Physical Activity Behaviour in Middle-aged and Older Adults

Cassandra D'Amore PhD
McMaster University
School of Rehabilitation Science

CLSA Webinar

December 12th , 2024 | 12:00 – 1:00pm

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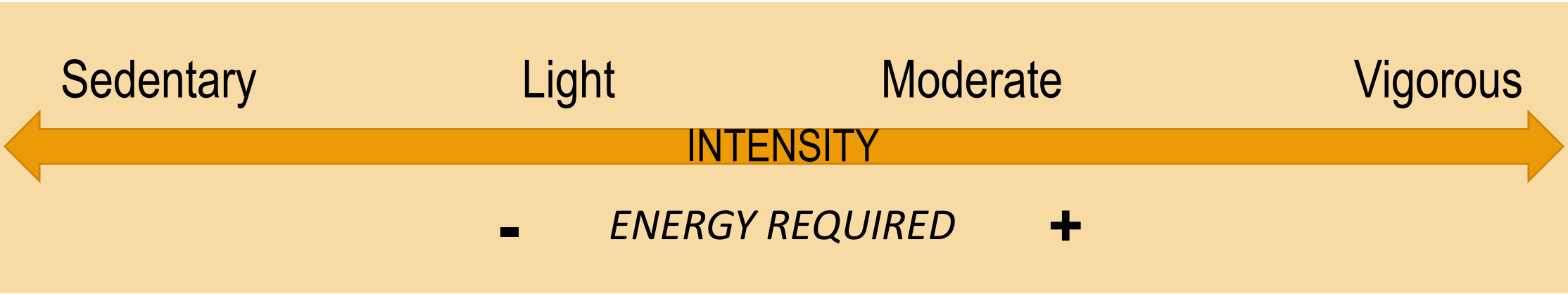
1. Introduction
2. Normative values for the PASAE
3. Describing PA in middle-aged and older Canadians
4. Community engagement in secondary analyses: An trainee example
5. Limitations, implications, and next steps

PHYSICAL ACTIVITY (PA)

"**Any** bodily movement produced by **skeletal** muscle that requires energy expenditure" [1]



INACTIVITY <150 minutes of moderate to vigorous PA a week[1]

1 IN 4 ADULTS WORLDWIDE

Do **NOT** meet recommended levels of physical activity a week [1]

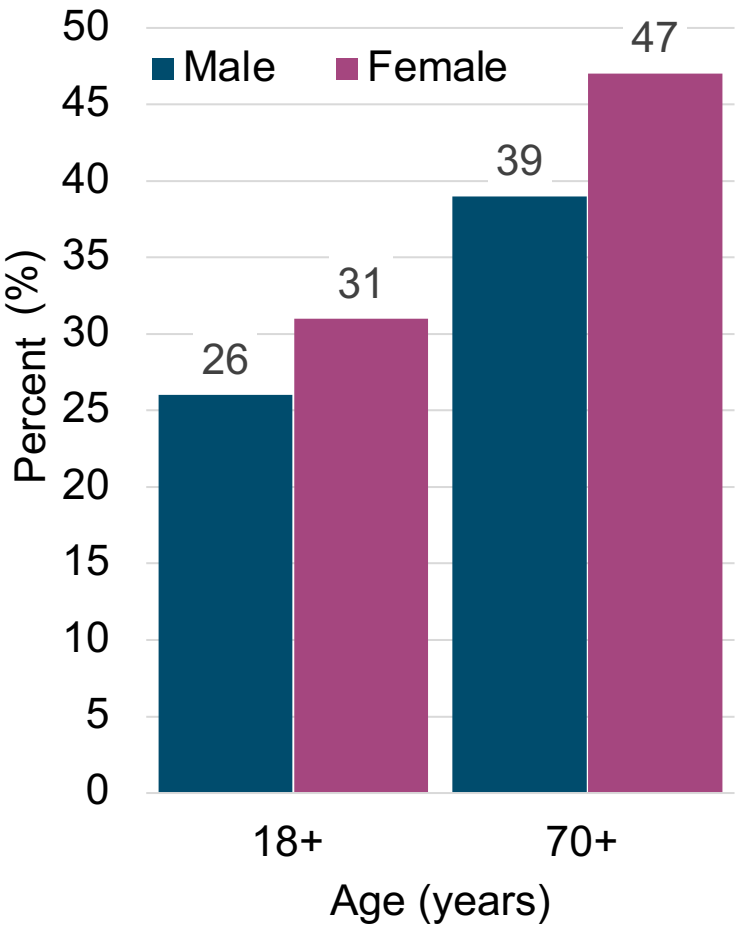


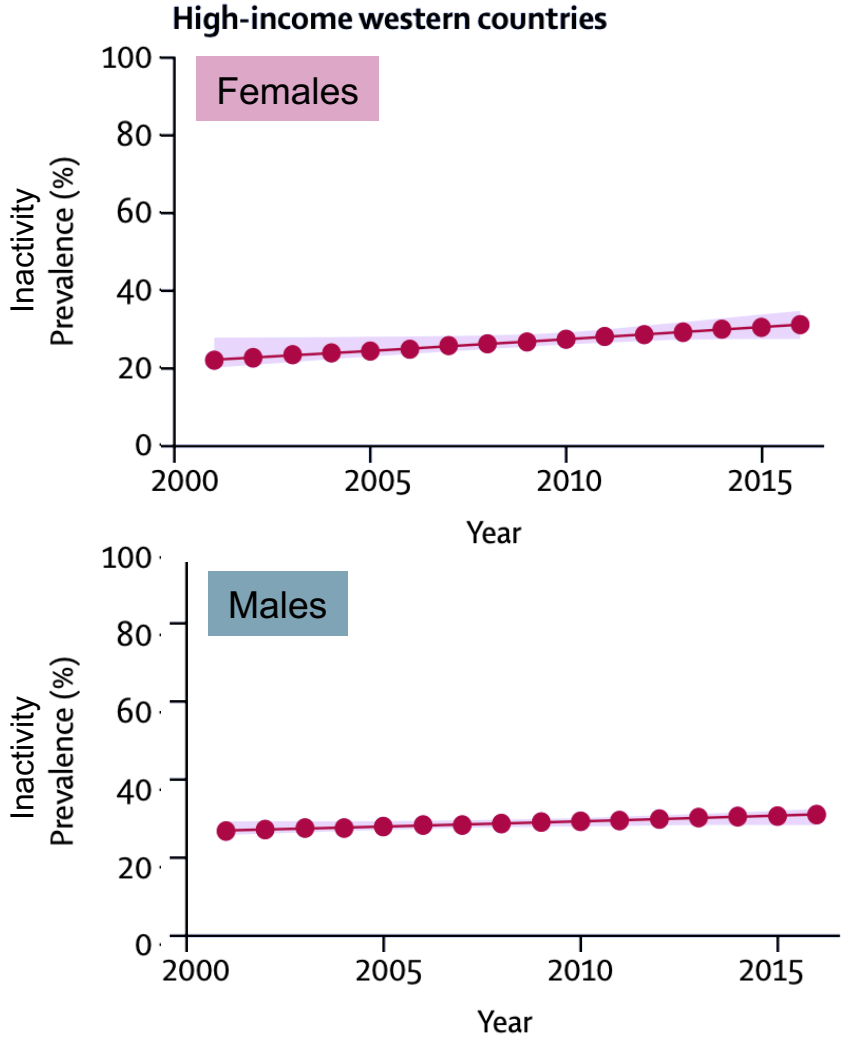
Fig. Prevalence of physical **inactivity** in Canada [2]

Global Status Report on PA 2022

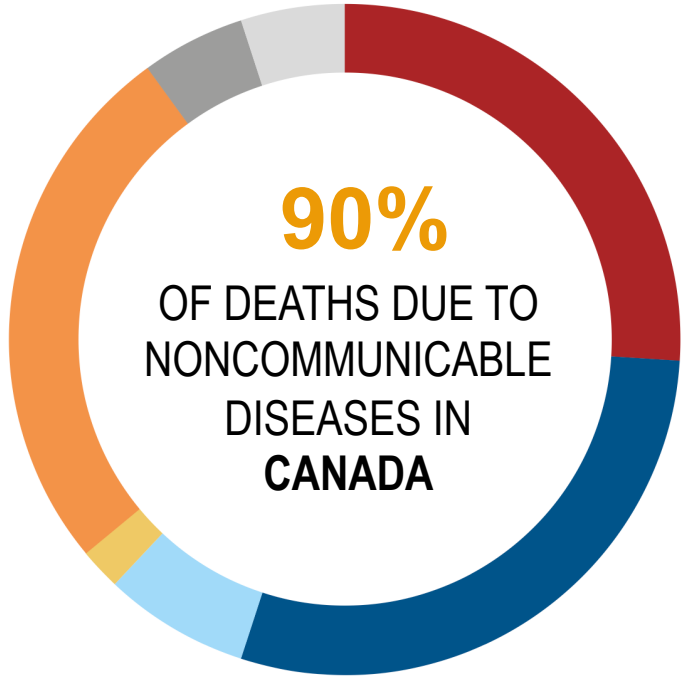
Older adults
Women

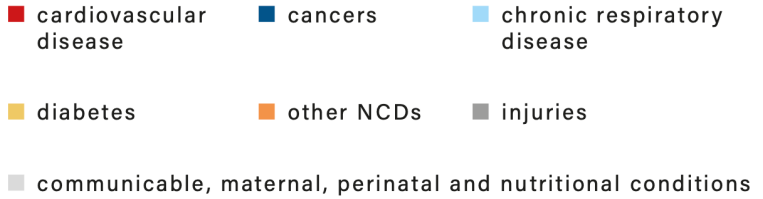
INACTIVITY IS A GLOBAL HEALTH CRISIS

increasing **inactivity** levels [6]



GREATER relative burden in **high-income countries** [5]





Global Status Report on PA 2022 [2]

BY INCREASING PA LEVELS…

Increase chronic disease prevention

Improve functional status

Improve social outcomes

Improve psychological health

Improve trajectories of healthy aging [3]

BY INCREASING PA LEVELS…

Improve trajectories of healthy aging

Fig. undertaking any level of PA increases the odds of being in the stable high trajectory of healthy aging [3]

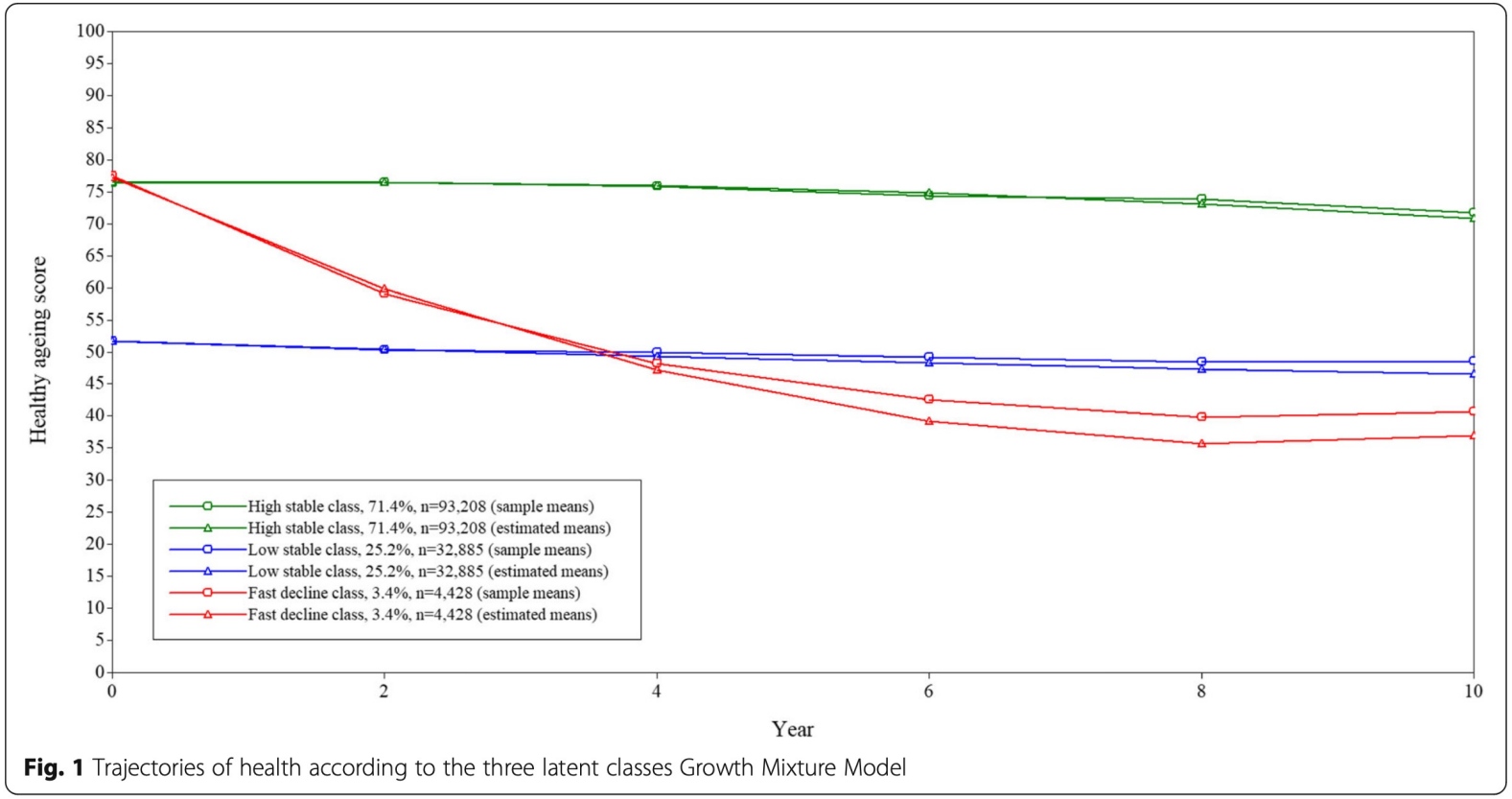


Fig. 1 Trajectories of health according to the three latent classes Growth Mixture Model

BY INCREASING PA LEVELS…

Increase chronic disease prevention

Improve functional status

Improve social outcomes

Improve psychological health

Improve trajectories of healthy aging [3]

Decrease prevalence of noncommunicable diseases

Decrease the burden on healthcare systems

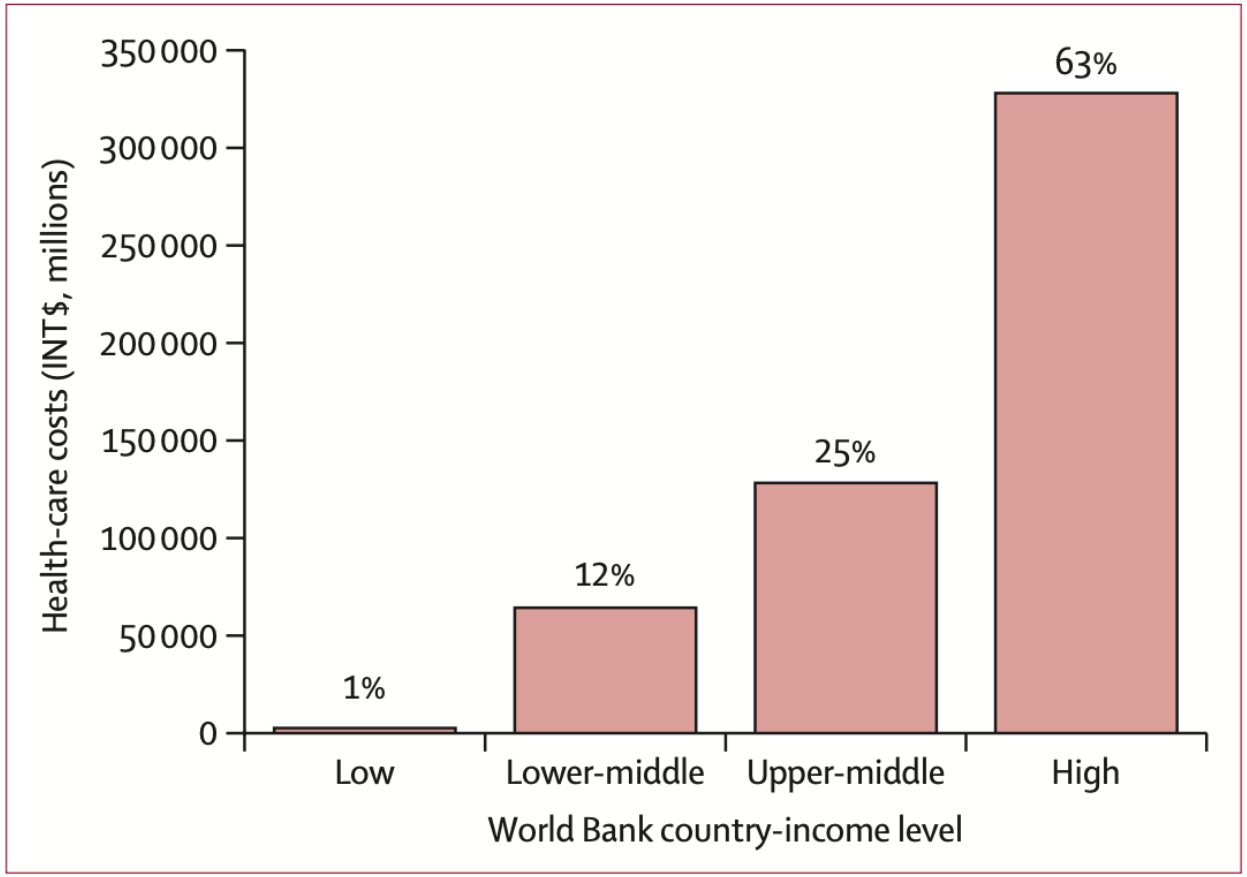
BY INCREASING PA LEVELS…

Decrease the burden on healthcare systems

Health care cost estimated from current inactivity prevalence

>$500 million per year in **Canada** [2]

$37 billion CAD worldwide[4]



[4]

Figure 4: **Costs and proportions of direct health-care costs of new cases of non-communicable diseases and mental health conditions attributed to physical inactivity by World Bank country-income level, 2020–30**

GAPS IN THE LITERATURE

Limited evidence

- Comprehensive understanding of current PA behaviour patterns
  - Older adults & females
  - Canada
- Female subgroups
- Age disaggregated analyses for older adults

TODAY…

Normative values for the Physical Activity Scale for the Elderly in men and women 45 to 85 years old: an analysis from the Canadian Longitudinal Study on Aging

Cassandra D'Amore, Alexandra Mayhew, Lauren Griffith, Parminder Raina, Julie Richardson, Marla Beauchamp (submitted Dec 2024)

Physical Activity Behaviour in Middle-Aged and Older Canadian Women and Men: An Analysis of the CLSA

Cassandra D'Amore, Lauren Griffith, Julie Richardson, Marla Beauchamp (submitted Sept 2024)

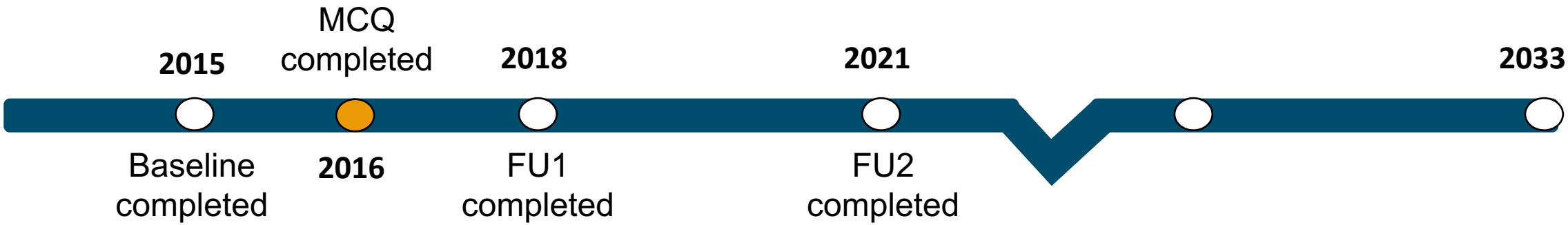
CANADIAN LONGITUDINAL STUDY ON AGING [7] (CLSA)

Baseline recruitment:
n=51,338, 45-85 years old

Tracking cohort n=21,241

Across 10 provinces
Telephone interviews

Exclusions:
Canadian territories and some remote regions
Federal First Nation reserves & provincial first nations settlements
Full time members of the Canadian Armed Forces
Institutionalized persons

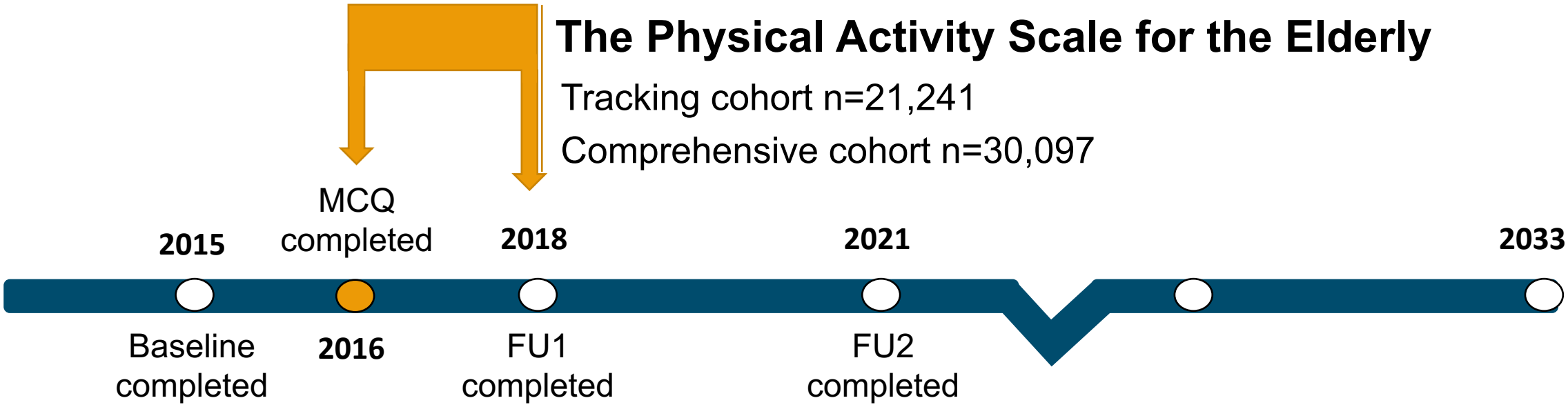


Comprehensive cohort n=30,097

Within 25-50km of a data collection site (7 provinces)
In person interviews in home
Additional questionnaires, physical assessment and fluid samples at collection site

clsa élcv

CANADIAN LONGITUDINAL STUDY ON AGING [7] (CLSA)



PHYSICAL ACTIVITY SCALE FOR THE ELDERLY (PASE)

- 7 day retrospective questionnaire [8]
- Used in over 35 countries [9]
- 10 questions → 13 items

3. Over the past 7days, how often did you engage in light sport or recreational activities such as bowling, golf with a cart, shuffleboard, fishing from a boat or pier or other similar activities?

[0.] Never → go to question #4
[1.] Seldom (1-2 Days)
[2.] Sometimes (3-4 Days)
[3.] Often (5-7 Days)

3a. What were these activities?

_____

3b. On average, how many hours per day did you engage in these light sport or recreational activities?

[1.] Less than 1 hour
[2.] 1 but less than 2 hours
[3.] 2-4 hours
[4.] More than 4 hours

Items (activity types):

- Walking
- Light sport/recreation
- Moderate sport/recreation
- Strenuous sport/recreation
- Muscle strength/endurance
- Sitting
- Heavy housework
- Home repair
- Lawn/yard work
- Outdoor gardening
- Caregiving duties
- Work/volunteer activities

Total PASE score:

- Range: 0 – 400+
- Higher score = more active
- Unitless
- Sufficient test-retest reliability & construct validity [9]

D'Amore *et al. BMC Geriatrics* (2024) 24:761
https://doi.org/10.1186/s12877-024-05332-3

BMC Geriatrics

RESEARCH Open Access

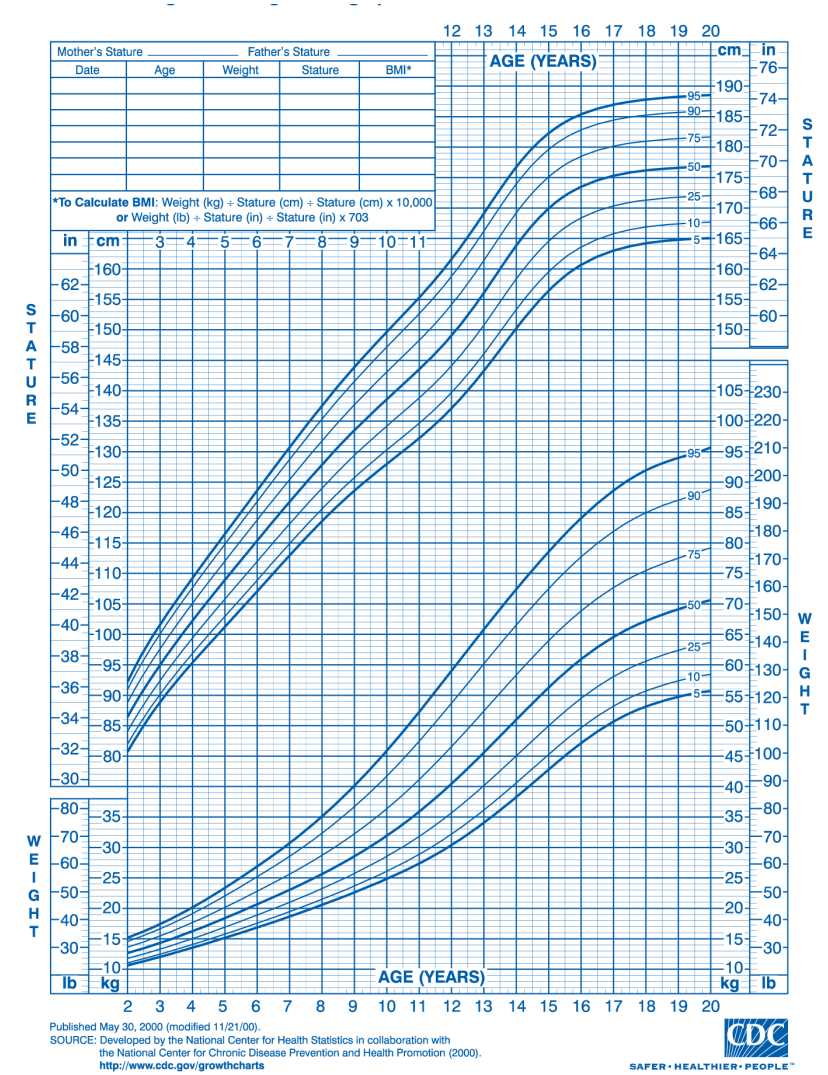
Mapping the extent of the literature and psychometric properties for the Physical Activity Scale for the Elderly (PASE) in community-dwelling older adults: a scoping review [9]

Cassandra D'Amore[1†], Lexie Lajambe[1†], Noah Bush[1], Sydney Hiltz[1], Justin Laforest[1], Isabella Viel[1], Qiukui Hao[1] and Marla Beauchamp[1*]

Normative values for the Physical Activity Scale for the Elderly in men and women 45 to 85 years old

OBJECTIVE

To create age- and sex-specific normative values for the PASE for community-dwelling people aged 45-85 years using the Canadian Longitudinal Study on Aging (CLSA)



ıre 21. Clinical growth chart 5th, 10th, 25th, 50th, 75th, 90th, 95th percentiles, 2 to 20 years: Boys stature-for-age and weight-for-age

ANALYTIC SAMPLE

CLSA sampling weights for target population description

Exclusion criteria

- Mobility limitation (reported using gait aid)
- Reported a limitation in any basic or instrumental activities of daily living
- Missing data for inclusion criteria or PA questionnaire

	Met inclusion criteria	Did not meet inclusion criteria	Difference	Significantly different p-value (95% CI)
Mean PASE Score	150.81	110.12	40.69	<0.001 (39.18, 42.19)
Females	141.70	105.40	36.3	<0.001 (34.44, 38.15)
Males	158.95	118.64	40.31	<0.001 (37.72, 42.90)

MODELLING

Stratified by sex and CLSA sampling weights for modelling

Determining models of best fit

- Quantile regression-based models
- General additive models for location scale and shape (GAMLSS)

- Cross validation
  - 70% training / 30% test

Age and Ageing 2023; **52:** 1–11
https://doi.org/10.1093/ageing/afad054

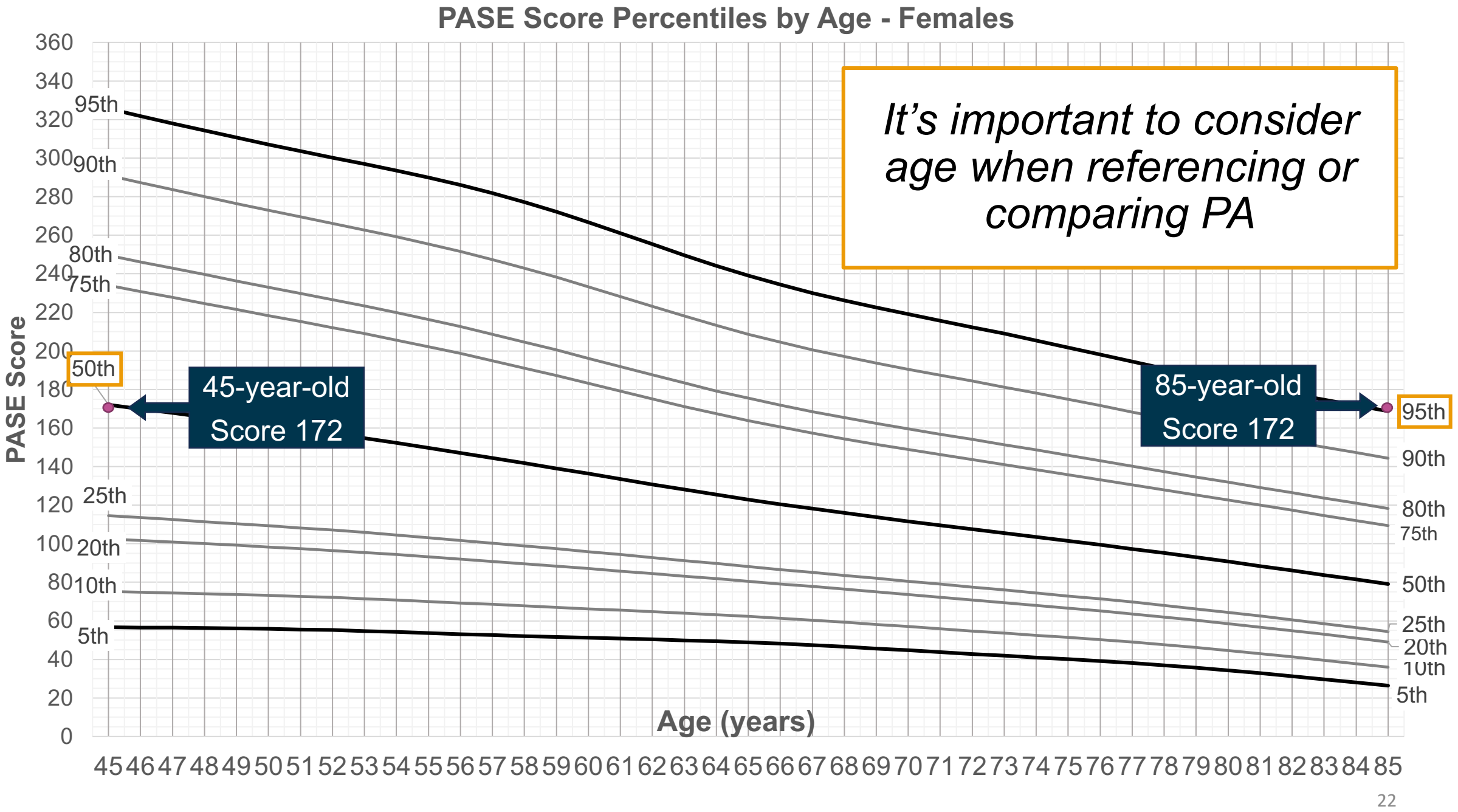
RESEARCH PAPER

Normative values for grip strength, gait speed, timed up and go, single leg balance, and chair rise derived from the Canadian longitudinal study on ageing [10]

Alexandra J. Mayhew[1,2,3], Hon Y. So[4], Jinhui Ma[1,2,3], Marla K. Beauchamp[3,5], Lauren E. Griffith[1,2,3], Ayse Kuspinar[3,5], Justin J. Lang[6,7], Parminder Raina[1,2,3]

RESULTS

	Sample	Target population estimates (weighted)		
	Total n=36,701	Total n=9,623,206	Male n= 4,975,812 (51.71%)	Female n=4,647,394 (48.29%)
Age	61.63 (9.94)	58.72 (9.72)	58.78 (9.78)	58.65 (9.66)
Cultural/racial background				
European	34,837 (95%)	9,107,471 (95%)	4,703,957 (95%)	4,403,514 (95%)
Non-European	1,397 (4%)	403,977.8 (4%)	216,788 (4%)	187,190 (4%)
Multiple origins	429 (1%)	102,278.5 (1%)	46,877 (1%)	55,402 (1%)
Physical activity (Total PASE score)	150.81 (74.88)	160.41 (78.55)	172.57 (82.47)	147.39 (71.89)
Physical activity represent last 12 months				
Agreed	24,996 (68%)	6,723,075 (70%)	3,578,708 (72%)	3,144,367 (68%)
Neither	779 (2%)	203,556 (2%)	112,096 (2%)	91,460 (2%)
Disagreed	10,805 (29%)	2,669,404 (28%)	1,270,941 (26%)	1,398,463 (30%)
Household income				
less than $20,000	1,387 (4%)	395,365 (4%)	154,630 (3%)	240,735 (5%)
$20,000 or more, but less than $50,000	7,551 (21%)	2,114,108 (22%)	988,459 (20%)	1,125,649 (24%)
50,000 or more, but less than $100,000	12,621 (34%)	3,379,029 (35%)	1,808,910 (36%)	1,570,119 (34%)
$100,000 or more, but less than $150,000	7,009 (19%)	1,805,244 (19%)	997,360 (20%)	807,884 (17%)
$150,000 or more	6,026 (16%)	1,470,916 (15%)	850,865 (17%)	620,052 (13%)
Missing	2,107 (6%)	458,543 (5%)	175,589 (4%)	282,954 (6%)


PASE Score Percentiles by Age - Females
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
PASE Score
95th
90th
80th
75th
50th
25th
20th
10th
5th
45-year-old
Score 172
85-year-old
Score 172
95th
90th
80th
75th
50th
25th
20th
10th
5th
Age (years)
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
It's important to consider age when referencing or comparing PA

SUMMARY

The first age- and sex specific normative values for the PASE from a population-based study

- Increases the interpretability of the total score and, therefore, the utility of the PASE

- Even among those without PA restrictions there is downwards trend in PA level with increasing age

- Females had consistently lower PA levels

Physical Activity Behaviour in Middle-Aged and Older Canadian Women and Men

OBJECTIVE

To describe the full spectrum of usual PA by type of activity and amount in middle-aged and older Canadians.

i) Explore PA behaviour in Canadians, using subgroups for known correlates of PA
- Household income
- Education
- Material and Social deprivation
- Age and sex
- Region and season

ii) Describe Canadians by the amount PA undertaken
- PASE score quintiles

ANALYTIC SAMPLE

Completed the Maintaining Contact Questionnaire (MCQ)

47,840 participants completed the MCQ

↳ 633 missing total PASE Score

STATISTICAL ANALYSIS

Inverse probability weights

Missing data strategy - Pairwise deletion

COMPREHENSIVE DESCRIPTION OF PA

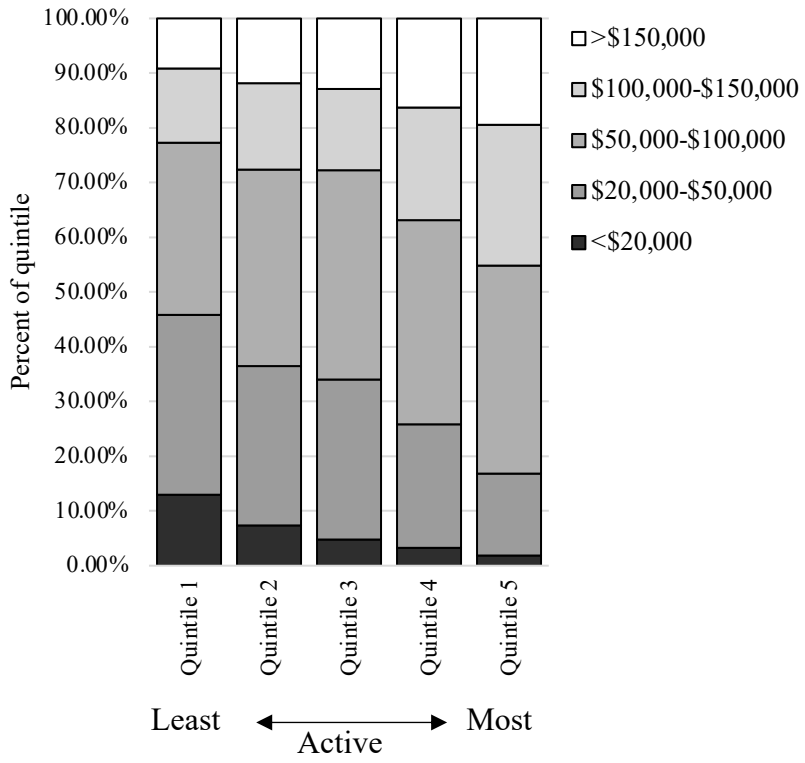
1. Total PASE Score (0-400+)
2. Proportion of PASE Score from each activity (0-1)
3. Prevalence of each activity
4. 150 minutes of MVPA guideline (Y/N)

RESULTS

Variable	Weighted (target population)	Unweighted (sample)
Complete MCQ	12,365,513	47,840
Age mean(SD)	59.783 (SD 10.181)	62.98 (SD 10.35)
Sex (Female)	6,406,677 (51.81%)	24,391 (50.98%)
Cultural/racial background		
European	11,735,186 (95.01%)	45,533 (96.20%)
Non-European	371,511(3.94%)	1,232 (2.60%)
Multiple origins	129,738 (1.05%)	567 (1.20%)
Self-reported general health		
Good or better	10,833,305 (87.68%)	42,879 (89.70%)
Fair/poor	1,522,737 (12.32%)	4,922 (10.30%)
Education		
< secondary school graduation	2435789 (19.77%)	3,152 (6.61%)
No post-secondary education	1718823 (13.95%)	5,182 (10.86%)
Some post-secondary education	1093640 (8.88%)	3,570 (7.48%)
Post-secondary degree/diploma	7074034 (57.41%)	35,815 (75.05%)
Household income		
less than $20,000	709,763 (6.07%)	2,513 (5.61%)
$20,000 or more, but less than $50,000	3,027,389 (25.88%)	11,096 (24.77%)
$50,000 or more, but less than $100,000	4,225,053 (36.11%)	16,116 (35.98%)
$100,000 or more, but less than $150,000	2,117,014 (18.19%)	8,300 (18.53%)
$150,000 or more	1,619,917 (13.85%)	6,765 (15.01%)
Total PASE score mean (SD)	151.094 (SD 79.11)	141.53 (SD75.17)
Completed 150 minutes of MVPA	7,959,951 (64.80%)	32,152 (67.60%)
PA represent last 12 months		
Agreed	8,691,980 (70.29%)	3,365,512 (68.82%)
Neither agree nor disagree	250,285 (2.02%)	1,004 (2.11%)
Disagreed	3,365,512 (27.22%)	13,836 (29.07%)

1. PATTERNS OF SOCIAL DETERMINANTS OF HEALTH

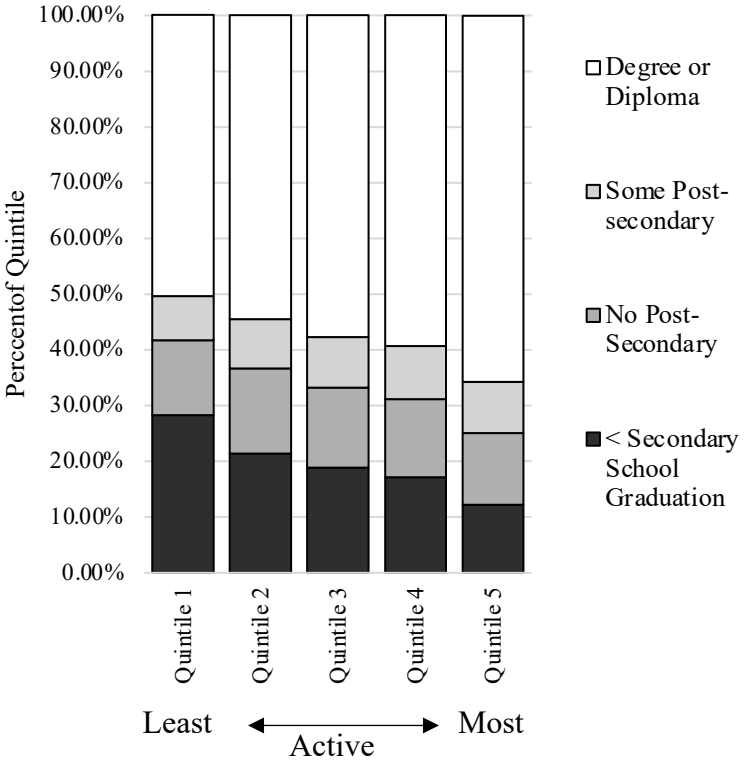
a. Household Income Distribution



PA level

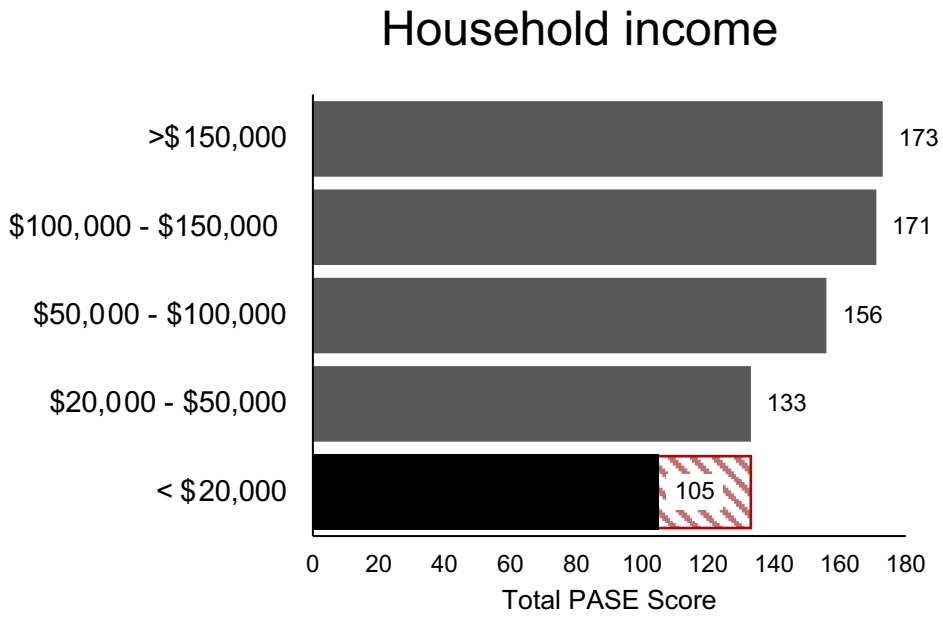
- ↑% of higher income
- ↑% of higher education
- ↑% of reported good health
- ↓% of females

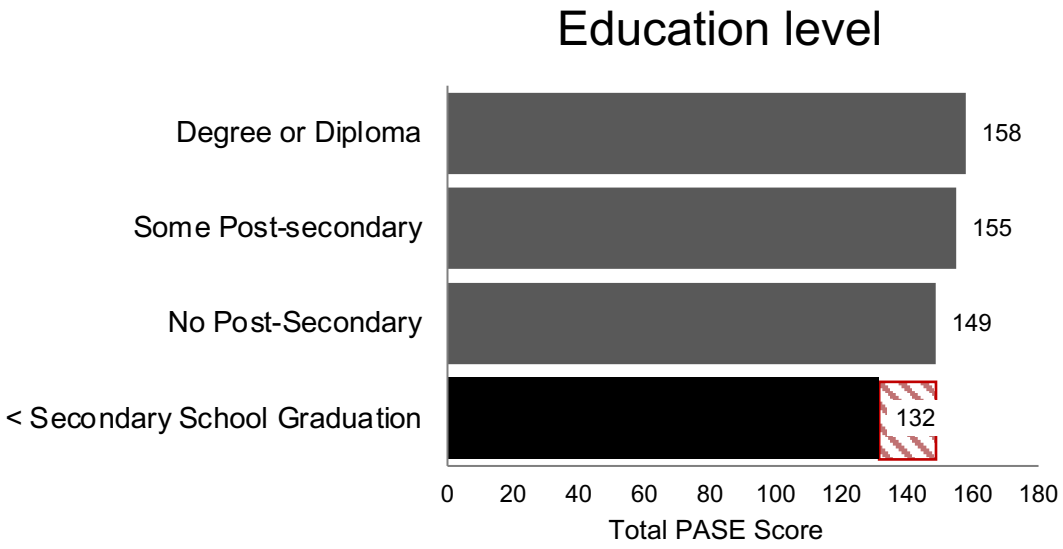
b. Education Level Distribution



2. SOCIOECONOMIC PATTERNS

Greatest difference in PA was found between the lowest SES groups and the next level up





3. AGE AND SEX PATTERNS IN PHYSICAL ACTIVITY

- PASE scores decreased with increasing age group
- Regardless of age group females had lower levels of PA

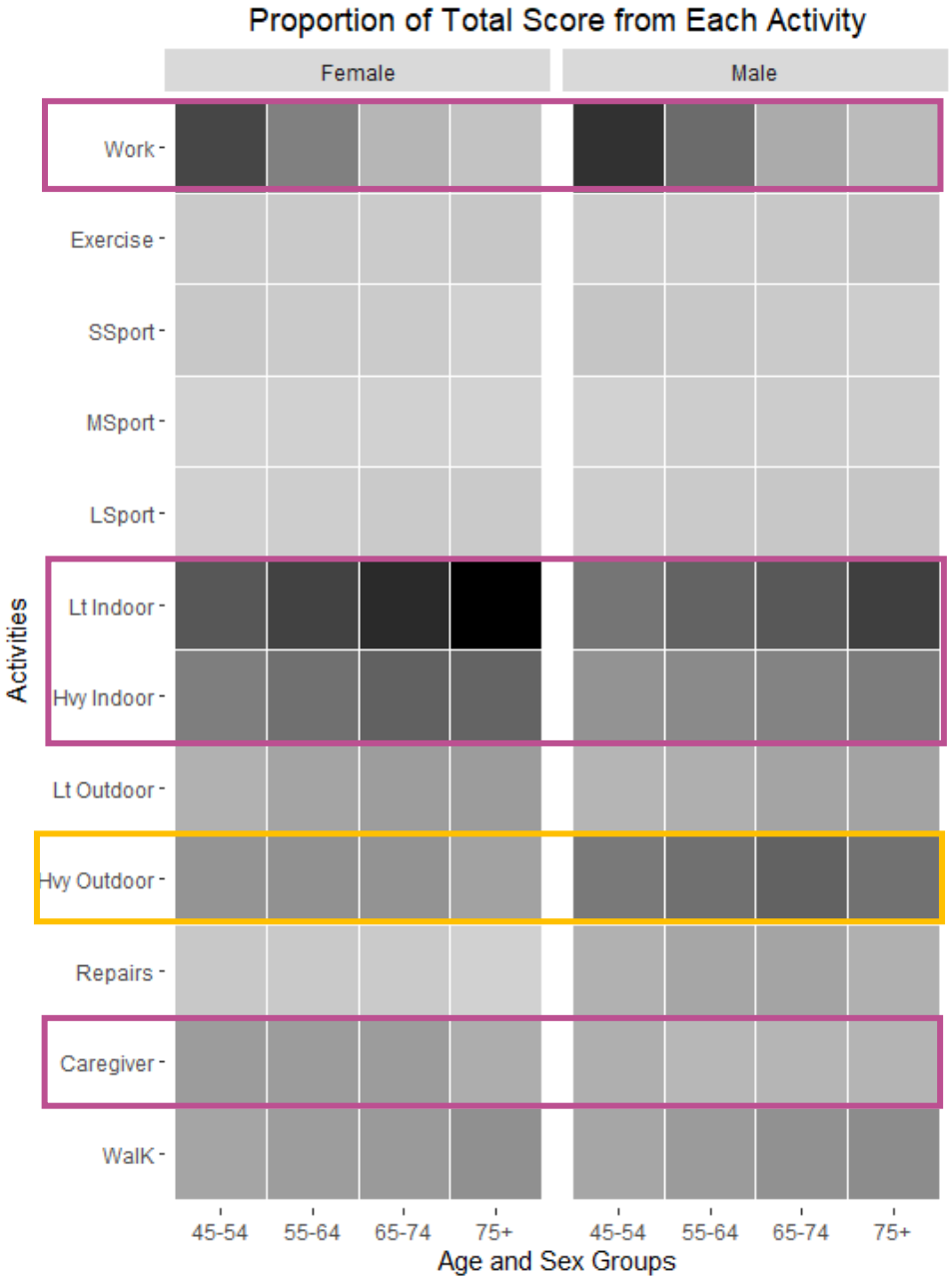
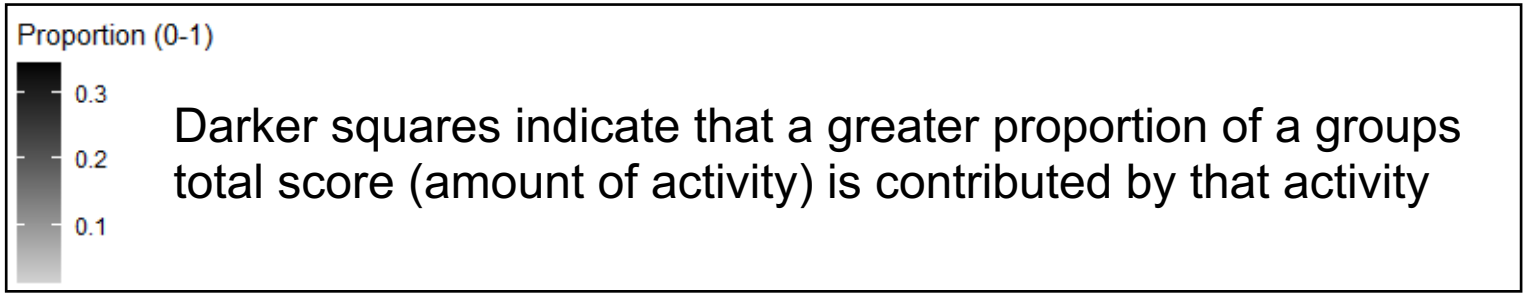
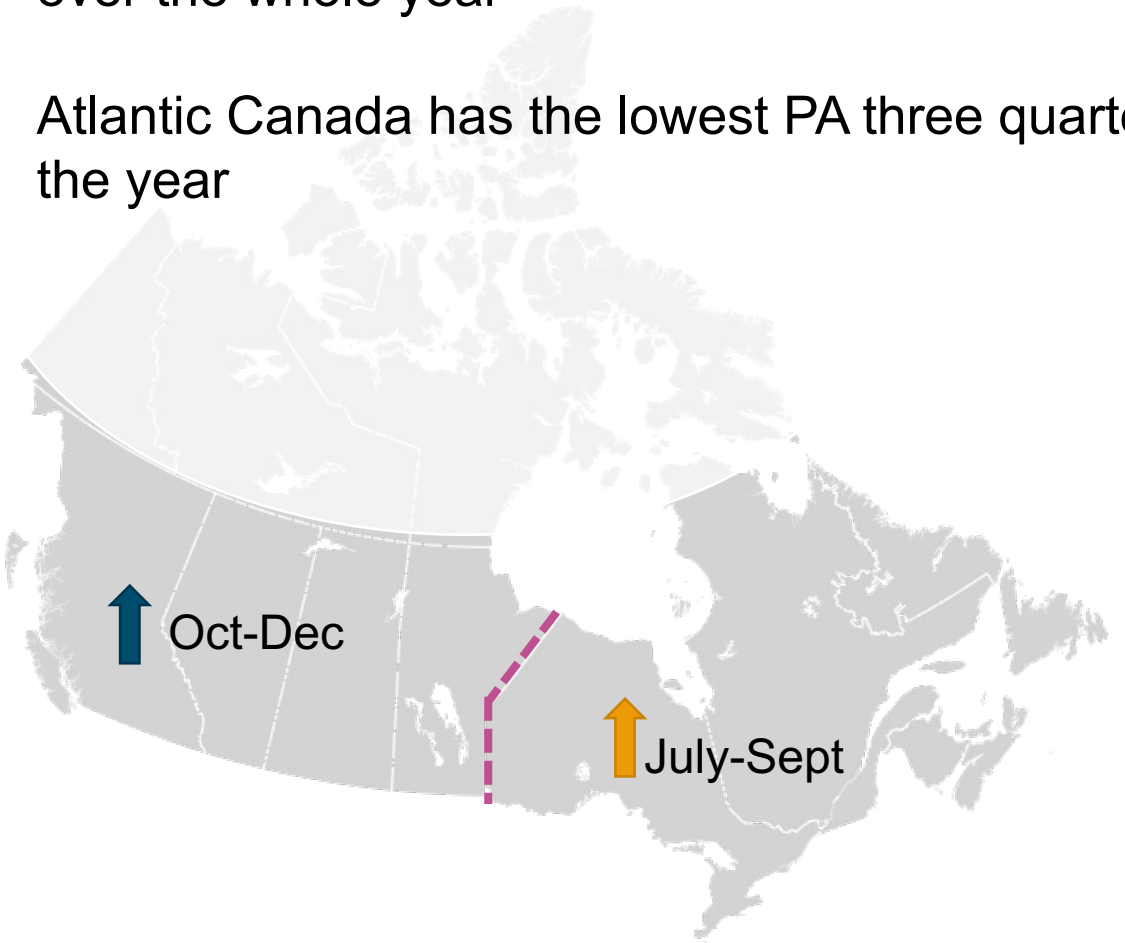


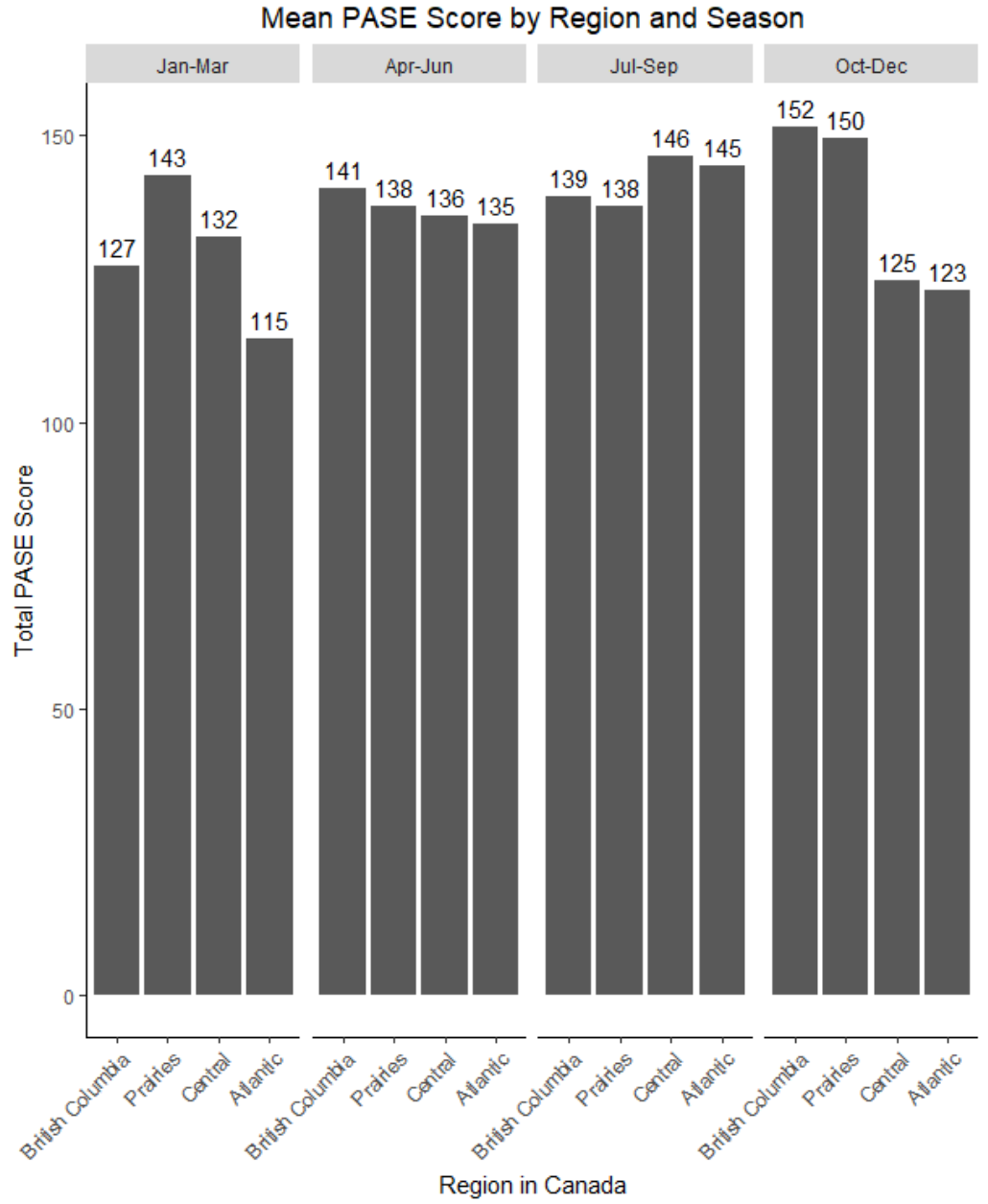
Fig. Proportion of total PASE score for males and females across age groups



4. REGIONAL PATTERNS ON PHYSICAL ACTIVITY

- The prairies had the highest PA level on average over the whole year
- Atlantic Canada has the lowest PA three quarters of the year





SUMMARY

This analysis provided a comprehensive description of PA behaviour in middle-aged and older Canadians

- Physical activity patterns of social determinants of health
  - Socioeconomic patterns
  - Age and sex patterns
- Physical activity patterns across regions of Canada

COMMUNITY ENGAGEMENT IN SECONDARY DATA ANALYSIS

RESEARCH BRIEF [11]

Older adults as research partners:

A systematic review of implementation and impact

Key Points

- We know more about what older adults do in their research partner roles than how they were engaged and with what impact.
- Older adults were more likely to be involved in carrying out and sharing results of research but were less often involved in designing it.
- The impacts that older adults have had as research partners include the creation of new and continuation of existing partnerships.
- Some older adult research partners reported feeling more socially connected and less lonely as a result of engagement in health research.
- More impact evaluation is needed to advance this field.

Results

Most of the 62 included studies were carried out in the community setting. Most studies did not report information about the ethnicity of their research partners; 12 studies reported inclusion of older adult research partners from Black, Chinese, Hispanic and Indigenous and white communities. Older adult research partners had lived experience with cancer, frailty, dementia, mobility issues, self-harm, and caregiving.

Older adult partners were most likely to be engaged in the execution of research and least likely to be engaged in the preparatory stages of research. In more than one third of studies, older adult partners were engaged to translate research findings. In six studies, older adult research partners were engaged across all stages of research.

It was more common for studies to discuss how older adults were engaged; fewer discussed how the impact of engagement was measured.

[11]

Research Phase	Involvement Activities*
Preparatory phase	• identifying topics • identifying research questions • input into engagement processes • establishing Advisory Board/Council • contributing to project design and management • completing research training course
Study design	• providing feedback on study methods, measures, interview guides, questionnaires • identifying community-relevant topics for focus groups, areas for action • refining or co-designing models/processes (e.g., care pathways, lesson plans) • testing interview guides • refining consent forms • ensuring culturally relevant data collection approaches • shaping public-facing materials • training student researchers
Recruitment	• assisting with recruitment and recruitment procedures • recruiting other citizen partners, encouraging attendance • explaining project purpose to community members
Data collection	• conducting key informant interviews • participating in community workshops to identify preferences/priorities • facilitating focus groups • facilitating completion of surveys
Data analysis	• member checking/confirming accuracy of data interpretation • prioritizing, co-analyzing, identifying key themes • contributing to development of model • reviewing results • making sense of findings • reflecting on actions taken
Knowledge translation	• providing feedback on knowledge translation materials (e.g., frameworks, reports, newsletters, leaflets, infographics, publications) • orally presenting research findings at workshops, feedback events, and in the community • advising on how to disseminate, promote, and advocate for the uptake of research finding

* Summary of activities completed by older adult research partners reported in studies

COMMUNITY ENGAGEMENT IN SECONDARY DATA ANALYSIS

An trainee example

Public advisory committee

[11]

Data analysis	• member checking/confirming accuracy of data interpretation • prioritizing, co-analyzing, identifying key themes • contributing to development of model • reviewing results • making sense of findings • reflecting on actions taken
Knowledge translation	• providing feedback on knowledge translation materials (e.g., frameworks, reports, newsletters, leaflets, infographics, publications) • orally presenting research findings at workshops, feedback events, and in the community • advising on how to disseminate, promote, and advocate for the uptake of research finding

* Summary of activities completed by older adult research partners reported in studies

Join Our Public Member Advisory Committee

Project: Describing physical activity behaviour of Canadians 45 to 85 years old

WHO ARE WE LOOKING FOR

- Must be 45 years or older
- People of any activity level, experience, or mobility are welcome
- No experience on advisory committee or knowledge of physical activity needed

WHAT WILL ADVISORY MEMBERS DO

Attend 2-3
90-minute meetings
over the next year

Share your thoughts and experiences about physical activity and the research we share with you

WHY GET INVOLVED

Come learn what physical activity means and why it is important for healthy aging

How much activity should you be doing

What is normal and what are other people doing

Advisory members will receive compensation for their time

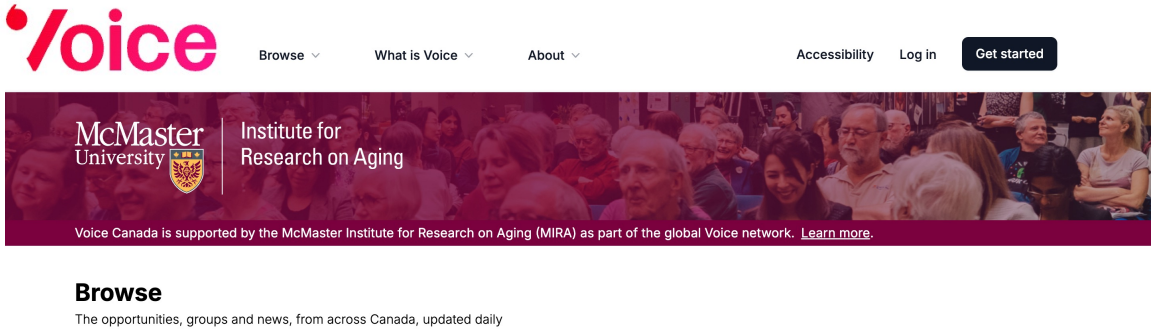
Our team will work with committee members to identify key messages from our research to share with the public

Contact Cassandra at 905-525-9140 ext. 23203 or thornech@mcmaster.ca for more information and confirm eligibility

McMaster University

RECRUITMENT

Eight people, 45 years and older

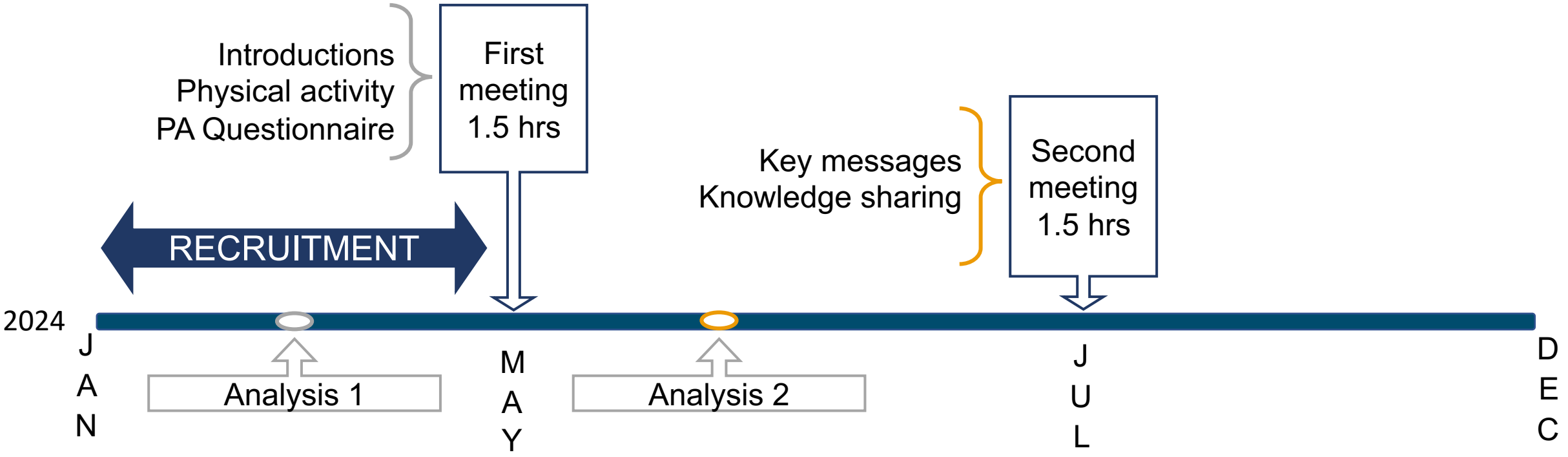


https://voicecanada.community/

COMMUNITY ENGAGEMENT IN SECONDARY DATA ANALYSIS

An trainee example

Public advisory committee



COMMUNITY ENGAGEMENT IN SECONDARY DATA ANALYSIS

An trainee example

Public advisory committee

Goal 1: Ensure all meeting attendees feel appreciated and valued for their knowledge and experience

Goal 2: Understand what physical activity is and why it is important

Goal 3: Identify at least one positive and one negative thing about the Physical Activity Scale for the Elderly (PASE)

Goal 4: Identify key messages to share with the community

Goal 5: Brainstorm ways to share results in meaningful way

McMaster Collaborative for Health and Aging Partnership in Research Fellowship

The objectives of the McMaster Collaborative for Health and Aging Partnership in Research Fellowship are to:

- Build capacity in patient-oriented research and patient engagement with a focus on aging.
- Provide opportunities for Collaborative trainees and older adult and caregiver partners to learn from each other and share their expertise.

https://collaborative-aging.mcmaster.ca/

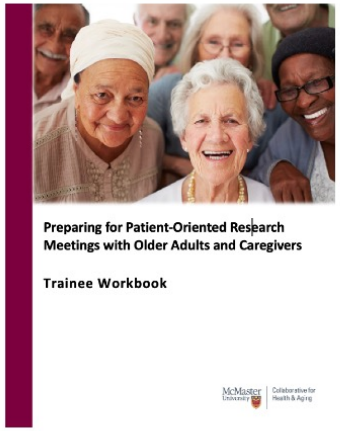
Partnership in Research Fellowship

Who's eligible: Trainees registered in a graduate program or employed as a postdoctoral fellow at an accredited Ontario university who are interested or engaged in partnered research with a focus on aging.

Deadline: October 15, 2024

Learn more and apply

Resources

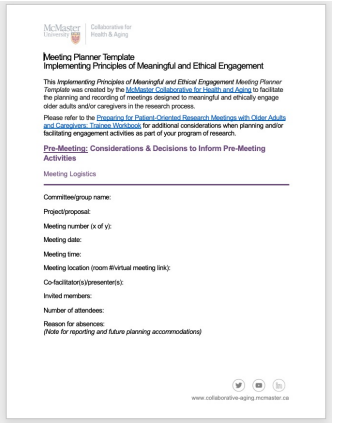


Preparing for Patient-Oriented Research Meetings with Older Adults and Caregivers Trainee Workbook

This workbook for research trainees provides suggestions to consider when planning virtual or in-person meetings with older adults and caregivers to inform research planning, implementation, and knowledge mobilization.

Implementing Principles of Meaningful and Ethical Engagement Meeting Planner Template

This template assists in the facilitation of planning and recording meetings designed to meaningful and ethically engage older adults and/or caregivers in the research process.



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IMPLICATIONS

Normative Values for the PASE

- Allows for consideration of variation in PA when assessing and monitoring levels over time
- Allows for more individualised observations and more granular progress toward a goal
- Increases the interpretability of the total score and, therefore, the utility of the PASE

Describing Usual Physical Activity Behaviour

- Targeted PA promotion efforts appear warranted based on the heterogeneity of PA behaviours in middle-aged and older Canadians
- Relationships between PA behaviours and health outcomes, including limitations in mobility and ADLs and chronic conditions, warrant further investigation via longitudinal analyses to determine directionality

LIMITATIONS

Sample

- Generalizability

Physical activity measurement

- Self-report
- Only validated in older adults (65+ years)
- Prior to the COVID-19 pandemic

NEXT STEPS

1. Longitudinal relationships

NEXT STEPS

2. 24 hour movement behaviours

Canadian 24 hour movement guidelines[12]

NEXT STEPS

3. Device measured movement behaviours

TicWatch & Thigh ActiGraph

CLSA CORE STUDY

Research shows that having mobility limitations may have a negative impact on your physical abilities, visits to emergency departments, hospitalization, and on admission to nursing homes. Mobility can be monitored through activity trackers that can record such things such as step counts, number of stairs climbed, distance traveled, type of travel (e.g., car, public transit, walking, cycling), number of minutes active, body position (i.e., lying, sitting, or standing).

Participants who consent to these data collection measures will be asked to wear two mobility trackers for a period of seven days:

- A TicWatch on their wrist
- An ActiGraph tracker on their thigh

Mobility trackers are provided at the in-home interview and then returned during the Data Collection Site visit.

https://www.clsa-elcv.ca/our-study/mobility-trackers/

References:

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[12] Canadian 24-Hour Movement Guidelines for Adults ages 65 years and older: An Integration of Physical Activity, Sedentary Behaviour, and Sleep. Canadian Society for Exercise Physiology. https://csepguidelines.ca/adults-65/

Thank you

Supervisor: Marla Beauchamp PhD

Committee Members: Lauren Griffith PhD, Julie Richardson PhD

Co-authors: Alexandra Mayhew, Parminder Raina,

Canadian Longitudinal Study on Aging team and participants
Public Advisory Committee Members

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Physical Activity Behaviour in Middle-aged and Older Adults

Cassandra D'Amore PhD

McMaster University
School of Rehabilitation Science

CLSA Webinar

December 12th , 2024 | 12:00 – 1:00pm