ADAPTIVE SPORTS FOR DISABLED VETERANS

Nancy Greer, PhD

Minneapolis ESP Center

Center for Care Delivery and Outcomes Research (CCDOR)

Minneapolis VA Health Care System

https://www.blogs.va.gov/nvspse/grant-program/

May 22, 2019

Acknowledgements

Co-authors/Collaborators

- David Balser, MD
- Lauren McKenzie, MPH
- Hannele Nicholson, PhD, MA, CCC-SLP
- Alexander Senk, MD
- Brionn Tonkin, MD
- Timothy J. Wilt, MD, MPH
- Roderick MacDonald, MS
- Christina Rosebush, MPH

Operational Partners

- Leif Nelson, DPT, ATP, CSCS, Director, National Veterans Sports Programs & Special Events
- Joel Scholten, MD
- Lucille Beck, PhD
- David Chandler, PhD

Technical Expert Panel

- Rory Cooper, PhD
- M. Jason Highsmith, PhD, PT, DPT, CP
- Kenneth Lee, MD
- Jennifer Piatt, PhD, CTRS
- Italia M. Wickremasinghe, MD

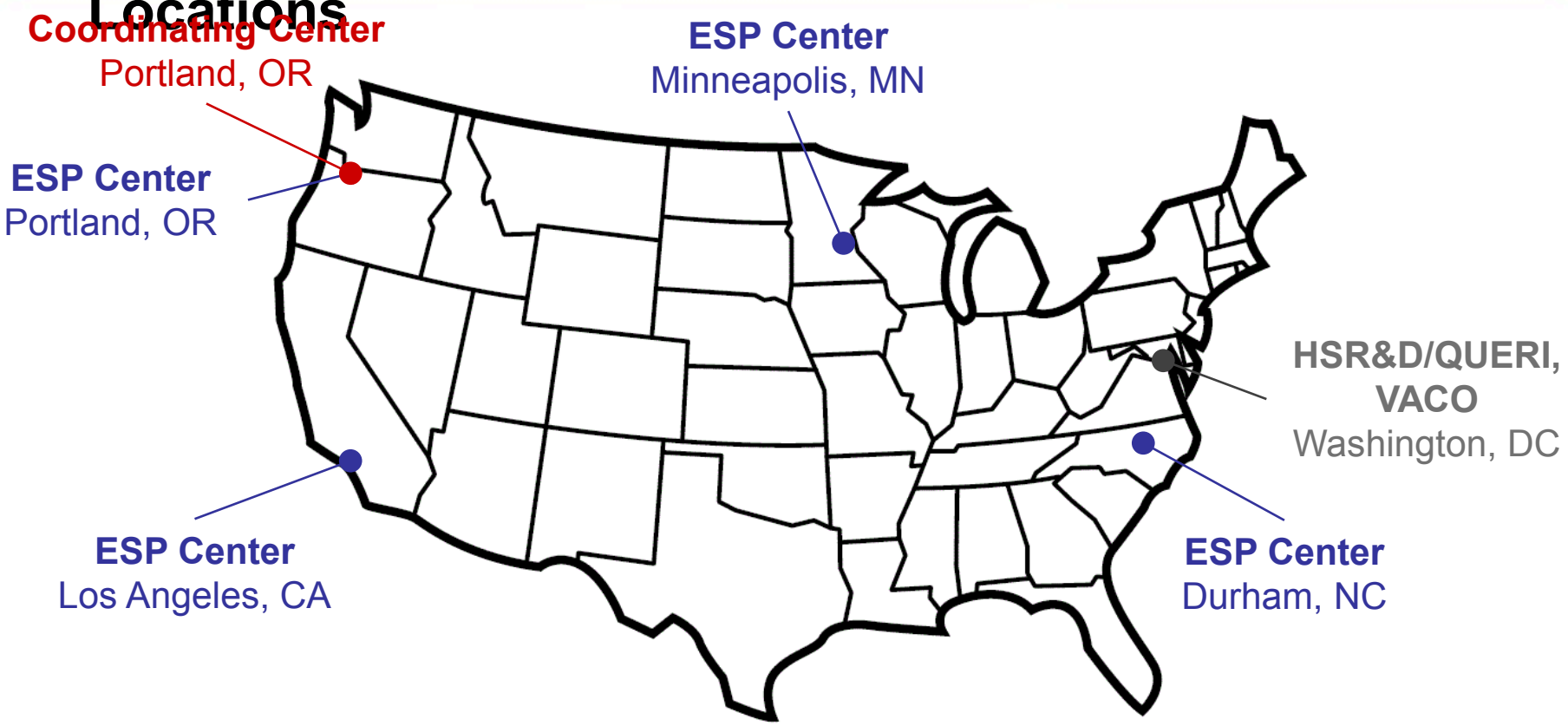
Disclosure

This report is based on research conducted by the Evidence Synthesis Program (ESP) Center located at the Minneapolis VA Medical Center, Minneapolis, MN, funded by the Department of Veterans Affairs, Veterans Health Administration, Health Services Research and Development. The findings and conclusions in this document are those of the author(s) who are responsible for its contents; the findings and conclusions do not necessarily represent the views of the Department of Veterans Affairs or the United States government. Therefore, no statement in this article should be construed as an official position of the Department of Veterans Affairs. No investigators have any affiliations or financial involvement (eg, employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties) that conflict with material presented in the report.

VA Evidence Synthesis Program (ESP) Overview

- Sponsored by VA Health Services Research and Development Service (HSR&D)
- Provide timely and accurate syntheses/reviews of healthcare topics identified by VA clinicians, managers, and policy-makers, as they work to improve the health and healthcare of Veterans
- Reports conducted by internationally recognized VA clinician methodologists
- Builds on staff and expertise already in place at the Evidence-based Practice Centers (EPC) designated by AHRQ

ESP Center Locations



VA Evidence Synthesis Program (ESP) Overview

- ESP reports help:
  - develop clinical policies informed by evidence;
  - the implementation of effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
  - guide the direction of future research to address gaps in clinical knowledge.
- Broad topic nomination process – *eg*, VACO, VISNs, field staff – facilitated by the ESP Coordinating Center (Portland) through an online process:

  http://www.hsrd.research.va.gov/publications/esp/TopicNominationForm.pdf

ADAPTIVE SPORTS FOR DISABLED VETERANS

(March 2019)

https://www.blogs.va.gov/nvspse/training-allowances/

Full-length report available on ESP website:

http://www.hsrd.research.va.gov/publications/esp/reports.cfm

Poll Question #1

- What is your primary role in VA related to adaptive sports? Select all that apply.
  - Clinician
  - Therapist (eg, Physical Therapy, Recreational Therapy)
  - Researcher or Administrator
  - Athlete
  - Other

Poll Question #2

- How long have you been involved with adaptive sports (in any role)?
  - More than 10 years
  - 1 to 10 years
  - Less than 1 year
  - No direct involvement in adaptive sports

Background

- Adaptive sports definition
  - Sport that has either been adapted specifically for persons with a disability or created specifically for persons with a disability (Federal Register 2014)
- Organized adaptive sports began in early 1900s
- Opportunities expanded in post-World War II era

https://www.wintersportsclinic.org/participate

Background

- Department of Veterans Affairs National Veterans Sports Programs and Special Events (NVSP&SE) office offers programs to "provide opportunities for Veterans to improve their independence, well-being, and quality of life through adaptive sports and therapeutic arts programs"

- Programs include: National Veterans Wheelchair Games, National Veterans Golden Age Games, National Disabled Veterans Winter/Summer Sports Clinics, National Disabled Veterans Training, Exposure, Experience (TEE) Tournament, and National Veterans Creative Arts Competition and Festival

- Grants program to support national or community-based adaptive sports programs

- Training grants for Veterans training for Paralympic and Olympic sports

Key Questions

- Key Question 1: What is the effectiveness of participation in adaptive sports programs among individuals with amyotrophic lateral sclerosis (ALS), limb amputation, hearing loss or deafness, multiple sclerosis (MS), post-traumatic stress disorder (PTSD), spinal cord disorder, spinal cord injury (SCI), stroke/cerebrovascular accident (CVA), traumatic brain injury (TBI), or visual impairment or blindness?
  - Key Question 1a. Does the effectiveness vary by frequency/duration of adaptive sport program participation?
  - Key Question 1b. Do particular patient groups (*ie*, age range, gender, race, time since injury, time involved in adaptive sports, type and/or severity of disability) benefit more than others from adaptive sports participation?

Key Questions

- Key Question 2: What are the potential harms of participation in adaptive sports programs among individuals with ALS, limb amputation, hearing loss or deafness, MS, PTSD, spinal cord disorder, SCI, CVA, TBI, or visual impairment or blindness?

- Key Question 3: What are the known facilitators of and barriers to the participation in adaptive sports programs among individuals with ALS, limb amputation, hearing loss or deafness, MS, PTSD, spinal cord disorder, SCI, CVA, TBI, or visual impairment or blindness?

Adaptive Sports of Interest for the Review

Alpine skiing	Golf	Surfing
Archery	Hand-cycling	Swimming
Athletics/ Track & field	Kayaking/Canoeing	Table Tennis
Billiards	Nordic Skiing	Tennis (including Wheelchair Tennis)
Boccia (Bocci, Bocce)	Para-Triathlon	Weightlifting-Power Lifting
Climbing	Sailing	Wheelchair Basketball
Curling	Shooting	Wheelchair Fencing
Cycling	Sitting Volleyball	Wheelchair Lacrosse
Equine Assisted Activities and Therapies (EAAT)	Sled Hockey	Wheelchair Rugby
Fishing (any type)	Snowboarding	
Goalball	Soccer	

Methods

- Key questions and scope developed with input from Operational Partners, Technical Expert Panel, and content experts from the Minneapolis VA Health Care System
- Literature search: MEDLINE, Embase, SPORTDiscus, Rehabilitation and Sports Medicine Source
- Single review of titles, dual review of abstracts and full text review of articles

Methods

Inclusion

- Age 18 and older
- 1 or more medical condition(s) of interest
- Participation in 1 or more adaptive sport(s) of interest at community level or higher
- Reporting an outcome of interest

Methods

Exclusion

- Sports programs with modifications of equipment or environment based on age
- Individual fitness programs or sport activity other than identified sports of interest
- Medical condition other than identified condition of interest
- Rehabilitation programs with no “sport” component
- Study of “physical activity” levels where physical activity includes items like household work, gardening, volunteering outside the home
- Human performance laboratory studies

Methods

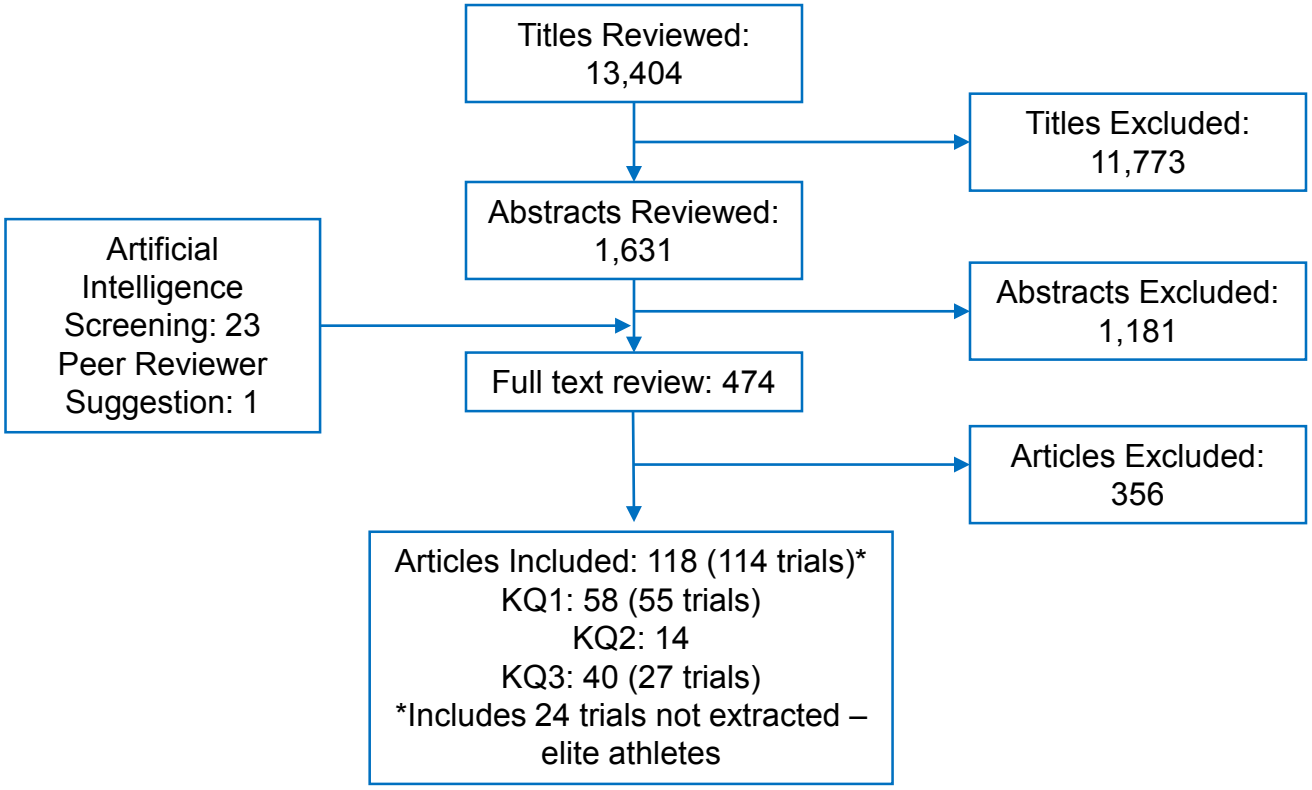
Data Extraction

- Study design and demographic data
- Outcomes:
  - clinically important changes in health and wellness; improvement in physical health or PTSD scale scores
  - daily functioning
  - self-esteem, perceived competence
  - community reintegration (social activities, employment, adaptive sports programs)
  - mood//quality of life
  - health care utilization
  - harms related to participation in adaptive sports
  - barriers and facilitators related to adaptive sports participation

Risk of Bias/Quality of Evidence

- Reviewed critical elements of individual studies (criteria from Joanna Briggs Institute)
- No formal assessment of overall quality of evidence

Results


Titles Reviewed: 13,404
Titles Excluded: 11,773
Abstracts Reviewed: 1,631
Artificial Intelligence Screening: 23
Peer Reviewer Suggestion: 1
Abstracts Excluded: 1,181
Full text review: 474
Articles Excluded: 356
Articles Included: 118 (114 trials)*
KQ1: 58 (55 trials)
KQ2: 14
KQ3: 40 (27 trials)
*Includes 24 trials not extracted – elite athletes

Key Question 1 - Effectiveness

Sports Program Studies: Adaptive sports program with multiple sessions over a period of a few days or longer; outcomes typically assessed before and after participation (eg, 3 day fly-fishing program)

Sports Activity Participation Studies: Typically a one-time assessment of individuals who participate in organized adaptive sports activities but the activity wasn't specifically implemented for the purpose of determining whether participation provided benefits or harms (eg, a study of participants in National Veterans Wheelchair Games (NVWG))

https://www.rehab.va.gov/PROSTHETICS/factsheet/NVSPSE-FactSheet.pdf

Key Question 1 –Effectiveness –Sports Program

Adaptive Sport (number of studies)	Medical Condition (number of studies)					
	PTSD (8)	MS (8)	CVA (5)	SCI (3)	Multiple (1)	ALS, Limb Amputation, Hearing Loss, TBI, or Vision Loss (0)
EAAT (11)	4 (n=7-29)	5 (n=3-67)	2 (n=20-24)			
Hiking/ Climbing (3)		3 (n=7-20)				
Golf (3)			3 (n=11-18)			
Fishing (2)	2 (n=28-96)					
Ski/Snow-board (2)	1 (n=34)			1 (n=10)		
Curling (1)				1 (n=13)		
Surfing (1)	1 (n=14)					
Multiple (2)				1 (n=24)	1 (n=18)	

ALS=amyotrophic lateral sclerosis; CVA=cerebrovascular accident/stroke; EAAT=equine-assisted activities and therapies; MS=multiple sclerosis; PTSD=Post-traumatic stress disorder; SCI=spinal cord injury; TBI=traumatic brain injury

Key Question 1 –Effectiveness – Sports Program Studies (k=25)

Characteristics	Categories	Number of Studies[a]
Age (mean or median)	>50 years	12
	25-49 years	12
	<25 years	0
Gender	100% Male	0
	75-99% Male	6
	50-74% Male	8
	25-49% Male	6
	<25% Male	3
Time from Injury or Diagnosis (mean or median)	>10 years	3
	5-10 years	8
	<5 years	3

[a]Studies reporting mean or median values for characteristic

Key Question 1 –Effectiveness – Sports Program Studies K-25

Program Durations: 2 days to 45 weeks

Study Designs: 6 RCTs, 4 non-randomized, 15 pre-post design

Sample Size:

10 or fewer:	5 studies
11-20:	12 studies
21-50:	6 studies
>50:	2 studies

Country:

United States:	13 studies (8 enrolling exclusively US Veterans)
Europe:	9 studies
South America:	2 studies
Canada:	1 study

Key Question 1 –Effectiveness – Sports Program Studies K=25

Equine Assisted Activities and Therapies (EAAT)

- 11 studies (PTSD, MS, CVA)
- PTSD: EAAT associated with improved mental health outcomes
  - 3 of 4 studies enrolled exclusively US Veterans
- MS: EAAT may be associated with improved balance and reduced fatigue
- CVA: EAAT not associated with health/wellness outcomes; little data on other outcomes
- Daily functioning, self-esteem, quality of life, and community integration infrequently reported

Hiking/Climbing

- 3 studies (MS)
- Programs not associated with changes in health/wellness outcomes (balance, fatigue, cognitive function)
- Daily functioning, self-esteem, depression only reported by one study; no study reported quality of life, community integration

Key Question 1 –Effectiveness – Sports Program Studies K=25

Golf

- 3 studies (CVA)
- May be associated with improved balance
- Daily functioning, mental health, and quality of life reported on one study only; no studies reported self-esteem or community integration

Fly-Fishing

- 2 studies (PTSD, US Veterans)
- Associated with improvement in PTSD symptoms and other mental health outcomes
- Limited data on health/wellness, daily functioning, self-esteem, or quality of life; no data on community integration

Ski/Snowboard, Curling, Surfing, Multiple Sports

- 1 or 2 studies each (PTSD, SCI, Multiple conditions)
- Ski/snowboard, surfing, multiple sports may be associated with improved mental health symptoms
- Limited data on other outcomes

Key Question 1 –Effectiveness – Sports Activity Participation (k=30)

Adaptive Sport (number of studies)	Medical Condition (number of studies)				
	SCI (20)	Vision Impairment (4)	Multiple (5)	Limb amputation (1)	ALS, Hearing Loss, MS, PTSD, CVA, TBI (0)
Multiple (20)	15 (n=14-1034)	1 (n=24)	4 (SCI, limb amputation, TBI, PTSD, vision impairment, MS)[a] (n=34-220)		
Wheelchair Rugby (4)	4 (n=14-150)				
Wheelchair Basketball (2)	1 (n=81)		1 (SCI or limb amputation) (n=46)		
Soccer (2)		1 (n=38)		1 (n=11)	
Goalball (1)		1 (n=40)			
Cycling (1)		1 (n=50)			

[a]multiple conditions in each study

ALS=amyotrophic lateral sclerosis; CVA=cerebrovascular accident/stroke; PTSD=post-traumatic stress disorder; MS=multiple sclerosis; SCI=spinal cord injury; TBI=traumatic brain injury

Key Question 1 –Effectiveness – Sports Activity Participation Studies (k=30)

Characteristics	Categories	Number of Studies[a]
Age (mean or median)	>50 years	2
	25-49 years	23
	<25 years	0
Gender	100% Male	9
	75-99% Male	13
	50-74% Male	6
	25-49% Male	0
	<25% Male	1
Time from Injury or Diagnosis (mean or median)	>10 years	12
	5-10 years	2
	<5 years	1

[a]Studies reporting mean or median values for characteristic

Key Question 1 –Effectiveness – Sports Activity Participation Studies (k=30)

Study Designs: Cross-sectional, some with comparator groups

Sample Size:

50 or fewer:	11 studies
50-100:	4 studies
101-500:	13 studies
>500:	2 studies

Country:

United States:	8 studies (4 enrolling exclusively US Veterans)
Europe:	14 studies
Asia/Pacific:	4 studies
Canada:	3 studies
South America:	1 study

Key Question 1 –Effectiveness – Sports Activity Participation Studies (K=30)

e

Wheel Chair Basketball, Wheelchair Rugby, Goal Ball, Cycling, Soccer

- 10 studies (SCI, visual impairment, limb amputation, multiple conditions)
- No outcome reported by >1 study
- No employment outcomes

Multiple Sports

- 20 studies (SCI, visual impairment, multiple conditions)
- SCI: participation associated with 1) greater self-esteem/self-efficacy and athletic identity and 2) higher quality of life; less consistent findings for mental health, community integration, and employment outcomes
- Visual impairment: participation associated with better balance
- Multiple conditions: participation associated with higher quality of life
- Limited reporting of health/wellness or daily functioning

Key Question 1a/1b – Factors Influencing Effectiveness

Frequency/Duration of Adaptive Sports Participation

- 5 sports activity participation studies
- More frequent participation associated with
  - higher athletic identity
  - lower trait anxiety and depression scores

Age, Gender, Race, Time Since Injury, Time Involved in Adaptive Sports, Severity of Disability

- 8 sports activity participation studies
- Gender: higher athletic identity scores in males (4 studies)
- Time since injury: similar athletic identity regardless of timing of failed vision (1 study)
- Time in adaptive sports: higher self-esteem (1 study) and increased employment rate (1 study) associated with more years of participation
- Time from injury, level of injury, age: not associated with community integration scores (1 study)

Key Question 2 – Harms

Sports Program Studies (k=6; all reported effectiveness outcomes)

- Sports: EAAT (3), hiking/climbing (2), wheelchair curling (1)
- Conditions: MS (4), SCI (1), PTSD/TBI (1)
- Excluded exacerbations of MS during participation
- EAAT (MS, PTSD/TBI):
  - No adverse events in 2 studies (5 or 10 week studies, total n=56)
  - 44% (14/32) of EAAT and 27% (10/37) of standard care group with adverse event or serious adverse event in 1 study (12 weeks, MS, n=69)
- Hiking/climbing (MS):
  - 45 week training/hiking program: 33% (3/9) minor medical events
  - 5 week indoor climbing: fatigue reported (no excessive fatigue, n=6)
- Wheelchair curling (SCI):
  - 4 weeks, no adverse events (n=13)

Key Question 2 – Harms

Sports Activity Participation Studies (k=8; 1 reported effectiveness outcomes)

- Sports: wheelchair basketball (2), wheelchair rugby (1), wheelchair racing (1), other wheelchair sports (3), power lifting (1)
- Conditions: SCI (5), SCI & other (2), visual impairment (1)
- Wheelchair sports (SCI or SCI & other):
  - Studies with comparator group
    - more rotator cuff injuries (76% vs 36%, n=296, overhead sports vs no sports)
    - lower % with shoulder pain and delayed onset of pain (39% vs 66%, n=257, any sport vs non-athletes)
    - similar rotator cuff injuries (n=35, tennis vs archery)
  - Studies with no comparator
    - injury requiring physician consultation: 29% (4/14) (rugby)
    - carpal tunnel syndrome: 67% (8/12) (racing); 52% (17/33) (basketball)
    - shoulder pain since wheelchair use: 72% (33/46) (basketball)
- Power lifting (visual impairment):
  - 36% (9/11) with lifting-related injury (12 month training period)

Key Question 3 –Barriers to/Facilitators of Participation (k=37)

Study Methods: surveys, questionnaires, focus groups, interviews, narrative analysis, registration/participation logs, mixed methods

International Classification of Functioning and Disability Health (ICF) framework

Domains:

Health conditions
Body functions
Body structures
activity
Participation
Environmental factors
Personal factors

https://www.icf-research-branch.org/icf-training/icf-e-learning-tool

Key Question 3 –Barriers to/Facilitators of Participation

Barriers (25 studies)

- Conditions: SCI (9); limb amputation (5); visual impairment (2); MS, PTSD, paraplegia (1 each); mixed (6)
- Sports: multiple (20), aquatics, fly-fishing, sea kayaking, 5-a-side football, wheelchair rugby

Represented Domains

- **Body Structure or Function Factors:** poor physical health, poor fitness status, muscle tone dysfunction, fatigue, difficulty sleeping, unmet medical needs, physical pain
- **Activity Factors:** dependency on others to complete basic activities of daily living, fear of becoming a burden to others, lack of a personal care assistant
- **Environmental Factors:** *Physical* lack of information about sports opportunities, cost, travel distance, insufficient transportation, inadequate or inaccessible facilities; *Social* lack of sport partner, feeling shame from others, issues with the group atmosphere or highly competitive environment
- **Personal Factors:** advanced age, fear of pain or further injury, lack of time, no involvement or interest in sports prior to injury/diagnoses

Key Question 3 –Barriers to/Facilitators of Participation

Facilitators/Motivators (31 studies)

- Conditions: SCI or related (11); limb amputation (5); PTSD, MS, visual impairment (2 each); multiple conditions (9)
- Sports: wheelchair basketball or rugby, EAAT, aquatics, hiking, fly-fishing, others

Represented Domains

- **Activity:** independence, maintain activities of daily living
- **Environmental Factors:** *Physical* prosthetic device, physical setting/atmosphere, accessibility, supportive and stress-free environment, safety measures in place; *Social* meeting people, maintain social contacts, interact with others with similar disabilities, participation in society, support from friends and family, buddy system/exercise partners, being part of a team, improved communication skills, availability of coaches
- **Personal Factors:** increased self-esteem and self-efficacy, improve/maintain health and fitness, fun and enjoyment, new experiences, acceptance of disability, sense of belonging, being a role model to others, ability to participate in sports that were enjoyed before disability

Key Question 3 –Barriers to/Facilitators of Participation

VeteranStudies

Barriers:

- 2 studies; fly-fishing (PTSD), multiple sports (limb amputation)
- lack of information about opportunities, insufficient transportation, large group size, lack of sport partner, feelings of shame, fear of further injury/pain, low self-esteem

Facilitator and Motivators:

- 6 studies; fly-fishing (PTSD), EAAT (multiple conditions), multiple sports (limb amputation, multiple conditions)
- increased independence, maintain activities of daily living, outdoor environment, friends, interact with others with similar disabilities, part of a team, improved personal relationships/communication skills, increase self-esteem/self-efficacy, improve/maintain health and fitness, new experiences, acceptance of disability, fun and enjoyment, sense of belonging

Key Findings

Adapted Sports Program Studies

- Some evidence of association of adaptive sports program participation and improved mental health outcomes and balance
- Little evidence of harms associated with program participation

https://www.blogs.va.gov/nvspse/national-disabled-veterans-tee-tournament/

Key findings

Sports Activity participation Studies

- Some evidence of association of participation and greater self-esteem, athletic identity, and self-efficacy (SCI; multiple sports); higher quality of life (SCI or multiple conditions; multiple sports)

https://www.blogs.va.gov/nvspse/national-veterans-summer-sports-clinic/

- Reported harms – largely shoulder and wrist pain in wheelchair sports (SCI)

Key Findings

Barriers to/facilitators of Participations

- Similar across sports and populations
- Barriers: physical environment and personal barriers
- Facilitators/motivators: social factors and personal beliefs

Limitations

- **Sports Program Studies**
  - Largely studies of EAAT and participants with PTSD, MS, or CVA
  - Selected individuals (agreed to participate in the sports programs)
  - Small sample sizes, few randomized trials
- **Sports Activity Participation Studies**
  - Largely studies of participants with SCI involved in multiple sports
  - Cross-sectional studies, most with no comparator group

Limitations

- Out comes of interest infrequently reported (ie, self-esteem/ perceived competence, community integration/social functioning, employment); no studies reported on health care utilization
- Medical conditions frequently self-reported with little information on severity, etiology, or comorbidities; participants with severe illness or disability and comorbid conditions were typically excluded from the individual studies
- Variation in interventions and outcomes assessment precluded data pooling; few sports/populations studied limits generalizability to other sports/populations
- Little long-term follow-up to determine whether participation continued or whether benefits were maintained
- Few studies assessed factors that assist individuals in initiating sports participation

Conclusions

- Evidence suggests that adaptive sports participation may have benefits with few harms in selected populations
- Insufficient information for many sports and many populations
- Future research should focus on other sports and other populations, assess other outcomes of interest, include long-term follow-up, and identify motivators to initiation of participation

https://www.wintersportsclinic.org/participate?lightbox=dataItem-jgqmluo4

VA

U.S. Department of Veterans Affairs

Veterans Health Administration

National Veterans Sports Programs & Special Events

va.gov/adaptivesports
social: @Sports4Vets

Questions?

If you have further questions, please feel free to contact:

Nancy Greer, PhD

Nancy.Greer@va.gov

Leif Nelson, DPT, ATP, CSCS

Leif.Nelson@va.gov

Joel Scholten, MD

Joel.Scholten@va.gov

Full-length report and cyberseminar available on ESP website:

http://www.hsrd.research.va.gov/publications/esp/

Please submit evaluations ***within 30 days*** to get credit for CEUs.
AOTA CEUS: complete short online survey http://www.aota.org/appsurvey

Join the **Sports4Vets** and **Arts4Vets** Listserv – veta.brooks1@va.gov

Next Adaptive Sports and Therapeutic Arts Grand Rounds:

Wednesday, June 26, 2019 at 1:00 PM EST

"The Benefits of Music Therapy and Music Listening in Acute Care"

Presented by Jillian Thompson, MT-BC