Physical Activity Interventions Among American Indian and Alaska Native Persons: A Systematic Review

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Background

- >70% of American Indian and Alaska Native (AIAN) persons **fail to meet** guidelines for physical activity (PA) engagement
- Physical inactivity is a leading cause of premature morbidity and mortality in AIAN persons
- AIAN persons face multiple additional, unique challenges that impede PA, e.g.:
  - Systematic displacement from native and culturally important lands forced AIAN persons to deviate from traditional diets and ways of life (e.g., sustenance activities)
  - Rural reservation status
  - Decreased access to quality care, preventative health services
  - Low socioeconomic status
  - Limited PA equipment resources
  - Lack of transportation to fitness centers
  - Inadequate pedestrian infrastructure
  - Variable climates or inclement weather
  - Safety concerns
  - Low perceived leisure-time PA opportunity
- The most recent systematic review of PA interventions in AIAN persons across the lifespan included studies published up to 2006
  - PA intervention methods have evolved with new technology and understanding of behavior change
  - Prior reviews also found a need for culturally acceptable and scientifically sound evaluation methods of PA interventions among AIAN persons
- Effective, evidence-based culturally relevant PA interventions are needed

Purpose

To identify and describe the content and impact of PA interventions on PA behavior with AIAN persons in the U.S. and Canada since 2006

Methods

Search Method

- A health sciences librarian guided the search design:
  - Databases: PubMed, Scopus, CINAHL, PsycINFO, Cochrane Central Register of Controlled Trials, Google Scholar, ClinicalTrials.gov, ProQuest
  - Grey literature: Tribal Epidemiology Centers, the Native Health Database
- Concepts searched: AIAN, physical activity, intervention

Inclusion Criteria

- Described an intervention designed to increase PA
- Targeted AIAN persons residing in the U.S. or Canada; or if a multiethnic population, contained an AIAN subanalysis; Native Hawaiian and Pacific Islander (NHPI) persons were included for the purpose of this review
- Were published in 2006 or later
- Reported a PA behavior outcome

Data Extraction and Synthesis

- Two reviewers extracted data independently using Covidence and resolved conflicts through discussion
- Extracted data included participant characteristics, intervention strategies, PA behavior outcomes, and risks of bias (Joanna Briggs Institute Critical Appraisal Tools for Randomized Controlled Trials and Quasi-Experimental Studies)

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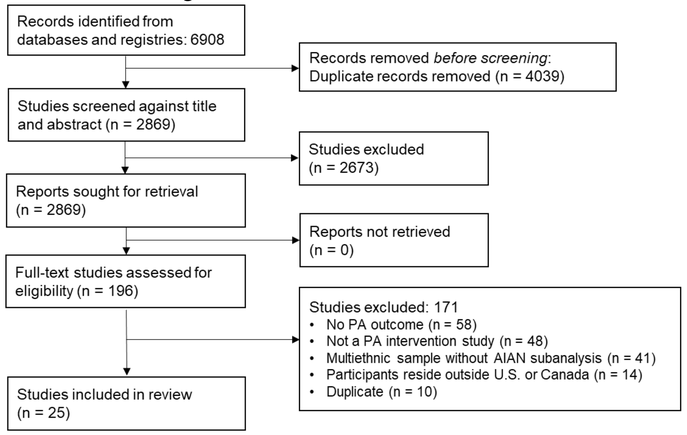
Results

PRISMA Flow Diagram



Intervention Strategies Utilized (n=25)		
Intervention Strategy	n	%
Intergenerational	5	20
Environmental Policy	8	32
Cultural Adaptation	20	80
Curriculum-Based	21	84

- Most interventions targeted children and youth
- Intergenerational (e.g., parent-caregiver dyad), environmental policy (e.g., restructuring school day), cultural adaptation (e.g., Indigenous games), and curriculum-based strategies were used across interventions
- 80% of studies used an element of cultural adaptation
  - Most considered cultural needs in design, not program or outcome evaluation
- 20 studies used self-report measures
- Sedentary behavior and leisure-time behavior were rarely assessed
- Outcomes were not often compared with progress toward meeting federally recommended PA guidelines for health
- Significant changes in PA outcomes were achieved post-intervention in 13 studies (52%)

Physical Activity Interventions Among AIAN Populations in the US and Canada (2006-October 2021)

Author (Year)	Study Design	N	Mean age, years	Tribal Affiliation	PA Measure	PA Outcomes	Critical Appraisal Items: Yes	Unclear	No
Allen (2008)	RCT	200	29.3	Affiliation not reported	• Self-report: MAQ	• No changes in leisure-time PA; sedentary time ↓ (*p*=.03)	10	1	2
Anand (2007)	RCT	174	NR	Affiliation not reported	• Self-report: IPAQ	• ↑ PA, sedentary time ↓ in intervention group was not statistically significant	4	8	1
Brown (2013)	RCT	76	11.4	Affiliation not reported	• Device: Accelerometer (Actical) • Self-report: MAQ	• Control group, sedentary time ↑ (p=0.01), MVPA ↓ (*p*<.001)	7	2	4
Calhoun (2010)	Quasi	26	54.0	Affiliation not reported	• Self-report: Author-developed tool	• No changes	6	1	1
Chambers (2015)	Quasi	255	13.2 (Median)	White Mountain Apache and Navajo	• Self-report: adapted 3-day PA recall	• No changes	3	1	5
Dawson (2021)	Quasi	1056	59.4	Affiliation not reported	• Self-Report: PA ≥60 min/wk, yes/no	• Percentage reporting ≥60 min/week of PA ↓ (*p*=.002)	4	3	2
Foulds (2011)	Quasi	273	41.5	Affiliation not reported	• Self-Report: Healthy Physical Activity Participation Questionnaire	• ↑ in PA scores for both men/women across all age groups (Male *p*=.013; Female *p*<.001) • ↑ PA score seen for lower intensity groups: (Walk 10K *p*<.05; Walk/Run 10K *p*<.05)	7	1	1
Garden-Robinson (2015)	Quasi	30	NR	Affiliation not reported	• Self-report: Instrument not described	• Self-reported PA ↑ (*p*<.05)	4	4	1
Gates (2015)	Quasi	72	12.1	Mushkegowuk Cree	• Device: Accelerometer (Actigraph GT3X)	• MVPA ↑ (*p*=.016); sedentary time ↓ (*p*=.001)	4	3	2
Grant (2015)	Quasi	61	11	Affiliation not reported	• Direct observation: SOPLAY	• No group differences	4	4	0
Ho (2008)	Quasi	95	42.1	First Nation	• Device: Accelerometer (Actical)	• No changes	7	2	0
Jiang (2013)	Quasi	2615	46.6	Approx. 80 Tribal groups	• Self-report: Instrument not described	• PA from previous month ↑ post-curriculum, Year 1, Year 2, Year 3 (*p*<.001) • % of participants meeting PA goal (150 min/week) decreased yearly	5	2	2
Kaholokula (2014)	Quasi	239	50.8	NHPI and Filipino	• Self-report: PAQ	• PAQ score ↓ (*p*<.001), indicating positive change post-intervention	7	0	1
Kattelmann (2010)	RCT	114	NR	Cheyenne River Sioux	• Self-report: Cross-Cultural Activity Participation Study survey	• No group differences	8	3	2
Lorig (2010)	RCT	110	50.5	Affiliation not reported	• Self-report: Instrument not described	• Minutes/week of aerobic exercise: No group differences	7	3	3
Oosman (2012)	Quasi	37	8.7	Metis	• Device: Accelerometer (Actical) • Self-Report: PAQ-C	• Control group, sedentary time ↑ (*p*=.016) • No group differences for PAQ-C scores	6	3	0
Ronsley (2013)	Quasi	179	10.9	Tsimishian Nation	• Self-Report: PAQ-C	• No group differences for PAQ-C scores	6	3	0
Sauder (2018)	RCT	62	9.3	Eastern Band of Cherokee Indians and Navajo Nation	• Self-report: Pathways 24-hour Physical Activity Recall Questionnaire	• No group differences	9	3	1
Sawchuk (2008)	RCT	125	58	Affiliation not reported	• Device: Pedometer (Yamax Digiwalker) • Self-report: CHAMPS	• No group differences	7	4	2
Sawchuk (2011)	RCT	36	61	Affiliation not reported	• Self-report: CHAMPS	• No group differences	9	2	2
Short (2018)	RCT	81	NR	Choctaw Nation of OK	• Device: Accelerometer (Fitbit Zip)	• No group differences in cumulative MVPA time	3	6	4
Story (2012)	RCT	454	5.84	Lakota (Oglala Sioux)	• Direct Observation: Teachers' logs of students' PA	• ≥60 min. of PA at school daily: No differences between groups	7	3	3
Tomioka (2012)	Quasi	282	70.97	NHPI	• Self-report: Health Outcome Survey	• Strengthening, stretching ↑ (*p*=.006) • Aerobic exercise ↑ (*p*=.073)	5	3	1
Tomlin (2012)	Quasi	163	12.4	First Nation	• Self-report: PAQ-C; PAQ-A • Device: Accelerometer (Actigraph)	• No changes	6	2	1
Waller (2007)	Quasi	21	NR	Affiliation not reported	• Self-report: Instrument not described	• 81% reported ↑ PA	1	6	2

PA: physical activity; RCT: randomized controlled trial; Quasi: quasi-experimental study; NR: not reported; NHPI: Native Hawaiian and Pacific Islander; MAQ: Modifiable Activity Questionnaire; IPAQ: International Physical Activity Questionnaire; SOPLAY: System for Observing Play and Leisure Activity in Youth; PAQ: Physical Activity Questionnaire; PAQ-C: Physical Activity Questionnaire for Children; PAQ-A: Physical Activity Questionnaire for Adolescents; CHAMPS: Community Healthy Activities Model Program for Seniors; MVPA: moderate-to-vigorous physical activity

Conclusion

- PA interventions have the capacity to improve PA behavior among AIAN persons
- Further work is needed to improve intervention design, implementation, and evaluation
- Indigenous ways of knowing should be valued in PA intervention research
  - Interventions should incorporate the Native perspective from design through project evaluation

Future interventions must:

- Prioritize PA behavior as a primary outcome variable
- Recognize all lifestyle physical activities (leisure, household, occupational, transportation)
- Utilize valid and reliable self-report measures
- Increase use of PA measurement devices
- Address the harmful legacy of colonialism and western evaluation methods