe participants. There is much discussion on the relationship between SES and these indicators; "medically underserved population" or "low SES population" may have different definitions from study to study and should be interpreted with caution.

For example, residency does not simply equate to living in an urban or rural area for those using residency of a specific geographic area as a proxy of low SES, but to a deprivation metric based on other factors such as population income, education level, or crime rate in the identified studies. Race/ethnicity should also be interpreted with caution; race/ethnicity cannot be fully included or excluded as an indicator of SES (Nguyen, Moser, & Chou, 2014; Ozawa & Hun Yeo, 2008). Studies that used race as a proxy or part of SES were primarily conducted in the United States, contrary to some studies conducted in the United Kingdom that did not report race despite 12.9% of their population being non-Caucasian. These results indicate that clarification is needed in identifying and defining medically underserved older adults, which is critical for intervention design and outcome comparisons to reduce health inequalities (Grundy & Holt, 2001).

## Components of Effective PA Interventions

The breadth of PA interventions identified in this study also suggests a gap in the evidence demonstrating the effectiveness of PA interventions for underserved older adults. Only four intervention studies explicitly targeted older adults. Results of the three feasibility studies indicated that strategies to increase reach, retention, and adherence for medically underserved older adults are needed. This finding is consistent with the literature review of Mendoza-Vasquez et al. (2016), indicating that recruitment and intervention delivery strategies are important to promote PA among underserved populations. Preliminary efficacy (Mihalko et al., 2006; Resnick et al., 2009; Stineman et al., 2011), in addition to efficacy established by the efficacy trial (Almeida et al., 2013), suggests that more studies are needed to establish effective interventions for improving leisure PA for this population. It is difficult to draw a simple conclusion of what kind of PA interventions are effective for medically underserved older adults due to the wide variety of participants and study settings. However, themes emerging from this study showed that several components should be considered when designing interventions for this population.

When considering culturally adapted materials as a component of PA interventions for medically underserved older adults, specified barriers and facilitators to age, race/ethnicity, and environmental background are critical. We found that the majority of intervention studies recruited underserved adults aged 18 years or over; thus, young, middle-aged, and older adults received the same intervention. However, Cleland, Tully, Kee, and Cupples (2012) found that age-specific barriers and facilitators to PA exist within underserved communities from a systematic review with 27 identified studies (Lattimore et al., 2011; Schutzer & Graves, 2004). For example, the approach to designing PA programs for weight loss targeting middle-aged to young-old African American women can be very different from PA programs for fall prevention targeting frail older adults.

Thus, age is still important to address when designing PA interventions that target underserved groups.

Studies regarding race/ethnicity-specific barriers and facilitators were primarily conducted in the United States, where racial and ethnic diversity tends to be higher. Underserved populations may have similar barriers and facilitators to PA to the general population, such as lack of time and motivation (Clark, 1999; Costello, Kafchinski, Vrazel, & Sullivan, 2011); however, the concerns behind these barriers might be different (Lattimore et al., 2011). Additional barriers and facilitators related to specific race/ethnic groups should be considered and included in culturally sensitive materials (Pekmezi et al., 2012; Pekmezi et al., 2013; Pekmezi et al., 2009).

The value of culturally sensitive materials is suggested from health inequality research (Anderson, Scrimshaw, Fullilove, Fielding, & Normand, 2003), but guidelines and a clear framework for how these materials should be implemented during different phases of leisure PA program development do not exist. We found five studies using culturally adapted materials with good feasibility outcomes and small but nonsignificant improvements in PA outcomes. This concurs with past studies. Bock, Jarczok, and Litaker (2014) found that PA interventions tailored by gender and ethnicity resulted in higher net changes in PA outcomes. Barbosa Filho and colleagues (2016) found similar results among underserved children and adolescents, but the implications of their study cannot be concluded due to insufficient quality and quantity of evidence. Thus, we suggest that future studies use culturally adapted materials to incorporate race/ethnic group-specific barriers and facilitators and provide clear protocols and materials.

One limitation of this study is that we did not restrict our search to theory-based interventions, which might reduce the quality of included studies. Another limitation is the possibility of reviewer selection bias due to the two reviewers' (Y.H. and K.J.) similar backgrounds in the field of rehabilitation science. The initial search resulted in a 30% difference in article selection between the two reviewers; however, both reviewers achieved consensus on all article selections before final inclusion. Despite these limitations, this study may provide initial insights on the landscape of leisure PA interventions for medically underserved older adults.

The findings of this scoping study indicate that more research is needed to reduce health disparities related to PA for medically underserved older individuals with minority ethnic/racial backgrounds, physical disability, and/or low SES. If the ultimate goal is to promote PA as a means to maintain or improve health, function, and well-being of medically underserved older adults, there is a need to shift from observing "what is the difference" to determining "what makes things better" for this population (Srinivasan & Williams, 2014). In the scope of this review, we identified studies related to leisure PA interventions, but future studies should also recognize the health benefits of total

PA, especially work- and household-related PA, among this population. To maximize the effectiveness of leisure PA interventions, researchers should consider age- and race/ethnicity-specific barriers and facilitators, and use culturally adapted materials to meet the needs of different racial/ethnic or SES groups.

## Supplementary Data

Supplementary data are available at *The Gerontologist* online.

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## Conflict of Interest

None reported.

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