The webinar, "**Functional Status and Disability in the Canadian Longitudinal Study on Aging**" will begin shortly.

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CLSA Webinar Series

Functional Status & Disability in the Canadian Longitudinal Study on Aging

Alexandra Mayhew, McMaster University

12 to 1 p.m. ET | February 22, 2018

Maintaining independence throughout the aging process is a key concern for older adults as well as health and social services. Functional impairments precede the onset of disability and may allow for early interventions to delay disability and maintain independence longer.

The Canadian Longitudinal Study on Aging (CLSA) includes several measures of functional status and disability. This presentation explores how activities of daily living can be used to define disability and how the CLSA's physical function questionnaire and performance tests can be used to define functional status.

As part of this study, logistic regression models were used to assess the association between physical function and disability, which revealed differences in the strength of the association dependent on which combinations of physical function limitations were present.

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Functional status and disability in the Canadian Longitudinal Study on Aging – An exploration of definitions, prevalence, and the relationship between function and disability

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PHD CANDIDATE, HEALTH RESEARCH METHODOLOGY

MCMASTER UNIVERSITY

Rationale

- Maintaining independence through the aging process is a key concern for older adults as well health and social services
- Age-related disabilities have numerous implications including increased demand for health care, reduced quality of life, increased cost of care, and higher mortality
- Functional impairments are thought to precede disability and may allow for early interventions to prevent disability and maintain independence longer

Purpose of this project

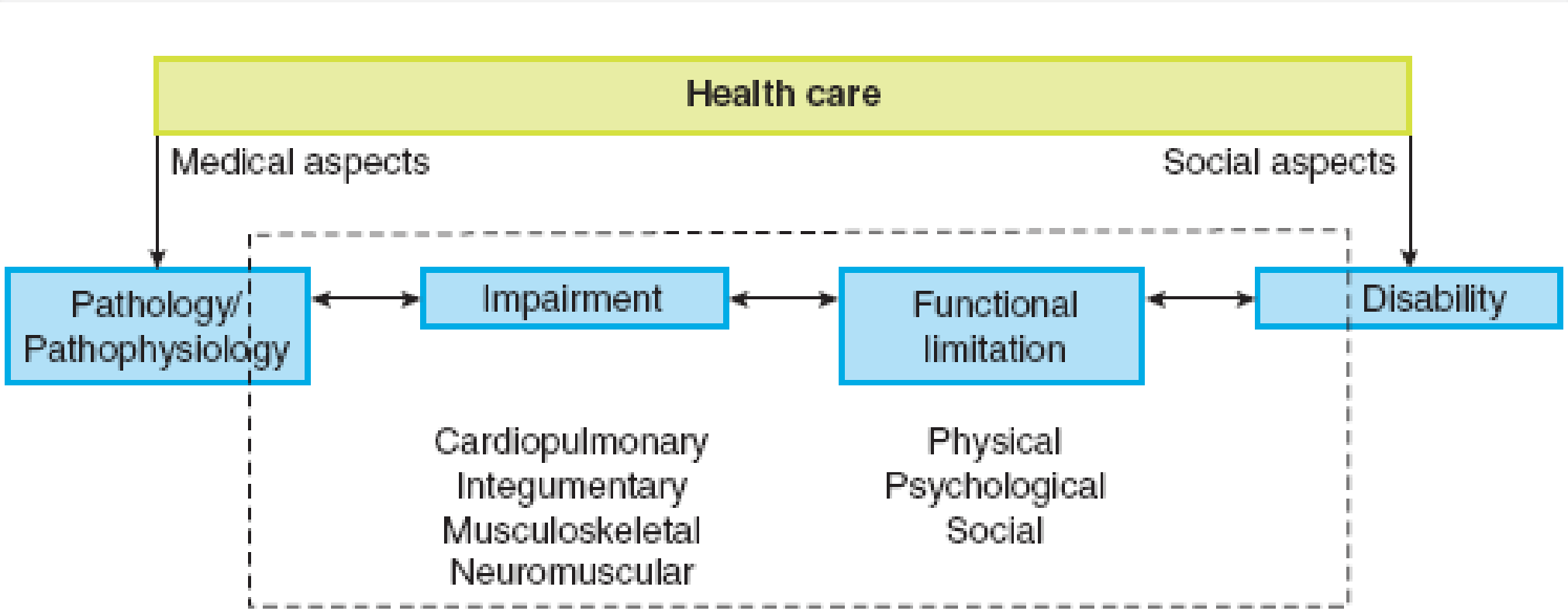
Estimate the prevalence of functional limitations in the CLSA

- Questionnaire based self-assessment
- Performance based testing

Estimate the prevalence of disability in the CLSA

Explore the relationship between measures of functional limitations and disability

Nagi's Disablement Model



Disability in the CLSA

Eating

+ looking after appearances!

Getting In and Out of Bed

Bathing

Grocery Shopping

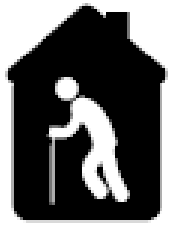
Money Management

Basic Activities of Daily Living (ADL)

Housework

Instrumental Activities of Daily Living (IADL)

Medicine



Getting Around Inside

Toileting

Getting Dressed

Preparing Meals

Telephone Use

Going Places Outside of Walking Distance

Functional status measures in the CLSA

Objective interviewer-administered performance tests, n = 30,000

Subjective self-reported questionnaire – telephone cohort, n = 20,000

- Self-reported function versus performance testing are strongly correlated (0.60 to 0.86)
- Performance testing and disability are moderately correlated (~ 0.30 – 0.50)
- Paucity of evidence of the association of self-reported measures of physical function and disability

Physical function questionnaire

Upper body limitations

- [ ] Reaching or extending arms above shoulders
- [ ] Pushing or pulling large objects
- [ ] Lifting 10lbs from floor
- [ ] Making a bed
- [ ] Washing back
- [ ] Taking impact in arms, shoulders, or hands

Lower body limitations

- [ ] Stooping, kneeling, crouching
- [ ] Standing for 15+ minutes
- [ ] Sitting for 1 or more hours
- [ ] Standing up after sitting in chair
- [ ] Walking up and down stairs
- [ ] Walking 2-3 blocks

Dexterity related limitations

- [ ] Handling small objects
- [ ] Using knife to cut food

Performance measures

Gait speed

- 4m walk at usual walking speed

Timed up and go

- Get up from a chair, walk three meters, turn around and walk back, sit in chair

Balance

- Up to 60 seconds
- Best time of right or left leg

Chair rise test

- Five chair rises without using arms

Grip strength

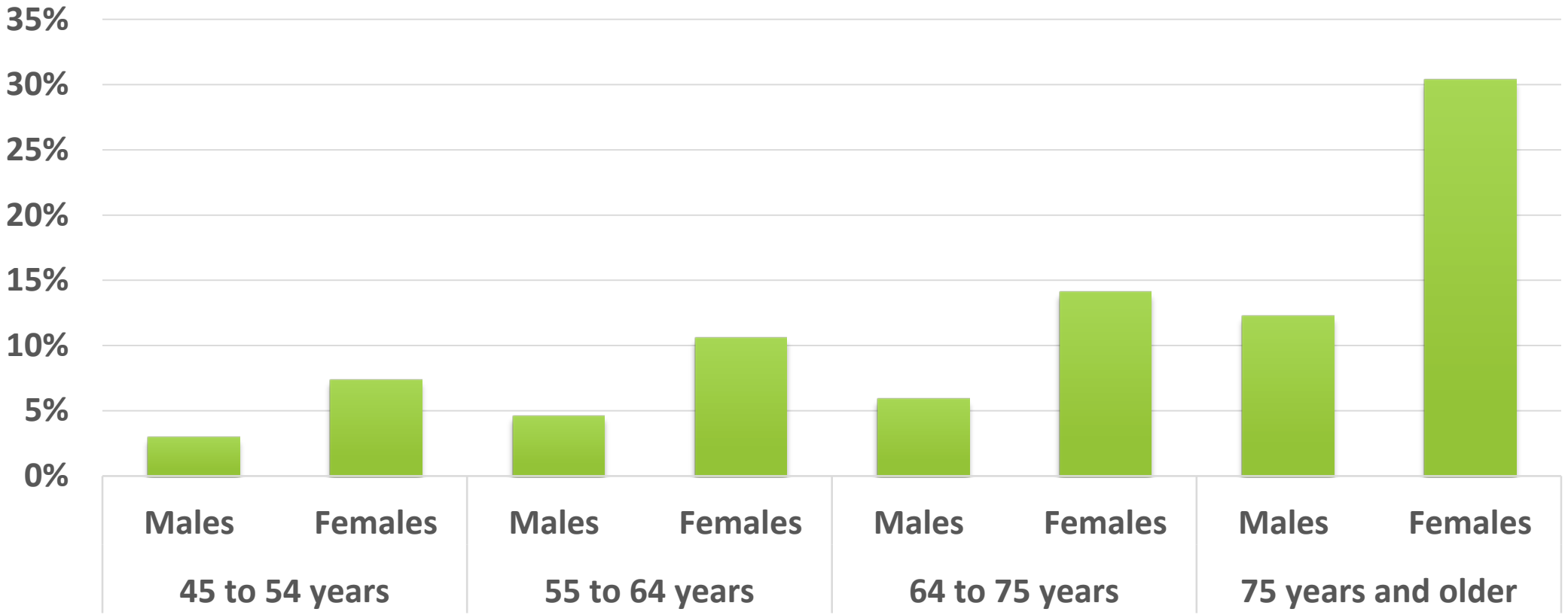
- Dominant hand, highest value of three repetitions

Participant characteristics

Variable	Mean (SD) or percentage	Number of participants
Mean age	63.0 (10.4)	51337
Male	49.1%	25182
Female	50.9%	26155
BMI	27.7 (5.3)	51076
Education		
Less than secondary school	5.6%	2706
Secondary school grad, no post-secondary	11.3%	5455
Some post-secondary education	7.6%	3693
Post-secondary degree/diploma	75.5%	36574
Household income		
less than $20,000	6.1%	2913
$20,000 or more, but less than $50,000	25.4%	12209
$50,000 or more, but less than $100,000	35.7%	17127
$100,000 or more, but less than $150,000	18.2%	8739
$150,000 or more	14.7%	7039
Chronic conditions		
At least 1 chronic condition	67.0%	29335

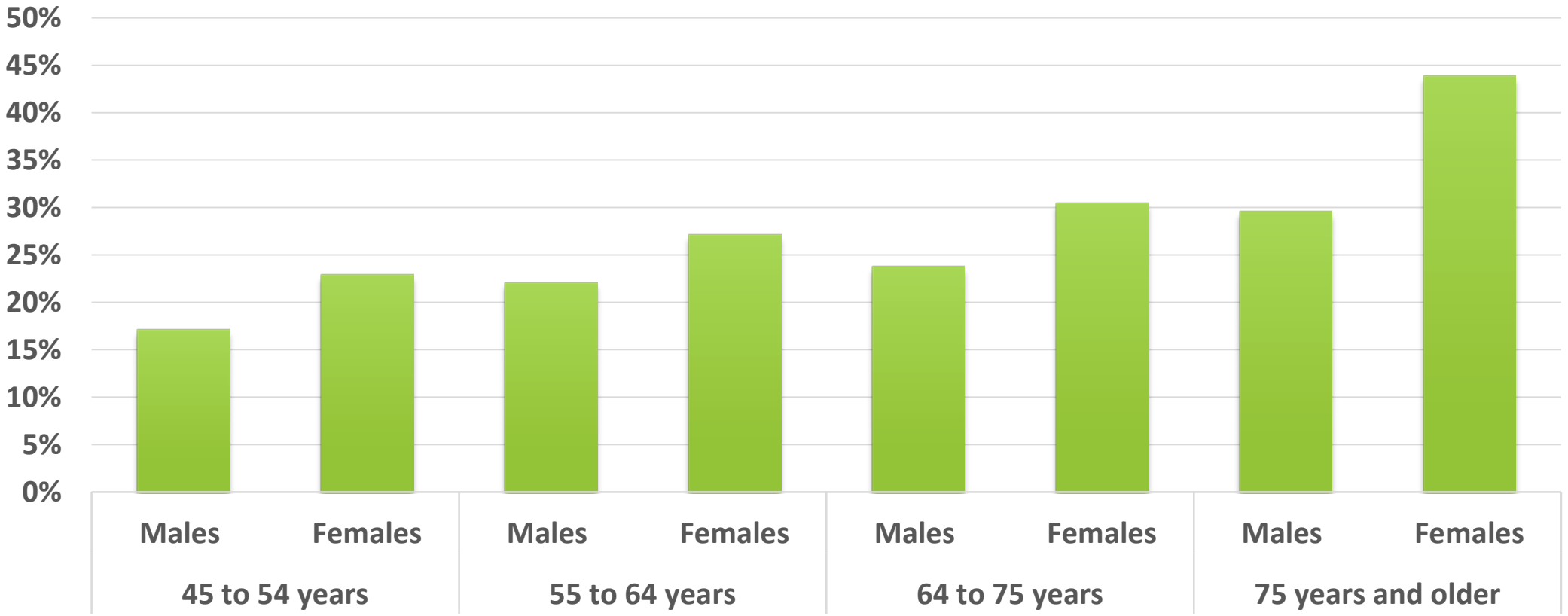
Prevalence of disability

Disability Prevalence - Required assistance with one or more BADL or IADL

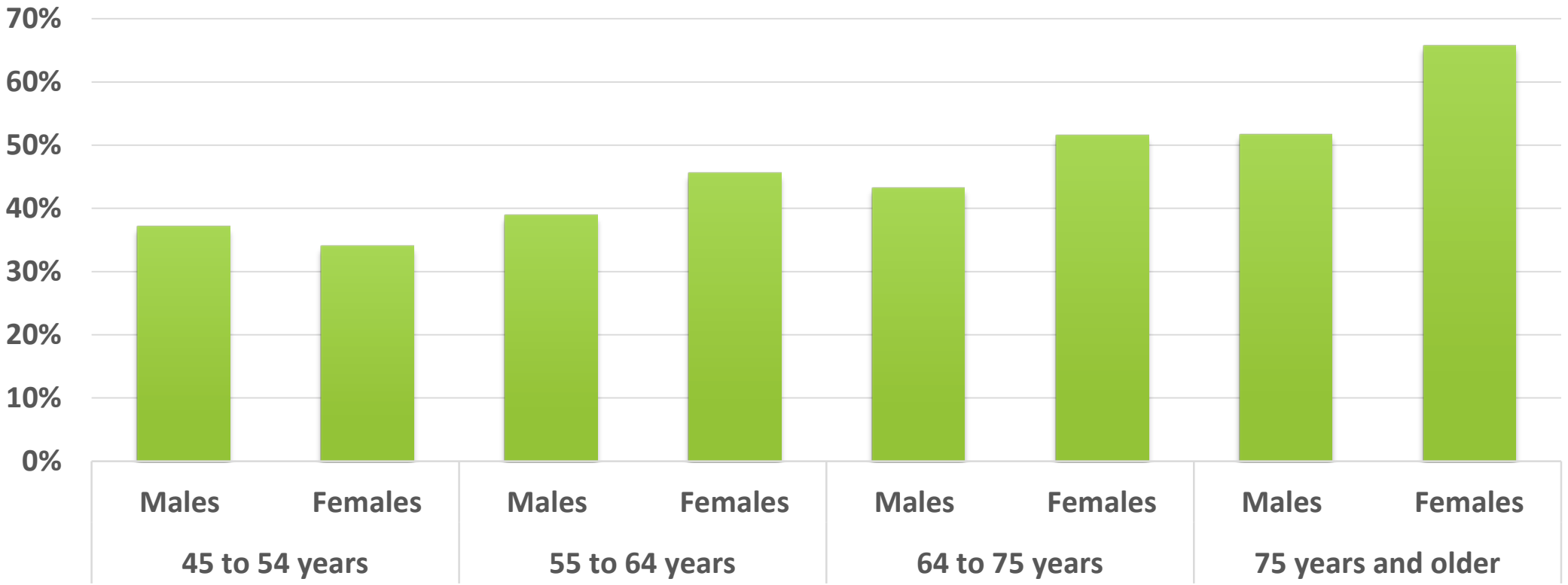


Prevalence of questionnaire based functional limitations

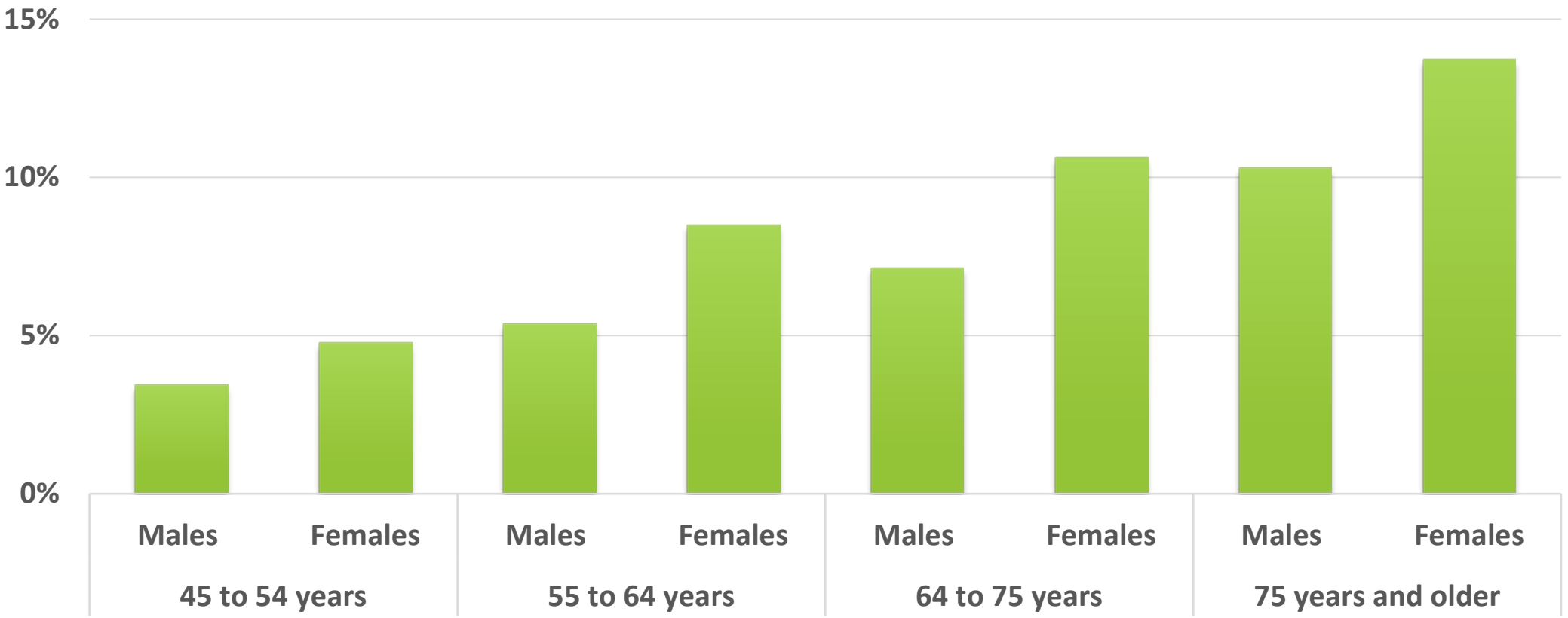
Functional limitation prevalence – Had difficulty with at least one upper body task



Functional limitation prevalence – Had difficulty with at least one lower body task

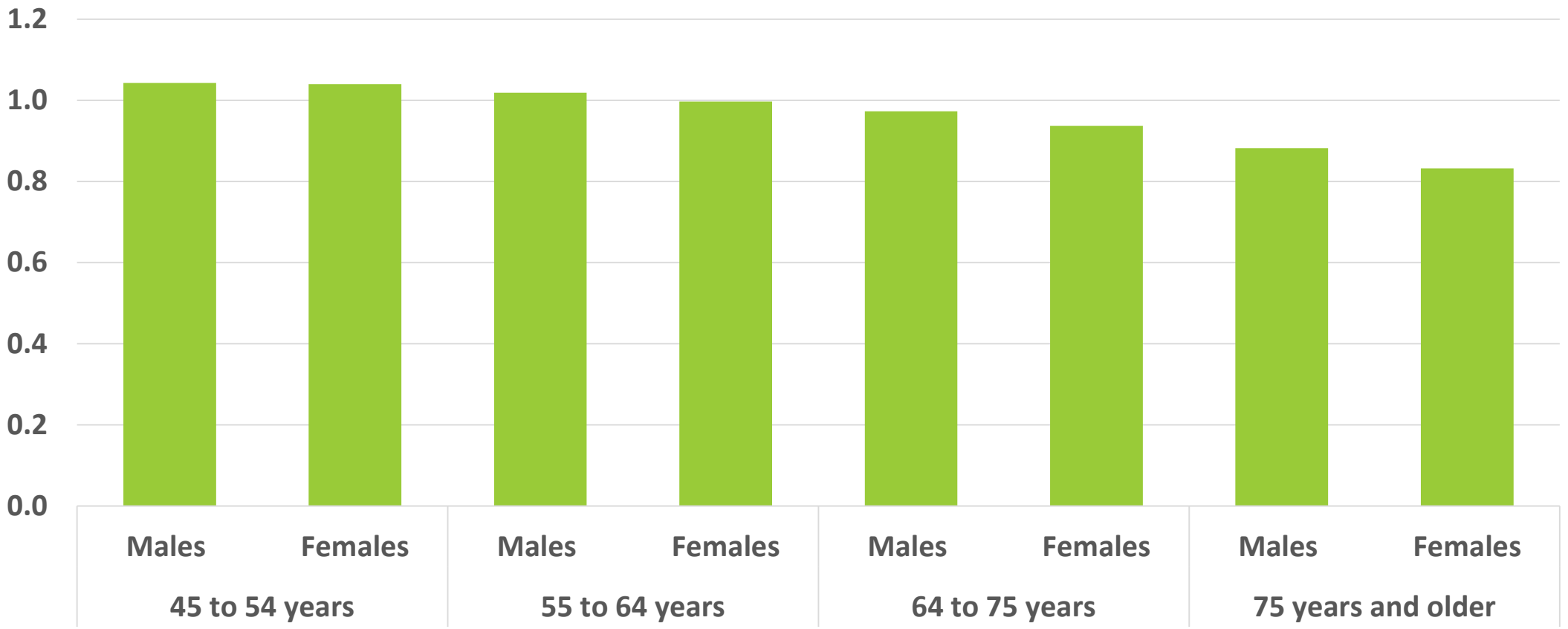


Functional limitation prevalence – Had difficulty with at least one dexterity related task



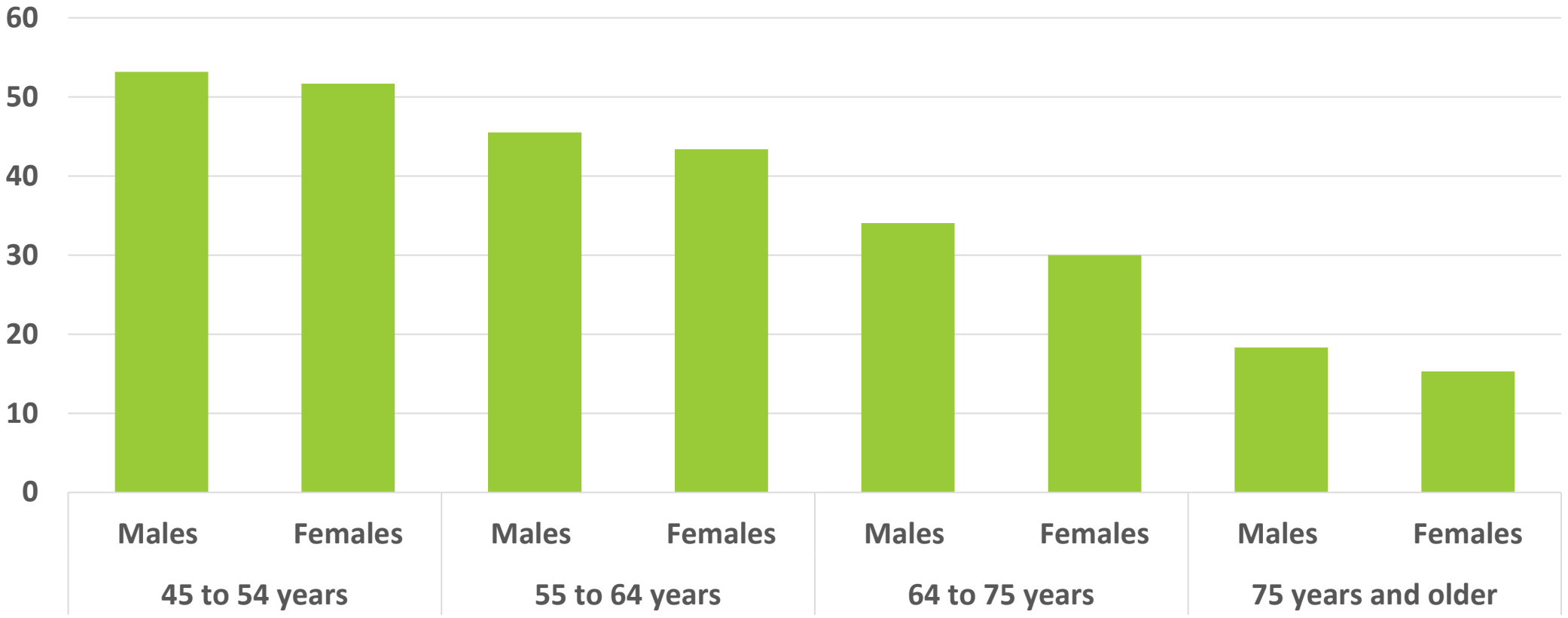
Normative values for functional limitations – performance measures

Functional limitation – mean speed for gait speed (meters per second) by age and sex

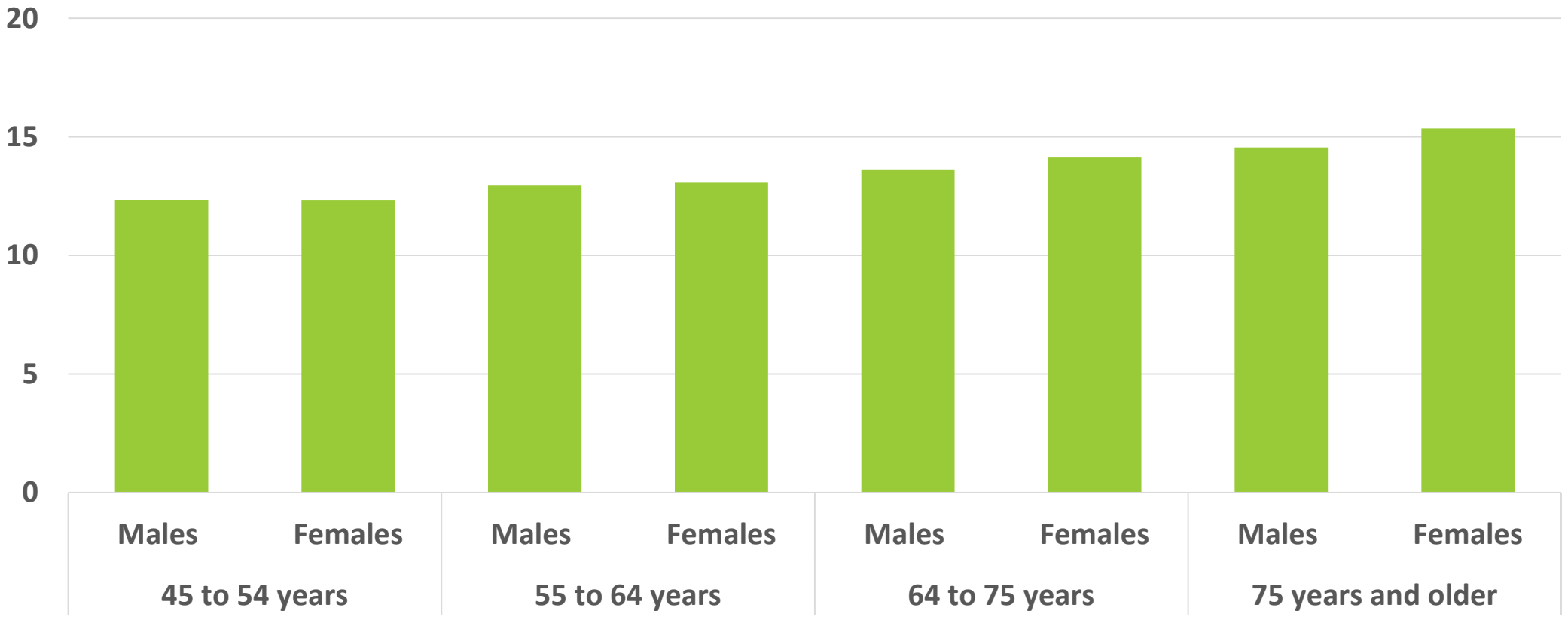


Functional limitation – mean time for timed up and go (seconds) by age and sex

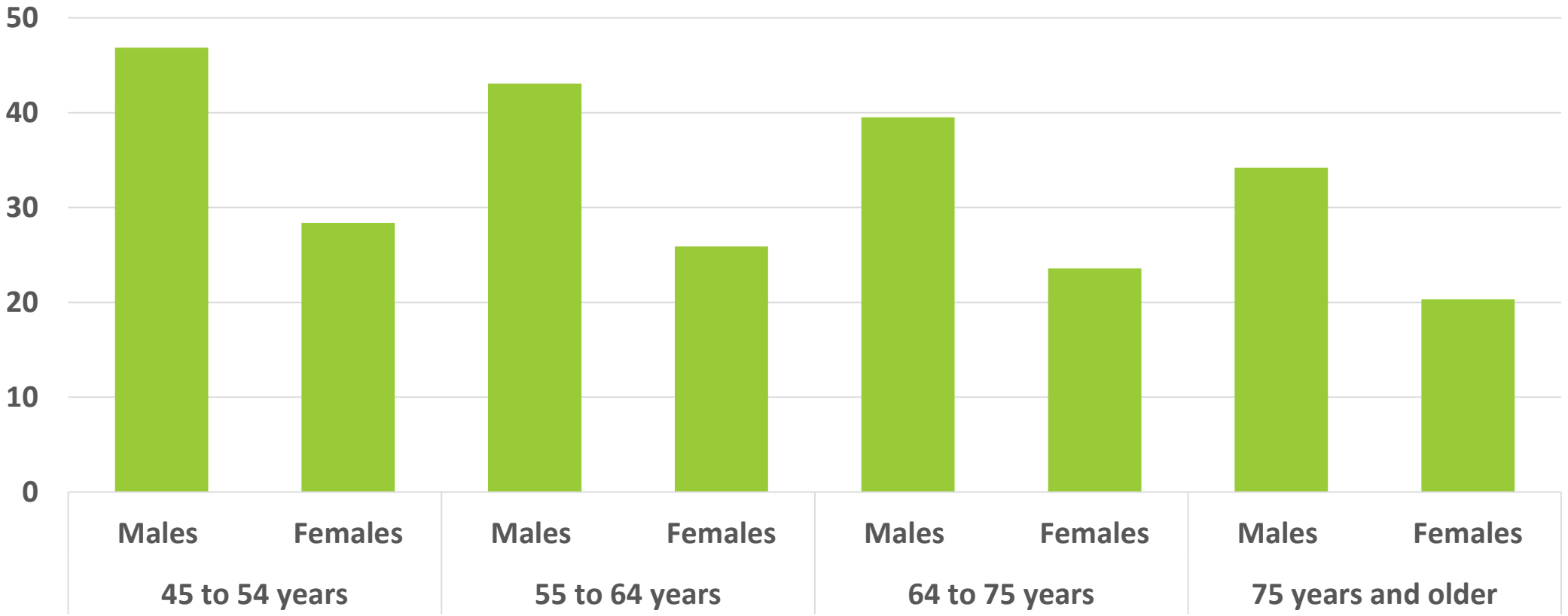
Functional limitation – mean time for balance (seconds) by age and sex



Functional limitation – mean time for chair rise (seconds) by age and sex



Functional limitation – mean hand grip strength (kilograms) by age and sex



Logistic regression models

- Outcome: At least one ADL/IADL limitation
- Predictors
  - Telephone-only cohort
    - Model 1: Having at least one domain limited versus no domains limited
    - Model 2: Adjusted for yes/no limitation for each domain within the same model
    - Model 3: Number of domains limited
    - Model 4: Combinations of domains with limitations
  - In person cohort
    - Model 1: Having at least one test in the lowest quintile versus no tests in the lowest quintile
    - Model 2: Adjusted for lowest quintile/not lowest quintile for each test within the same model
    - Model 3: Number of tests in the lowest performance quintile
    - Model 4: Combinations of domains with limitations
- All models adjusted for age, sex, number of chronic conditions, self-rated pain, household income, depression status, BMI, alcohol consumption, and cognitive decline

Telephone-only cohort

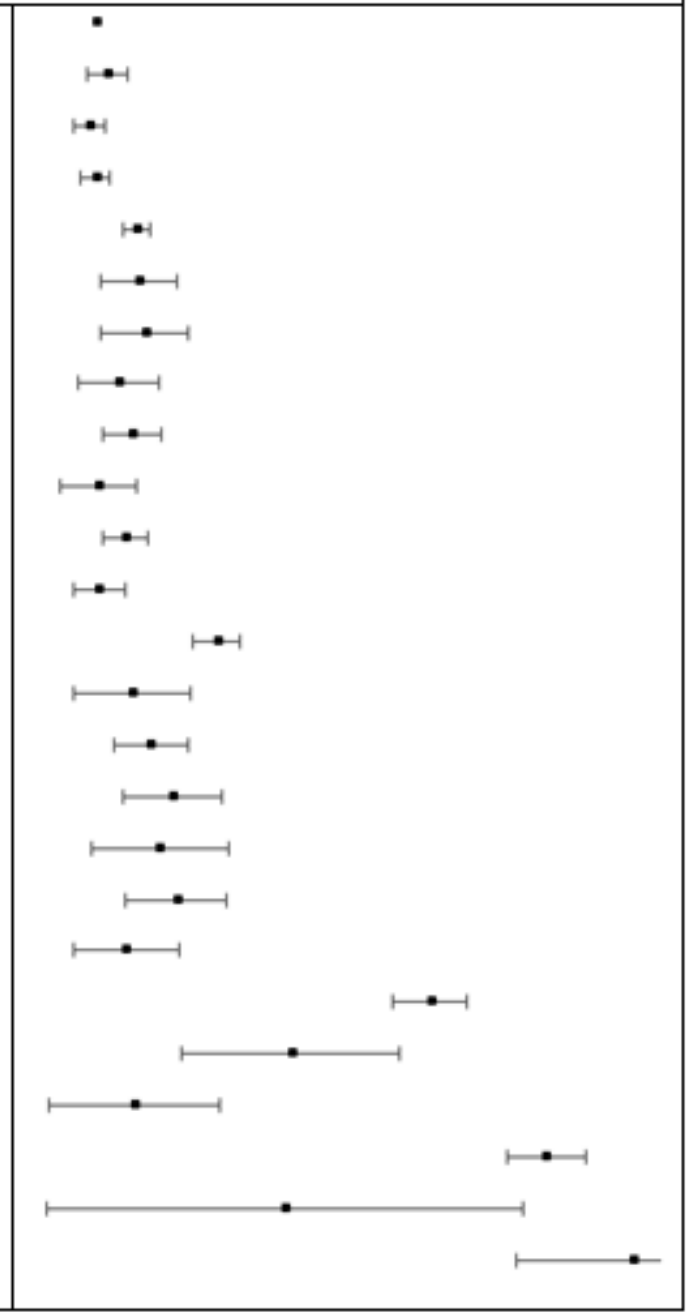
QUESTIONNAIRE BASED ASSESSMENT OF PHYSICAL FUNCTION

	Odds ratio	95% CI	Odds Ratio +/- standard error 0.0 15.0
Model 1 - at least one limitation versus no limitations			
At least one domain limited	3.67	3.03, 4.46	
Model 2 - adjusted for presence or absence of limitation in each individual domain			
Upper body limitation vs no upper body limitation	3.35	2.90, 3.86	
Lower body limitation vs no lower body limitation	2.31	1.93, 2.76	
Dexterity limitation vs no dexterity limitation	1.86	1.52, 2.28	
Model 3 - number of domains with at least one limitation			
3 domains limited	13.11	9.91, 17.34	
2 domains limited	6.69	5.38, 8.31	
1 domain limited	1.90	1.53, 2.36	
Model 4 - Individual combinations of domains with at least one limitation			
Upper, lower, and dexterity limitation	13.19	9.97, 17.44	
Upper body and lower body limitation	7.24	5.82, 8.99	
Upper body and dexterity limitation	5.55	1.69, 18.22	
Lower body and dexterity limitation	2.46	1.49, 4.07	
Upper body limitation	1.87	1.33, 2.64	
Lower body limitation	1.88	1.49, 2.36	
Dexterity related limitation	2.71	1.44, 5.13	

In person cohort

PERFORMANCE TEST BASED ASSESSMENT OF PHYSICAL FUNCTION

	Odds ratio	95% CI	Odds Ratio +/- standard error 0.0 15.0
Model 1 - at least one test in lowest performance quintile			
At least one test in lowest quintile	2.22	1.94, 2.54	
Model 2 - adjusted for presence or absence of lowest performance quintile in each individual test			
Gait speed - lowest quintile vs not lowest quintile	1.29	1.03, 1.60	
TUG - lowest quintile vs not lowest quintile	1.60	1.29, 1.99	
Balance - lowest quintile vs not lowest quintile	1.58	1.31, 1.92	
Chair rise test - lowest quintile vs not lowest quintile	1.31	1.10, 1.56	
Grip strength - lowest quintile vs not lowest quintile	1.26	1.03, 1.53	
Model 3 - number of tests with lowest performance quintile			
1 in lowest quintile	1.55	1.32, 1.82	
2 in lowest quintile	2.00	1.66, 2.39	
3 in lowest quintile	2.68	2.19, 3.28	
4 in lowest quintile	6.51	5.21, 8.12	
5 in lowest quintile	13.92	10.25, 18.92	

Model 4 - Individual combinations of tests with lowest performance quintiles			
Gait speed	1.56	1.08, 2.25	
Balance	1.85	1.45, 2.35	
Chair rise	1.40	1.05, 1.86	
Grip strength	1.54	1.23, 1.93	
Gait speed + TUG	2.52	1.62, 3.92	
Gait speed + balance	2.57	1.51, 4.36	
TUG + balance	2.72	1.74, 4.25	
TUG + chair rise	2.10	1.41, 3.13	
TUG + grip strength	2.40	1.48, 3.92	
Balance + chair rise	1.62	1.08, 2.44	
Balance + grip strength	2.25	1.64, 3.08	
Chair rise + grip strength	1.63	1.06, 2.49	
Gait speed + TUG balance	4.43	3.04, 6.45	
Gait speed + TUG + chair rise	2.44	1.57, 3.8	
Gait speed + TUG + grip strength	2.86	1.68, 4.89	
Gait speed + balance + chair rise	3.36	1.73, 6.52	
Gait speed + balance + grip strength	3.07	1.86, 5.05	
TUG + balance + chair rise	3.47	2.22, 5.43	
Balance + chair rise + grip strength	2.28	1.40, 3.71	
Gait speed + TUG + balance + chair	9.53	6.92, 13.14	
Gait speed + TUG + balance + grip strength	6.20	4.17, 9.22	
Gait speed + TUG + chair rise + grip strength	2.46	1.54, 3.93	
Gait speed + balance + chair rise + grip strength	12.29	6.62, 22.81	
TUG + balance + chair rise + grip strength	6.07	3.31, 11.14	
Gait speed + TUG + balance + chair rise + grip strength	14.34	10.54, 19.5	

Discussion

- Overall, 9.0% of participants had at least 1 ADL/IADL limitation
  - Similar to the estimates in the CCHS, particularly in those aged 65+
  - Consistently in the literature, more females have limitations than males
- Physical function limitations are more prevalent than ADL/IADL disability
  - Could be phrasing of questions
  - Could indicate that these limitations precede disability

Discussion continued

- Strong association between function and disability, regardless of if it is measured by questionnaire or performance testing
- There is an independent effect of each domain of function (questionnaire based) and performance based measure on disability

Limitations of the field and next steps

- ADL/IADL used to define disability - limited in scope, not the most relevant to community dwelling adults
- Little understanding of how performance tests and questionnaire based measures of physical function map on to one another
- Overlap between ADL/IADL questionnaire and physical function questionnaires
- Lack of clinically validated cut points for performance testing
  - Lack of discussion of the importance of the role of age
  - Need longitudinal data to create these (CLSA!)
- Causal relationship between physical function and disability
  - Longitudinal data from the CLSA will be able to address this!

Conclusions

- In this analyses of 51,338 participants from the CLSA, the overall prevalence of disability was 9.0%
- Functional limitations are more prevalent than disability
  - Lower body limitations– 41.5%
  - Upper body limitations – 25.1%
  - Dexterity related limitations – 7.0%
- Clear that functional status is lower in older adults but unclear where cut points should be and therefore could not assess prevalence
- On all measures, females tend to be more limited than males
- Regardless of how you operationalize physical function, there is a strong relationship with ADL/IADL disability

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Dr. Anne Gilsing
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Questions?

Upcoming CLSA Webinars

“Assistive device use among community-dwelling older adults”

Dr. Yoko Ishigami-Doyle

March 29, 2018 | 12 p.m. EST

Register: bit.ly/clsawebinars