

Review Article

A Systematic Review of Interventions to Increase Physical Activity Among American Indian and Alaska Native Older Adults

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Abstract

Background and Objectives: Physical activity (PA) is a powerful protective factor known to reduce risk for chronic conditions across the life span. PA levels are lower among American Indians and Alaska Natives (AIANs) when compared with other racial/ethnic groups and decrease with age. This evidence justifies a synthesis of current intervention research to increase PA levels among AIANs. This systematic review examines completed interventions to increase PA among AIAN older adults and considers recommended practices for research with Indigenous communities.

Research Design and Methods: The systematic review was designed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement for systematic review protocols and reporting guidelines. Three electronic databases, PubMed, Web of Science, and PsycINFO, were searched for academic literature. Trials investigating interventions to increase PA among AIAN adults older than 50 years were eligible. The Quality Assessment Tool for Quantitative Studies was used to evaluate the quality of evidence.

Results: Three published trials were identified, including one group-level, clinic-based and two individual-level, home-based interventions. All were 6 weeks in duration, took place in urban areas, and used self-report PA measures. Findings indicated an overall increase in PA levels, improved PA-related outcomes, and improved psychosocial health among participants. None described community-engaged or culture-centered research strategies.

Discussion and Implications: The narrow yet promising evidence represents a need for expanded research and a call to action for using culture-centered strategies. An advanced understanding of cultural and contextual aspects of PA may produce more impactful interventions, supporting health and mobility across the life span.

Keywords: Behavior change, Behavioral interventions, Health disparities, Indigenous health

Background and Objectives

In the United States, underrepresented racial and ethnic groups disproportionately experience chronic illness and disability; this is especially true for older adult

populations (Centers for Disease Control and Prevention, 2019; Meyer et al., 2013). Preventive strategies—such as interventions to modify health behaviors known to affect disease risk—are at the forefront of public health

efforts to address health disparities among such groups (National Institutes of Health, 2016). Physical activity (PA) is a modifiable behavior known to reduce disease risk among older adults (Bauman et al., 2016). Interventions have demonstrated promising results for improved PA levels among older adults (Chase, 2015), including reduced risk of chronic disease and disability, even among those with preexisting conditions (Pahor et al., 2014). This evidence fuels hope for broad positive impact of PA-focused interventions for diverse older adults. This research is critical among American Indians and Alaska Natives (AIANs), who report among the lowest levels of PA in the United States (National Center for Health Statistics, 2019) and experience pronounced health disparities in conditions known to be prevented by PA (U.S. Department of Health and Human Services Office of Minority Health, 2018). Formative research has identified that cultural beliefs and values that influence PA in AIAN older adults may differ from those of other racial/ethnic groups (Belza et al., 2004; Henderson & Ainsworth, 2003; Hopkins et al., 2007; Lewis, 2013). Thus, effective, meaningful PA promotion interventions among AIAN older adults likely require consideration and cultural tailoring (Conn et al., 2013). A systematic review of interventions to increase PA among AIAN older adults may illuminate critical evidence in PA behavior change and health outcomes that can serve as a foundation for future intervention development, and identify critical gaps to stimulate effective, action-oriented health disparities research.

AIAN Older Adults

The AIAN older adult population is expected to increase more than threefold from 2010 to 2050, from approximately 235,000 to 918,000 (Vincent & Velkoff, 2010). There are currently 574 federally recognized AIAN tribes in the United States (Sweeney, 2020), and over 60 additional state-recognized tribes (Saenz, 2020). The AIAN designation refers to descendants of the original peoples of North America who maintain tribal affiliation or family and/or community connection (Norris et al., 2012). AIAN older adults are recognized for their resilience in the face of major challenges associated with cultural colonization and dramatic shifts in ways of living throughout their lifetime (Kahn et al., 2016).

Although evidence of past and present social and economic oppression is linked to current health disparities in morbidity and mortality in this population (Goins et al., 2015), a recent surge of decolonizing and participatory research has revealed optimistic perspectives among AIAN older adults on successful aging (Lewis, 2013, 2014), dynamic methods for sharing their history and experiences with coming generations (Varcoe et al., 2010; Wexler, 2011; Whitewater et al., 2016),

and engaging in healthy behaviors to support longevity (Hopkins et al., 2007; Lewis, 2013).

Health Disparities and PA

Despite increased life expectancy among AIANs, pronounced health disparities are present and life expectancy remains lower than for non-Hispanic Whites (Espey et al., 2014; U.S. Department of Health and Human Services Office of Minority Health, 2018). AIANs experience higher rates of diabetes, obesity, hypertension, and cardiovascular disease than the U.S. general population (U.S. Department of Health and Human Services Office of Minority Health, 2018), and AIAN older adults report higher rates of functional limitations and disability than non-Hispanic White peers (Goins et al., 2007). Approximately two-thirds of AIAN older adults report comorbidity, defined as the presence of two or more chronic conditions (Goins & Pilkerton, 2010). Furthermore, modifiable risk factors known to impact onset and management of chronic conditions and disability are higher among AIAN older adults than other racial/ethnic groups (U.S. Department of Health and Human Services Office of Minority Health, 2018).

PA is one modifiable risk factor known to have a protective effect against conditions disproportionately present among AIAN older adults (Albright & Gregg, 2013; Moore et al., 2016; Sesso et al., 2000). Population-based studies indicate AIAN adults are less active than other racial/ethnic groups (National Center for Health Statistics, 2019), and physical inactivity increases with age (Coble & Rhodes, 2006; Redwood et al., 2009; Storti et al., 2009).

Interventions designed to increase PA among community-dwelling older adults have demonstrated promising evidence. A meta-analysis of PA interventions targeting those aged 65 years and older ($N = 13,829$) identified an overall mean effect size for two-group post-test comparisons of 0.18 (95% CI: 0.10–0.26, $p < .001$; Chase, 2015). This represented a difference of 620 steps per day, or 73 min of PA per week between treatment and control groups, improvements that could contribute to substantial progress toward achieving recommended guidelines for PA and healthy aging (Nelson et al., 2007). Yet, PA intervention studies among medically underserved older adults emphasize the importance of cultural adaptation of materials, addressing race/ethnicity-specific barriers and facilitators, and appropriateness of intervention form (Hu et al., 2019). To date, these factors are not well understood among AIAN older adults.

Experts in the fields of Indigenous public health and intervention science have called for efforts to utilize culture-centered strategies to develop and implement health interventions; such strategies may increase impact and sustainability and support health equity (Dickerson et al., 2020; Jernigan et al., 2020; Whitesell et al., 2020). These strategies align with broader calls in the field of public

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Peer-reviewed, original research article • Published in English • Study took place in the United States • Study participants' age criteria: 50 years or above, or sample mean age: 55 years and above • Individual- or community-level interventions • Experimental or quasi-experimental design • Controlled and uncontrolled studies • Measured and reported results on at least one PA-related outcome (e.g., PA participation, PA level, self-efficacy for PA, or other behavioral outcomes such as social or environmental support for PA or motivation for PA) 	<ul style="list-style-type: none"> • Studies that combined AIAN populations with other ethnic/racial population groups • Studies on prevalence, correlates, or determinants • Abstracts, conference proceedings, dissertations, conceptual papers, commentaries, and reviews of the literature • Studies that present rationale and methods only

Note: AIAN = American Indian and Alaska Native; PA = physical activity.

health for behavioral interventions to be responsive to cultural practices and worldviews of groups for whom the interventions are intended (Barrera et al., 2013; Resnicow et al., 1999). Although terminology and methods vary, for the purposes of this paper, culture-centered strategies are considered an umbrella term for the array of associated terms in the current literature, such as cultural adaptation, cultural attunement, cultural enhancement, culturally grounded, culture specific, culturally focused, cultural tailoring, and cultural targeting (Barrera et al., 2013). Although these terms are not necessarily synonyms, the purpose within the context of this study is to identify *if* and *how* such strategies may have been incorporated into PA interventions among AIAN older adults.

Heterogeneity exists across Indigenous cultures, influencing health risk and impacting intervention effectiveness, outcomes of interest, and Indigenous conceptualizations of healing (Bruce et al., 2014). Environmental context, such as AIAN community agreements and relationships with national governments, may play an important role. In the United States, the National Institutes of Health recently developed the Tribal Health Research Office, whose strategic plan identifies a roadmap for addressing health research needs for AIAN communities; one goal is to expand research in emerging areas of need (National Institutes of Health, 2019). Thus, this systematic review establishes an important foundation toward this end, synthesizing the evidence on interventions to increase PA among AIAN older adults.

Research Design and Methods

Literature Search

The systematic review was designed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement for systematic review protocols and reporting guidelines (Moher et al., 2015). Reporting details can be found in the [supplementary](#)

[material](#). The search strategy was designed in consultation with a university-based health sciences librarian. PubMed, Web of Science, and PsycINFO databases were searched for interventions to increase PA among AIAN older adults from January 1, 1970 to September 24, 2019. For example, the PubMed search strategy, which yielded 188 results, was the following: (((((((("American Indian" OR "American Indians" OR "Alaskan Native" OR "Alaska Native" OR "Native American*") AND ((active AND living) OR athletics OR exercise OR "physical activity" OR physical education" OR sports OR cancer OR "cardiovascular disease" OR diabetes OR obesity OR prevention OR wellness OR "community change" OR policy OR resolution)))) AND ((US[Affiliation] OR USA [Affiliation]))) NOT india [Affiliation]. The search strategies for other databases are available from the corresponding author. The references of each article were reviewed to identify any additional articles.

Study Inclusion and Exclusion Criteria

Eligible studies included peer-reviewed original research articles published in English that took place in the United States. Following the precedent of exemplary research among AIAN populations (Goins & Pilkerton, 2010; Graves et al., 2010), a lower age criterion was used for older adults, requiring study inclusion criteria of age 50 years and above or featuring a sample mean age of 55 years and above, due to evidence that the chronological pace of aging among AIANS may exceed that of other racial/ethnic groups (Hayward & Heron, 1999). See [Table 1](#) for study inclusion and exclusion criteria.

Data Extraction and Quality Assessment

Articles were scanned for inclusion based on title, abstract, and full text independently by the first and second authors (M. Pedersen and K. J. Harris; [Table 2](#)). Differences were resolved through discussion and consensus, and final

Table 2. Data Extraction Information of Interest

Information extracted	
<ul style="list-style-type: none"> • Study population • Setting • Study design • Baseline characteristics • Theoretical or conceptual framework • Behavior change techniques • Intervention strategies and details • Measures and methods • PA and health outcomes 	<ul style="list-style-type: none"> • Covariates • Year of data collection and publication • Sample age • Sample size used for final analysis • Results • Author-identified strengths and limitations • Author-identified lessons learned specific to conducting research and promoting PA among AIAN populations • Processes for culturally centered intervention development and/or implementation

Note: AIAN = American Indian and Alaska Native; PA = physical activity.

inclusion was identified. Data from included studies were extracted and cross-checked by the first author. Data on use of culture-centered strategies were also evaluated. Authors searched for terminology associated with culture-centered strategies, and for approaches and methods recommended for culture-centered research among Indigenous groups (Dickerson et al., 2020; Jernigan et al., 2020; Whitesell et al., 2020). These included the studies which (a) used a community-based participatory research approach; (b) applied formative research to develop equitable and respectful partnership between academic or research institutions and community-based entities; and (c) selected culturally and contextually responsive research design, theoretical framework, intervention components, and implementation and dissemination methods. If description of the use or application of culture-centered strategies was discovered in the text, or if study methods indicated the use of such strategies, data were extracted and cross-checked by the first author.

Study quality was assessed independently by M. Pedersen and K. J. Harris using the Quality Assessment Tool for Quantitative Studies (Armijo-Olivo et al., 2012). This tool incorporated six components of study quality including selection bias, design, confounders, blinding, data collection methods, and withdrawals and dropouts. Intervention integrity and appropriateness of analysis to research question were also evaluated. Study components were assigned an individual rating (strong, moderate, and weak) by the two independent raters, guided by an accompanying dictionary for detailed evaluation instructions. Based on component scores, a global rating was assigned to each study; ratings could be strong, moderate, or weak. Differences between raters were resolved through discussion and consensus. This tool has been used in previous systematic reviews focusing on research with Indigenous populations (Godin et al., 2015; Pelletier et al., 2017; Sushames et al., 2016), and is appropriate for a range of study designs in the field of public health.

Results

The PRISMA flow diagram of included studies is presented in Figure 1. Three primary studies were identified as meeting

all eligibility criteria and were included in the narrative synthesis (Kochevar et al., 2001; Sawchuk, Charles, et al., 2008, Sawchuk et al., 2011). Studies in the full-text review were excluded because they presented intervention rationale and methods only (Gittelsohn et al., 2017; Lee et al., 2012; Prochaska et al., 2018), did not fit the age criteria (Brown & Kraft, 2008; Jiang et al., 2013; Robertson et al., 2007; Venkat Narayan et al., 1998; Witmer et al., 2004), did not measure PA-related outcomes (Gilliland et al., 2002), did not report participant sample mean age (Armstrong, 2000), the sample included racial/ethnic groups other than AIAN (Silverstein et al., 2018; Sperber et al., 2013), presented duplicate data (Jiang et al., 2012, 2015, 2018; Sawchuk, Bogart, et al., 2008; Sawchuk et al., 2017; Stefanich et al., 2005), or were not accessible (Glor, 1991).

Study Quality

The assessment tool was applied to the three studies included in the final analysis by two researchers, using the accompanying dictionary for detailed, step-by-step guidance for each component. One study was identified as weak in quality (Kochevar et al., 2001), while the other two were identified as moderate (Sawchuk, Charles, et al., 2008; Sawchuk et al., 2011).

Study Characteristics

Table 3 lists characteristics and brief descriptions of the three included studies. Mean sample size was 61 participants (range 22–125 participants), average age was 63 years. Women were well represented, comprising at least 69% of the sample in each of the three studies. Participants tended to be obese, with a mean body mass index of 31 kg/m². All three interventions were 6 weeks in duration; one featured twice weekly on-site group exercise sessions (12 sessions total; Kochevar et al., 2001), and two featured 6 weeks of at-home PA self-monitoring with telephone-based support (Sawchuk, Charles, et al., 2008; Sawchuk et al., 2011). Retention rates for the Sawchuk, Charles, and colleagues' (2008) and Sawchuk and colleagues' (2011)

studies were 94% and 90%, respectively, while Kochevar and colleagues (2001) featured a 64% retention rate. Data provided did not include sufficient information to indicate predictors of attrition.

Settings and Recruitment

All three study settings were based out of urban health/medical clinics. Recruitment strategies included advertisements at urban primary care clinics, health fairs, and word of mouth (Sawchuk, Charles, et al., 2008; Sawchuk et al., 2011). Inclusion criteria focused on older adults, generally between the ages of 50 and 85 years, who were either inactive (Sawchuk, Charles, et al., 2008; Sawchuk et al., 2011) or identified with at least one comorbidity (Kochevar et al., 2001). Participants denied medical contraindications to walking (Sawchuk, Charles, et al., 2008; Sawchuk et al., 2011) or verified approval of their physician to perform exercise (Kochevar et al., 2001). Of note, data collection for the two Sawchuk studies (Sawchuk, Charles, et al., 2008 and Sawchuk et al., 2011) was completed approximately 2 years apart, out the same clinic with very similar eligibility criteria. The authors did not specify whether participants could be included in both studies.

Theoretical Frameworks

No theoretical frameworks were identified in the studies.

Research Design and Methods

The Sawchuk, Charles, and colleagues' (2008) and Sawchuk and colleagues' (2011) studies were nonblinded, randomized controlled trials. The Kochevar and colleagues' (2001) study was a nonrandomized trial and described obtaining a "holdout sample"—interpreted to serve as a control group—which equaled at least 25% of the entire sample size. Both studies conducted outcome measurements at baseline and post-test.

Intervention protocols varied from highly structured (Kochevar et al., 2001) to unstructured self-directed (Sawchuk, Charles, et al., 2008; Sawchuk et al., 2011). Kochevar and colleagues (2001) utilized a structured, facilitated intervention protocol adapted from the fitness program, "So Much Improvement with a Little Exercise" (Hickey et al., 1995). In contrast, both studies by Sawchuk, Charles, and colleagues (2008) and Sawchuk and colleagues (2011) featured unstructured, self-directed interventions focused primarily on walking. See Table 3 for intervention details.

Outcomes

Outcome measures and brief descriptions of PA and health outcomes are listed in Table 4. Briefly, studies did

not identify a significant difference in PA-related outcomes between experimental and control groups. In examining single-sample within-group results, studies indicated a statistically significant overall improvement over time in self-reported PA-related outcomes, including frequency and intensity of exercise activities, and psychosocial factors including emotional states, vitality, social functioning, and mental health scores.

Culture-Centered Intervention Research

All studies identified Institutional Review Board (IRB) approval by an academic institution; Sawchuk, Charles, and colleagues (2008) and Sawchuk and colleagues (2011) also included approval of the Privacy Board at the Seattle Indian Health Board. None of the studies described the use of a community-based or a participatory research approach. There were no descriptions of formative work conducted to develop community partnerships, engagement, or capacity building among communities or clinical settings. There were also no descriptions of Indigenous and academic perspectives, and alignment of study design or intervention methods with cultural values and practices. However, Sawchuk, Charles, and colleagues (2008) and Sawchuk and colleagues (2011) described a culturally acceptable term of "elder," identifying this term as one denoting a status within some AIAN cultures, communities, and families beyond that of chronological age. Sawchuk, Charles, and colleagues (2008) and Sawchuk and colleagues (2011) also identified walking—the central form of PA in both interventions—as a culturally acceptable and popular form of PA among AIAN older adults, and one that is realistic within the context of underfunded community health clinics, given its low equipment requirements and accessibility. Implementation and evaluation of responsiveness to cultural contexts were not discussed.

Discussion and Implications

PA is acknowledged as a key public health strategy to support healthy aging (Nelson et al., 2007). This systematic review uncovered three interventions to increase PA among AIAN older adults in the literature base, two of which were conducted over a decade ago. Research identifying best practices for interventions to increase PA among medically underserved and ethnic minority populations can bring to light innovative ideas to motivate participation and adherence, address unique barriers, and advance implementation strategies to enhance intervention impact and sustainability (Hu et al., 2019). Community-based participatory strategies for PA intervention can bring local attention and enthusiasm for continued public health efforts in this area, creating space and local infrastructure for long-term change. This review provides a call to action for increased PA-focused studies utilizing recommended practices for intervention research among AIAN populations.

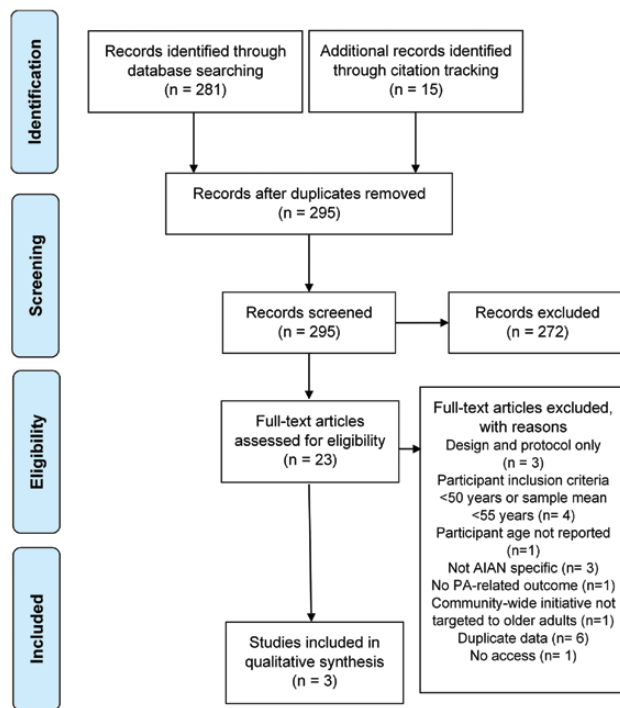


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram of search process. AIAN = American Indian and Alaska Native; PA = physical activity.

Study Characteristics

Participants

All studies reported larger numbers of female participants, which is representative of gender distribution in the older adult population. While none of the studies reported gender-based differences to PA interventions, gender differences in PA behavior have been identified as an issue for further investigation among AIANs. Observational studies indicate that AIAN women are less physically active than men (Bersamin et al., 2014; Duncan et al., 2009; Storti et al., 2009). This issue may persist into older adulthood, and further information regarding barriers and facilitators for PA faced by female AIAN older adults is needed. Future studies may include planned gender comparisons to improve understanding of intervention impact in this area.

All studies occurred in urban areas. This represents a gap in knowledge about rural PA intervention development among AIAN older adults. Although the number of AIANs residing in urban areas has been steadily increasing, approximately 54% of the AIAN population resides in rural areas and small towns (Deweese & Marks, 2017), and this number increases with age (Goins et al., 2015). Moreover, more AIAN older adults live in rural areas than do non-AIAN people of the same age in the United States (29% and 18%, respectively; Goins et al., 2015). Residents in rural communities in the United States demonstrate lower levels of PA than urban residents (Eberhardt & Pamuk, 2004; Reis et al., 2004), indicating potentially greater social and environmental barriers to PA such as isolation,

long distances to recreational facilities, and inadequate walking infrastructure (Fan et al., 2014; Martin et al., 2005; Meit et al., 2014). Thus, encompassing AIAN older adults living on tribal lands and in rural areas in PA intervention research is crucial to address the unique needs of this population.

Settings

All studies included were based out of urban primary care systems. Primary care settings may be promising for PA interventions among this population, given the breadth of Indian Health Service (IHS) locations across the nation; as of July 2020, the IHS serves approximately 330 health centers and 103 health stations (operated by IHS or contracted to Tribal Nations) across the 12 service areas in the United States, importantly including remote, rural, and urban areas (IHS, 2020). An example of intervention delivery across IHS settings is the Special Diabetes Program for Indian Diabetes Prevention (SDPI-DP) demonstration project (Jiang et al., 2013). The SDPI-DP was successfully implemented across a diverse mix of 36 programs in the United States, including IHS hospitals or clinics and IHS-contracted health care programs administered by Tribal Nations (Jiang et al., 2013). Exploring how health care settings can best meet the needs of AIAN older adults for PA programming may be an important component of future research; evidence suggests barriers to participation—such as mistrust of health care systems and providers and concerns about confidentiality—in health care-based research and programming (Buchwald et al., 2006; Guadagnolo et al., 2009).

Delivery and mode of PA

Method of intervention delivery included both unstructured and structured forms. Sawchuk, Charles, and colleagues' (2008) and Sawchuk and colleagues' (2011) studies featured an unstructured, individual, home-based intervention period with an emphasis on step-counting, utilizing routine phone-based support throughout. In contrast, Kochevar and colleagues (2001) utilized an onsite, structured exercise program delivered by facilitators, featuring exercises to increase flexibility and mobility. Both forms of delivery indicated an increase in overall PA level, suggesting opportunities for effective PA intervention across forms of delivery.

Epidemiological evidence indicates walking for transportation and walking for exercise as the preferred forms of PA among AIAN older adults (Redwood et al., 2009), and thus walking may serve as an appropriate mode of PA for intervention. Qualitative evidence indicates that walking is valued among AIAN older adults, suggesting walking for PA may serve as a link to spending time outdoors, culture or traditional ways of life, and healthy aging among AIAN older adults (Henderson & Ainsworth, 2000; Hopkins et al., 2007; Lewis, 2013). Furthermore, in Sawchuk, Charles, and colleagues'

Table 3. Study Characteristics and Brief Description of Intervention

Study; geographic setting	Study setting, target age group, sample size	Brief description
Kochevar et al. (2001); Southcentral (Oklahoma City area, OK)	Urban community-based health clinic, American Indian older adults aged 55–75 years, <i>N</i> = 22 (86% female)	Conducted a randomized controlled study with pre–post measures, evaluating the impact of a group exercise class on PA level and health. This 6-week, 40-min, two times per week exercise intervention was modeled after other fitness programs designed for older adults. Intervention components included exercises to increase flexibility, increase mobility, and reduce pain in muscles and joints. Instructional classes featured a 10-min warm-up, 20-min low-impact workout (moderate-level exertion), and 10-min cool down. Reported no between-group differences, reported improved within-group PA levels, and reported increased indicators of psychosocial and physical health. Authors conclude such a program could be made available at additional health clinics serving AI older adults, and physicians should review exercise programs to increase activity with older patients.
Sawchuk, Charles, et al. (2008); Northwest (Seattle area, WA)	Urban community-based health clinic, American Indian older adults aged 50–74 years, <i>N</i> = 125 (74% female)	Conducted a randomized controlled trial with pre–post measures, evaluating impact of self-monitoring practices on PA and health. This 6-week intervention included self-monitoring paper logs to be completed at home daily. The active control group was provided logs, a review of physical activities that can be completed at home, and an educational handout on the health benefits of PA. The experimental group was provided a pedometer in addition to the logs, review, and handout. All participants received a 5- to 10-min phone call at weeks 2 and 4 from a research assistant to check-in and encourage PA participation. Authors reported no between-group differences; however, they reported improved within-group overall PA amount and frequency, and increased vitality. Authors conclude that PA interventions for this population can be tailored for delivery in the primary care treatment setting and suggest objective measurements in future research and measurement of study adherence.
Sawchuk et al. (2011) Northwest (Seattle area, WA)	Urban community-based health clinic, American Indian older adults aged 50–85 years, <i>N</i> = 36 (69% female)	Conducted a randomized controlled trial with pre–post measures, evaluating the impact of self-monitoring and weekly goal setting on PA and health. The 6-week intervention included self-monitoring of daily steps using a pedometer and paper activity log. The pedometer-only group received the pedometer and log, and instructions on how to use both. The GS group received the pedometer, log, instructions, and information on how to track their baseline weekly step average and identify a weekly goal to increase step count by 5%. All participants received a 5- to 10-min phone call weekly from a research assistant to check-in and encourage PA participation. For the GS group, phone calls included setting a new weekly step-count goal. Authors reported no significant between-group differences on PA outcomes; however, the GS group significantly improved mental health scores compared with the pedometer-only group. Within-group differences included improved distance on a 6-min walking test, increased overall exercise activities and moderate-intensity activities, and improved social functioning, vitality, and mental health. Authors conclude walking can be easily promoted and disseminated in primary care and community settings to address barriers to PA and exercise.

Note: AI = American Indian; GS = pedometer plus goal-setting group; PA = physical activity.

(2008) study, although the active control group received a printed daily activity tracking log instead of a pedometer, both the active control and experimental groups increased daily PA with no significant between-group difference. This finding may indicate promising evidence for low-resource interventions among this population. Recent PA intervention studies among low-income adult

and older adult minority groups have shown promising evidence for neighborhood- and community-center-based walking groups to increase daily steps among participants (King et al., 2020; Schulz et al., 2015). Harnessing this evidence-base to adapt and deliver PA interventions among AIAN older adult populations may bring further light to this issue.

Table 4. Outcome Measures and Summary of Findings

Study	Outcome measures	Type of comparison, summary of findings
Kochevar et al. (2001)	<ul style="list-style-type: none"> • Survey (11 questions, Likert scale or rating on scale of 0–100) to measure weekly participation in activities for exercise • Self-perception of emotional and physical health • Blood pressure, heart rate, respiration rate 	<ul style="list-style-type: none"> • Within-group comparison (experimental group): Increased self-report daily physical activities (such as chores) Increased self-report daily exercise activities Improved (decreased) systolic blood pressure
Sawchuk, Charles, et al. (2008)	<ul style="list-style-type: none"> • CHAMPS • SF-36 • 6MWT 	<ul style="list-style-type: none"> • Single-sample within-group paired comparison: Increased overall weekly caloric expenditure Increased weekly frequency of all exercise-related activities Increased moderate-intensity exercise-related activities Increased vitality score
Sawchuk et al. (2011)	<ul style="list-style-type: none"> • CHAMPS • SF-36 • 6MWT • Step counts (pedometer, average steps per day) 	<ul style="list-style-type: none"> • Single-sample within-group paired comparison: Increased distance walking on 6MWT Increased weekly frequency of all exercise-related activities Increased moderate-intensity exercise-related activities • Between-group comparison (experimental group and active control group): Improved mental health score

Note: 6MWT = 6-min walk test; CHAMPS = Community Health Activities Model Program for Seniors; SF-36 = Short-Form 36 Outcomes.

Culture-centered intervention research

Based on the studies included in the final analysis, interventions to increase PA among AIAN older adults have not incorporated culture-centered strategies for health research. As all three studies were based out of urban Indian health clinics and the Sawchuk, Charles, and colleagues' (2008) and Sawchuk and colleagues' (2011) studies described IRB approval from the Seattle Indian Health Board, it is possible that formative work, including partnerships with urban Indian health organizations and community member review, may have been included in the research, but not explicitly described in the publication.

As research expands in this area, opportunities to utilize culture-centered research strategies across contexts may differ. For example, cultural identity in urban centers may be varied when compared with rural or reservation communities (Brown et al., 2016). It may also be the case that some AIAN communities do not prefer to modify or develop interventions to include culture-centered strategies. Nonetheless, participatory research strategies can be employed to identify the needs and preferences of the population to promote PA intervention participation and effectiveness.

Description of community-based research practices among AIAN communities is critical to include in scientific communication as public health research efforts work to repair a long history of unethical research which excluded tribal leadership from oversight and approval. This history has borne important and unique research processes and protections including tribal government and community engagement, as described in a growing body of research recommendations (Dickerson et al., 2020; Fisher & Ball, 2003).

Limitations

There are limitations to this systematic review. Although comprehensive search strategies were used to locate all available PA intervention research among AIAN older adults, it is impossible to obtain every potential eligible study (Cooper, 2017). The search strategy and process were developed in consultation with a research librarian specializing in health sciences to maximize the rigor of the search. In addition, this systematic review was limited by a focus on AIAN older adult populations in the United States only, and by the information and data reported by primary study authors. Primary study quality can impact interpretation of the results of this review; quality ratings indicated weak-to-moderate quality studies included in the final analysis, indicating a need for higher-quality intervention research in this area. Limitations are also related to general methods and scope; systematic reviews are observational studies, and findings are intended to encourage future research. The authors engaged in evidence synthesis only and did not attempt to conduct a meta-analysis of the findings reviewed. Given the number of studies identified and the quality of the studies (ranging from weak to moderate), this approach is appropriate to the current state of the field (Borenstein et al., 2009; Valentine et al., 2010). The authors look forward to future analyses when the field has matured. Finally, due to the research question at hand, this study was narrowed to focus on AIAN older adults, limiting the ability to generalize to other racial/ethnic populations. Moreover, broad heterogeneity is known to exist across tribal communities and cultures, limiting the ability to generalize to other tribal communities.

Conclusion

Three interventions to increase PA among AIAN older adults were identified in this systematic review. Results illuminate the narrow yet promising evidence in this area of growing relevance. All interventions noted improvements in PA-related outcomes, aligning with evidence from large intervention studies among other racial/ethnic groups. Findings indicate the potential for PA intervention research to improve health among this population and reduce risk for morbidity and mortality. This evidence represents a call for expanded research using best practices to advance understanding of PA promotion among the AIAN older adult population. This presents an opportunity for researchers, practitioners, and community members to cooperatively develop culturally relevant, evidence-based, and creative interventions that increase PA, improve health, reduce health care expenditures, and ultimately improve quality of life for this important and underserved group.

Supplementary Material

Supplementary data are available at *The Gerontologist* online.

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Conflict of Interest

None declared.

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