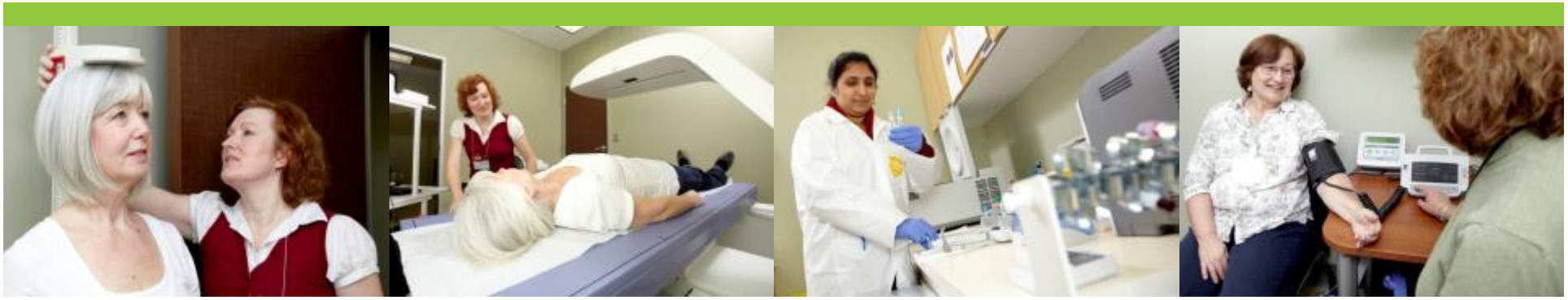

The Canadian Longitudinal Study on Aging

A national platform and infrastructure for researchers and trainees.

Lauren Griffith, PhD, CLSA Associate Scientific Director
Alexandra Mayhew, PhD Candidate
McMaster University

Department of Family Relations and Applied Nutrition Seminar Series
January 18th, 2018

Seminar Objectives

1. To understand the CLSA study design and content
2. To explore work done using the CLSA nutrition data
3. To become familiar with the CLSA data access process and inspired to use the CLSA research platform

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Overview

- **Background (LG)**
- **Study Design (LG)**
- **Study Content/Data Collection (LG)**
- **Example of CLSA project (AM)**
- **Data Access (LG + AM)**

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The CLSA

- Strategic initiative of CIHR Institute of Aging; on the Canadian research agenda since 2001
- 3 co-principal investigators supported by more than 160 co-investigators from 26 institutions
- Multidisciplinary - biology, genetics, medicine, psychology, sociology, demography, nursing, economics, epidemiology, nutrition, health services
- Largest study of its kind to date in Canada for breadth and depth: following 50,000 participants for ≥20 years

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CLSA Leads

Co-principal Investigator
Christina Wolfson (McGill)

Lead Principal Investigator
Parminder Raina (McMaster)

Co-principal Investigator
Susan Kirkland (Dalhousie)

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Aim and Vision

- AIM: To examine life/health transitions and capture trajectories to enable the identification of modifiable factors with the potential to inform interventions (prevention/treatment/impact) to improve the health of populations as they age

- VISION: To create a research platform infrastructure to enable state-of-the-art, interdisciplinary population-based research and evidenced-based decision-making that will lead to better health and quality of life for Canadians as they age.

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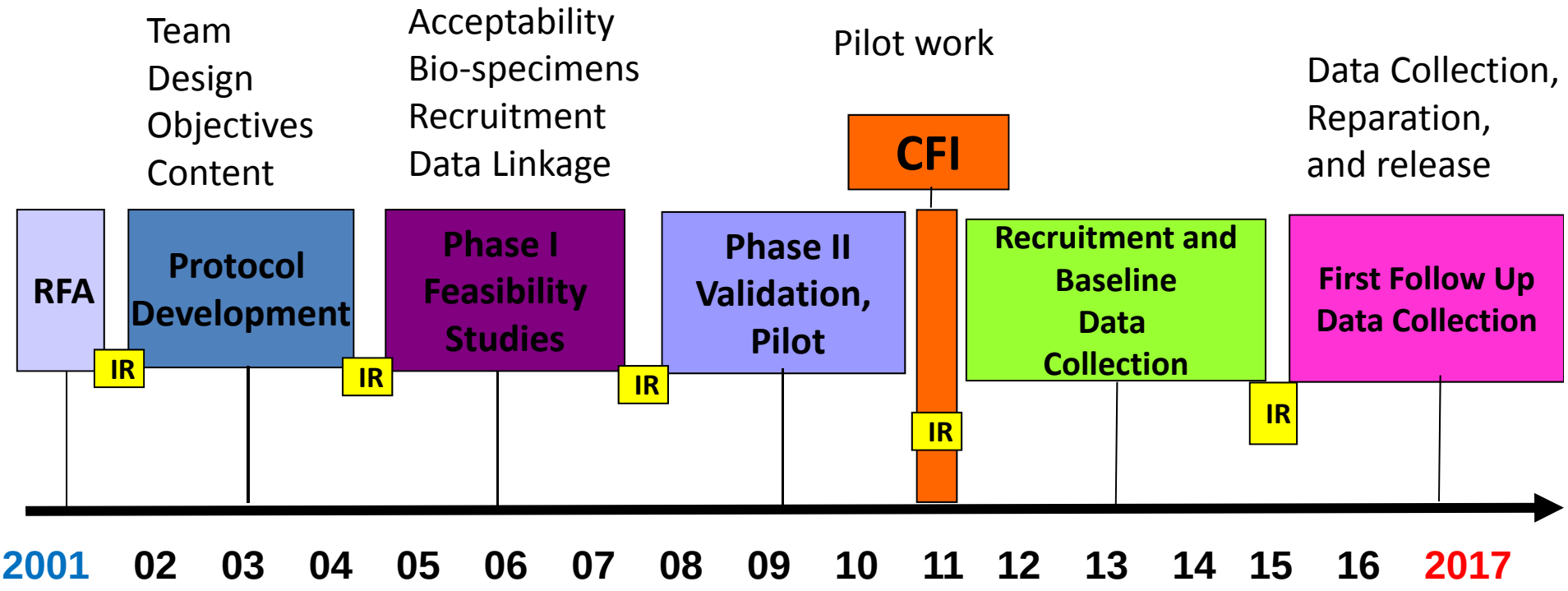
The Journey so far…



IR **International peer review**

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Study Design

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CLSA Research Platform

50,000 women and men aged 45 - 85 at baseline

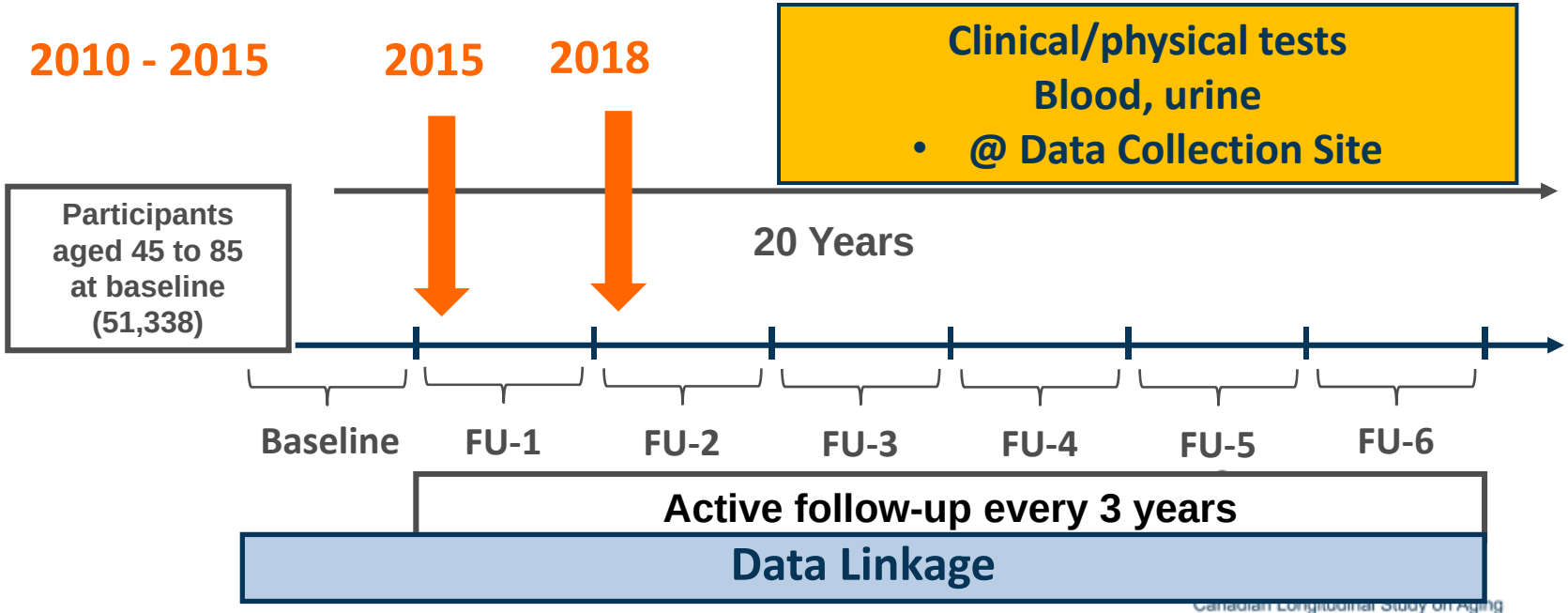
Target: 20,000
Randomly selected within provinces

Target: 30,000
Randomly selected within 25-50 km of 11 sites

Questionnaire
- **By telephone (CATI)**

Questionnaire
- **In person, in home (CAPI)**

Clinical/physical tests
Blood, urine
- **@ Data Collection Site**



National in Scope

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Defining the cohort

- Men and women living in any of 10 provinces in Canada aged 45-85 at recruitment
  - Capturing baby boomers (born between 1946-1964) plus members of the “silent” generation (i.e. those born before 1945)

Recruiting the Cohort

1. Partnership with Statistics Canada
   - Canadian Community Health Survey 4.2 Healthy Aging (2008-09) CCHS 4.2
     - CCHS participant agreement to share contact information with the CLSA – *a first for Statistics Canada*
2. Partnership with provincial Ministries of Health (MOH)
   - Health Card Registration databases
   - Mailouts, return Consent-to-Contact form, CLSA follow up
3. Random Digit Dialing
   - Leger Marketing and CLSA CATI

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Cohort Exclusion Criteria at Baseline

Driven by CCHS 4.2 exclusion criteria 1. to 5.

1. Residents of the 3 territories
   - Northwest Territories, Nunavut, Yukon
2. Living in an institution
3. Living on a First Nation Reserve
4. Full time members of the armed forces
5. Temporary visa holders

CLSA Added Criteria

- Cognitively impaired (at baseline)
- Unable to communicate in French or English

1 to 5 exclude <4% of the target population

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Terminology

- Tracking Cohort
  - Target - 20,000 participants from all 10 provinces, followed through Computer Assisted Telephone Interviews (60 minutes at baseline)
  - **21,241 recruited***
- Comprehensive Cohort
  - Target - 30,000 participants living within 25 km (or 50 km) of a CLSA Data Collection Site (DCS)
  - Followed through in-home interviews (60 minute) and physical assessments (2-3 hours) at a DCS
  - **30,097 recruited***

Study Content and Data Collection

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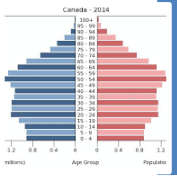
CLSA Questionnaire modules
All 51,338 participants

Demographic/Lifestyle

- Age
- Gender
- Education
- Marital status
- Sexual orientation
- Language
- Ethnicity
- Wealth/income
- Veteran Identifier
- Smoking, alcohol
- Nutritional risk
- Physical activity
- Health care utilization
- Medication use
- Supplement use



Health

- General health
- Women's health
- Chronic conditions
- Disease symptoms
- Sleep
- Oral health
- Injuries, falls
- Mobility
- Pain, discomfort
- Functional status
- ADL, IADL
- Cognition
- Depression
- PTSD
- Life Satisfaction

Social

- Social
  - networks
  - support
  - participation
  - inequality
- Online communication
- Care receiving
- Care giving
- Retirement status
- Labour force participation
- Retirement planning
- Transportation
- Mobility, Migration
- Built environments
- Home ownership

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CLSA Data Collection

Data Collection Site

Physical Assessments:

- Height, Weight, BMI
- Bone Density, Body Composition, Aortic Calcification
- Blood Pressure, ECG, c-IMT
- Pulmonary Function
- Vision & Hearing
- Performance testing

Biospecimen Collection:

- Blood
- Urine

Cognitive Assessments:

- Neuropsychological Battery
  - Memory
  - Executive function
  - Reaction time

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CORE BIOMARKERS: Baseline

	Category	N	Biomarkers
Available	**HEMATOLOGY** Data Collection Sites (DCS)	25,425	• Erythrocytes • Granulocytes • Hematocrit • Hemoglobin • Lymphocytes • Platelets • MCV • MCV • MCHC • MPV • RDW
Available mid-2018	**CHEMISTRY** Calgary Laboratory Services (CLS)	27,170	• Albumin • Alanine aminotransferase (ALT) • C-reactive protein (CRP) • Creatinine • Cholesterol • Ferritin • Free T4 • HDL • LDL • Non-HDL • Thyroid stimulating hormone (TSH) • Triglycerides • 25-Hydroxyvitamin D • Hemoglobin A1c (n = 26961)
	GENETICS Genetic and Epigenetic Centre (GEC)	10,000	• Genome-wide genotyping • DNA extracted from buffy coat on samples (n = 26,884) • 820K UK Biobank Axiom Array (Affymetrix)
	EPIGENETICS Genetic and Epigenetic Centre (GEC)	1,500	• DNA methylation • DNA extracted from PBMCs • 850K Infinium MethylationEPIC BeadChip (Illumina)
	METABOLOMICS Kyoto, Japan	1,000	• Mass spectrometry

Updated July 14, 2017

First Follow Up
2015-2018

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First Follow-Up: New Content Added

- *Child maltreatment
- **Elder abuse
- Epilepsy screening
- Decedent interview
- Unmet health-care needs
- Preventive health behaviours (screening, vaccination, etc)
- Enhanced hearing, oral health and transportation modules
- Gender identity questions
- Subjective cognitive decline
- Loneliness

*Childhood Experiences of Violence Questionnaire. Walsh et al 2012
**National Initiative for the Care of the Elderly (NICE)

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Follow up considerations

- Keeping participants engaged
- Tracing participants who have moved
- Attention to changes in life circumstances that may affect ability to participate
  - Cognitive, sensory, mobility impairment
- Ensuring that changes in content permit the ongoing examination of transitions and trajectories

Passive Data Collection Work in progress

- Linkage is an important CLSA strategy
  - Great potential for collecting information that is difficult to get from participants due to time, accuracy limitations; and/or may even be unknown to participants
  - Potential to obtain historical data prior to CLSA entry
- Types of databases
  - Individual level administrative provincial health databases
  - Vital statistics/disease registries
  - Population level databases of community characteristics, climate, pollution

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Baseline Demographics

Socio-demographic Characteristics unweighted

	Tracking	Comprehensive	Total N=51,338
Age			
45-54	5,832 (27.5)	7,595 (25.2)	13,427 (26.2)
55-64	6,564 (30.0)	9,856 (32.7)	16,420 (32.0)
65-74	4,634 (21.8)	7,362 (24.5)	11,996 (23.4)
75-85	4,211 (19.8)	5,284 (17.6)	9,495 (18.5)
Sex			
Female	10,835 (51.0)	15,320 (50.9)	26,155 (50.9)
Male	10,406 (49.0)	14,777 (49.1)	25,183 (49.1)
Language			
English	17,483 (82.3)	24,291 (80.7)	41,774 (81.4)
French	3,758 (17.7)	5,806 (19.3)	9,564 (18.6)
Born in Canada	18,513 (87.2)	24,644 (81.9)	43,099 (84.1)

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CLSA Participants by Province unweighted

Province	Tracking	Comprehensive	Total
British Columbia	2613 (12.3)	6254 (20.8)	8867 (17.3)
Alberta	2103 (9.9)	2958 (9.8)	5061 (9.9)
Saskatchewan	1382 (2.7)	0	1382 (2.7)
Manitoba	1477 (7.0)	3114 (10.4)	4591 (9.0)
Ontario	4705 (22.2)	6417 (21.3)	11122 (21.7)
Quebec	3601 (17.0)	6057 (20.1)	9658 (18.8)
New Brunswick	1355 (2.6)	0	1355 (2.6)
Nova Scotia	1546 (7.3)	3075 (10.2)	4621 (9.0)
Prince Edward Island	1138 (2.2)	0	1138 (2.2)
Newfoundland	1251 (5.9)	2219 (7.4)	3470 (6.8)

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CLSA Approved Projects

Selected Approved Trainee Projects 2017

- A Model of Health: Using data modelling techniques to improve health outcomes for older Canadian adults by optimizing the development and delivery of physical activity interventions
  Simon Fraser University
- Potential metabolic and functional benefits of a comprehensive evaluation of physical activities for Canadian adults
  University of New Brunswick
- Impact of the Lifestyle Factors on the Health Aging of Individual
  Simon Fraser University
- Examining multimorbidity among middle-aged Canadians
  University of Manitoba
- Frailty and mobility limitations in older Canadians with musculoskeletal diseases compared to other chronic medical conditions
  McMaster University
- Characterization of cardiovascular disease burden and health of Canadian cancer survivors
  University of Alberta
- Exploring the complexity, management and health-related outcomes of disability, frailty and multimorbidity among community-dwelling older adults in Canada
  McMaster University

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Keywords – All projects

What can you do with CLSA Data? The Diet Sub Study

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Short Diet Questionnaire

- 36 questions about the usual consumption of different foods and beverages
- Originally validated to estimate the usual consumption frequencies of fat, fibre, calcium, vitamin D, and fruits and vegetables

Refer to: Shatenstein B., Payette H. 2015. Evaluation of the relative validity of the short diet questionnaire for assessing usual consumption frequencies of selected nutrients and foods. *Nutrients, 7*, 6362-6374.

Rationale

- Dietary intake is an important factor in healthy aging
- Measuring diet is prone to measurement error with additional challenges in older adults
- To limit response burden, the short diet questionnaire (SDQ) was developed
- Asks about usual frequency of consumption of foods and drinks
- Validated in the NuAge study
  - Ranked individuals for their consumption of nutrients
  - Validity and reliability in the CLSA is not known
- Electronic dietary recalls have been developed (ASA24), unclear if these would be appropriate in older adults

Goals

- Assess the validity and reliability of the SDQ in the CLSA population
- Assess the feasibility of using the ASA24 as an alternative dietary recall measure

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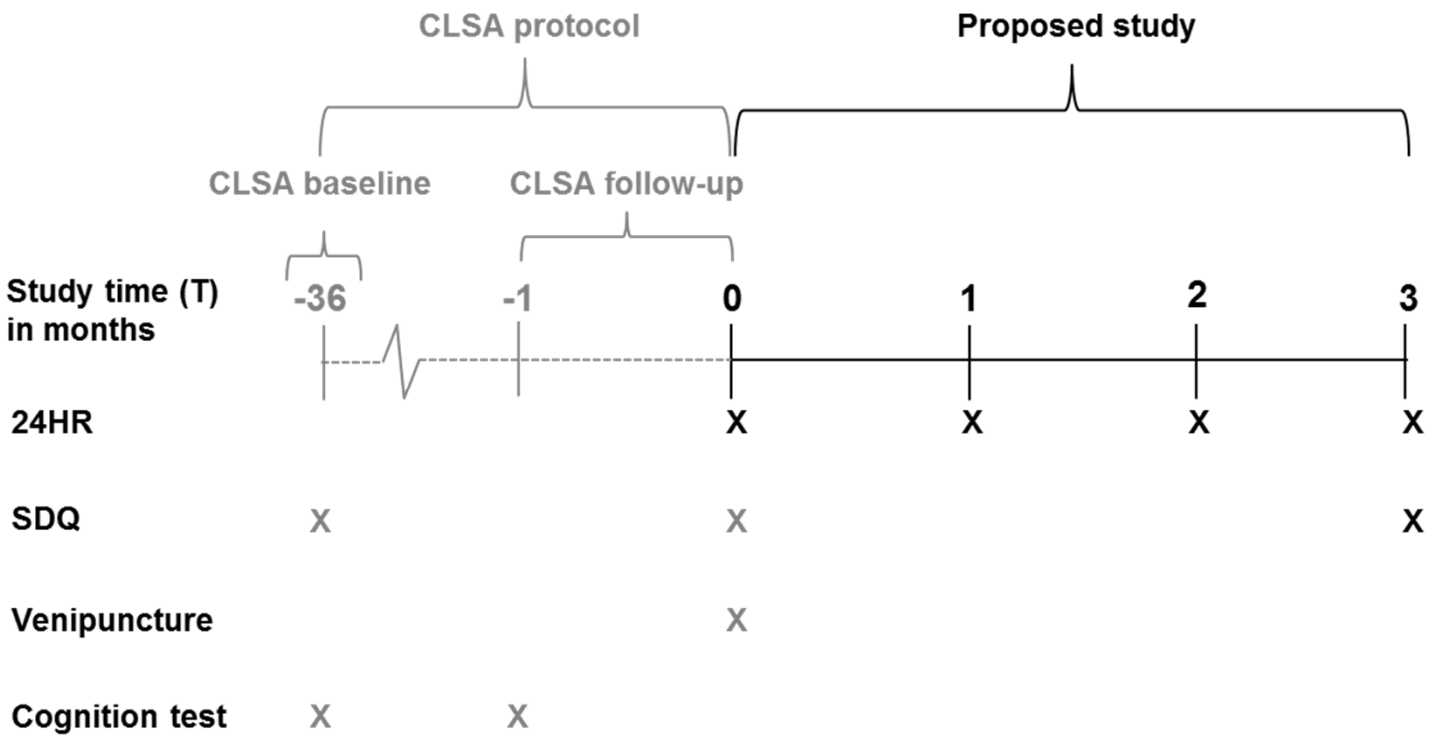
Methods – study design



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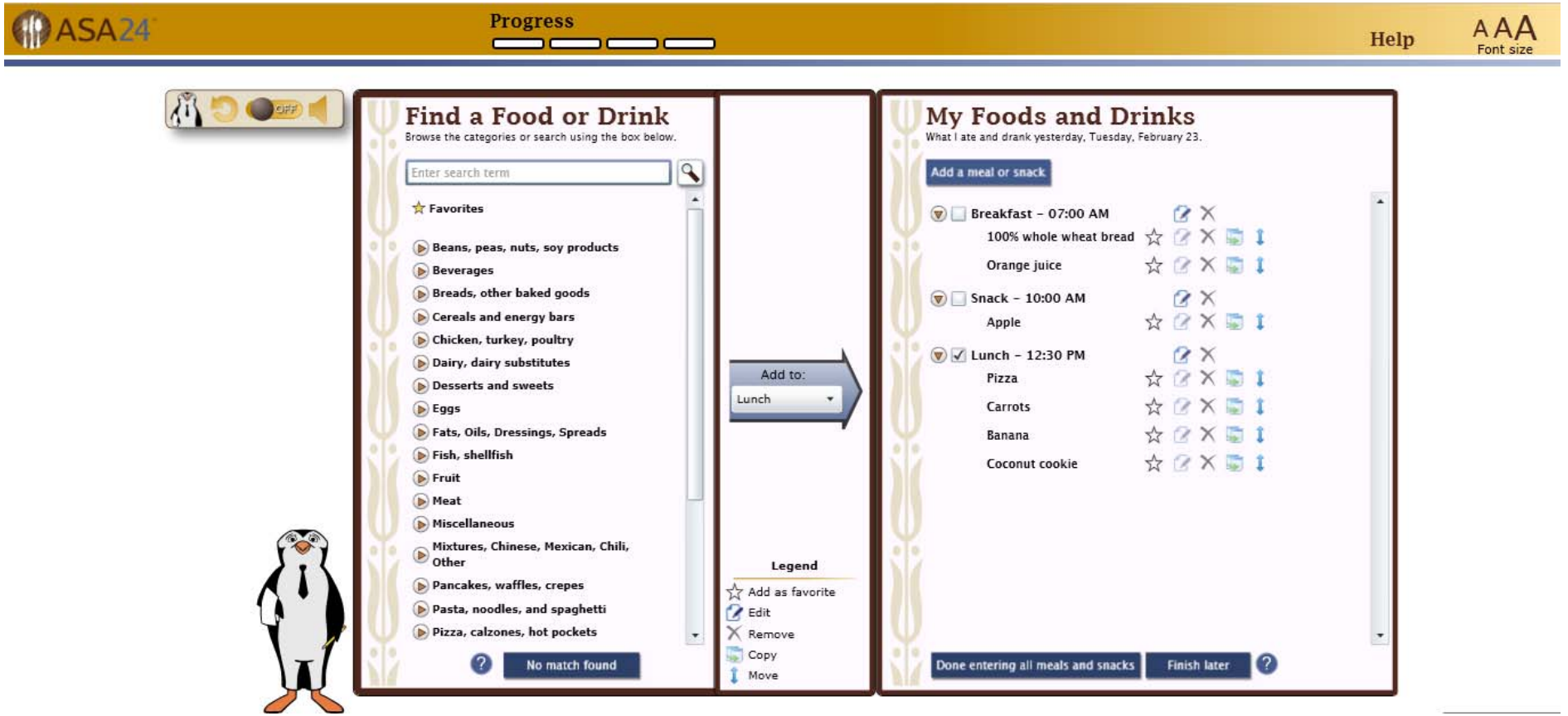
Methods - ASA24 recalls



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Did you add anything to your 100% whole wheat bread that you haven't already reported?

Select all that apply.

Orange juice: Did you drink your beverage out of a cup, glass, or something else

Banana: What size was it?

Apple: How much did you actually eat?

Select the image that best represents the amount you ate at snack Tuesday at 10:00 AM.

1 1/4 fruits

Less than 1/4 fruit

1 fruit

1/4 fruit

3/4 fruit

1/2 fruit

Amount eaten:

1 fruit

Previous | Don't Know | Next

Methods – nutrient calculation

- Nutrients were calculated from the SDQ using the method described by Shatenstein *et al* (2005)
- The ASA24 provided nutrient consumption for each 24 hour dietary recall which were then averaged

Methods – statistical analyses

Assessment	Assessment type	Statistical technique	Nutrients/foods	Categorization
SDQ vs ASA24	Validity	Spearman rank correlations	Dietary fiber Calcium Vitamin D Total fat Cholesterol MUFA PUFA Saturated fat	None
SDQ vs ASA24	Validity	Weighted kappa		Age/sex specific quartiles
SDQ1 vs SDQ2	Reliability	ICC		None
SDQ1 vs SDQ2	Reliability	Weighted kappa		Age/sex specific quartiles
SDQ1 vs SDQ2	Reliability	ICC	Individual line items Food groups	Frequency of consumption

Results – SDQ validity

	SDQ2		24-HRs		Spearman R	Weighted kappa
	Mean	SD	Mean	SD		
Middle aged (45-64 years; N=96)						
Dietary fibre (g)	13.3	5.3	19.8	8.1	0.59	0.36
Calcium (mg)	734	312	899	353	0.50	0.37
Vitamin D (ug)	4.8	2.5	5.5	4.5	0.51	0.28
Total fat (g)	50.7	14	75.4	20	0.26	0.23
Cholesterol (mg)	210	76	273	105	0.31	0.20
Monounsaturated fat (g)	18.6	5.6	27.9	7.6	0.21	0.16
Polyunsaturated fat (g)	9.9	3.2	16.3	5.8	0.29	0.14
Saturated fat (g)	17.8	5.5	24.8	7.6	0.26	0.18

**** Spearman's R and weighted kappa values were attenuated in those aged 65+**

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Results – SDQ nutrient reliability

	SDQ 1		SDQ 2		ICC (95% CI)	Weighted kappa (95% CI)
	Mean	SD	Mean	SD		
All ages (45+; N=232)						
Dietary fibre (g)	14.94	4.92	14.31	5.17	0.57 (0.47 - 0.65)	0.38 (0.30 - 0.46)
Protein (g)	65.57	18.60	65.45	17.10	0.53 (0.42 - 0.62)	0.37 (0.29 - 0.45)
Calcium (mg)	750.54	345.69	803.03	345.02	0.55 (0.45 - 0.64)	0.40 (0.31 - 0.49)
Fat (g)	53.34	16.71	53.05	16.43	0.51 (0.40 - 0.60)	0.37 (0.29 - 0.45)
Vitamin D (ug)	4.96	2.78	5.46	2.63	0.57 (0.47 - 0.66)	0.41 (0.33 - 0.49)
Cholesterol (mg)	217.09	78.81	215.47	78.56	0.60 (0.51 - 0.68)	0.44 (0.36 - 0.52)
MUFA (mg)	19.70	6.66	19.38	6.50	0.49 (0.38 - 0.59)	0.37 (0.29 - 0.45)
PUFA (mg)	10.34	3.54	10.26	3.38	0.52 (0.41 - 0.61)	0.35 (0.27 - 0.44)

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PUFA (mg)	10.34	3.54	10.26	3.38	0.52 (0.41 - 0.61)	0.35 (0.27 - 0.44)

Results – SDQ combinations reliability

	SDQ1		SDQ2		ICC (95%) CI
	Mean	SD	Mean	SD	
Fresh red meat	0.30	0.27	0.30	0.22	0.47 (0.36 - 0.56)
Total fresh meat and fish	0.62	0.34	0.62	0.30	0.58 (0.48 - 0.66)
Total fresh, processed meat, fish	0.78	0.46	0.77	0.43	0.35 (0.23 - 0.46)
Milk	0.90	0.97	1.05	0.85	0.62 (0.54 - 0.70)
Cheese	0.52	0.35	0.52	0.45	0.42 (0.31 - 0.52)
Eggs	0.32	0.24	0.32	0.24	0.70 (0.63 - 0.76)
Yoghurt	0.52	0.46	0.47	0.42	0.72 (0.65 - 0.77)
Vegetables excluding potatoes	1.89	1.07	1.82	1.00	0.49 (0.39 - 0.58)
Fruit juice	0.41	0.56	0.42	0.71	0.50 (0.40 - 0.59)
Calcium supplemented food	0.09	0.32	0.09	0.34	0.44 (0.33 - 0.54)
Sweet desserts and chocolate	0.41	0.39	0.39	0.42	0.60 (0.51 - 0.68)
Sweet and salty snacks, desserts	0.72	0.54	0.77	0.55	0.65 (0.57 - 0.72)

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Sweet and salty snacks, desserts	0.72	0.54	0.77	0.55	0.65 (0.57 - 0.72)

Results – SUS Score

	Disagree	Neutral	Agree
I think that I would like to use the diet survey frequently	45.1	37.2	17.7
I found the diet survey unnecessarily complex.	42.0	17.0	50.4
I thought the diet survey was easy to use	31.9	17.7	50.4
I think I would need the support of a technical person to be able to use the diet survey	77.0	10.6	12.4
I found the various functions of the ASA24-Canada were well integrated.	17.7	31.0	51.3
I thought there was too much inconsistency in the ASA24-Canada	55.8	37.2	7.1
I imagine that most people would learn to use the ASA24-Canada very quickly	29.2	26.5	44.2
I found the ASA24-Canada very cumbersome to use	39.8	16.8	43.4
I felt very confident using the ASA24-Canada	12.5	23.2	64.3
I needed to learn a lot of things before I could use the ASA24-Canada	71.7	20.4	8.0

Results – SUS Score

	Disagree	Neutral	Agree
I think that I would like to use the diet survey frequently	45.1	37.2	17.7
I found the diet survey unnecessarily complex.	42.0	17.0	50.4
I thought the diet survey was easy to use	31.9	17.7	50.4
I think I would need the support of a technical person to be able to use the diet survey	77.0	10.6	12.4
I found the various functions of the ASA24-Canada were well integrated.	17.7	31.0	51.3
I thought there was too much inconsistency in the ASA24-Canada	55.8	37.2	7.1
I imagine that most people would learn to use the ASA24-Canada very quickly	29.2	26.5	44.2
I found the ASA24-Canada very cumbersome to use	39.8	16.8	43.4
I felt very confident using the ASA24-Canada	12.5	23.2	64.3
I needed to learn a lot of things before I could use the ASA24-Canada	71.7	20.4	8.0

Conclusions

- The SDQ can validly rank participants for fibre, calcium, and vitamin D intake compared to 24 hour recalls
- Test re-test reliability of the SDQ varies, but is generally acceptable for nutrients, combinations of foods, and certain line items
- The ASA24 is not practical to use in the CLSA

Data Access - Baseline Data

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Data and Biospecimen Access

- The CLSA was designed as a research study but is funded as a research platform
- Data and biospecimens available to the research community
- Who:
  - Researchers based in academic settings and research institutes in Canada and *elsewhere can apply
  - Graduate students and postdoctoral fellows based at Canadian institutions or trainees studying elsewhere funded by a Canadian agency
- *As yet, biospecimens cannot be released to researchers outside Canada

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What do you get?

- **Alphanumeric data on all 51,338 participants**
  - **Additional raw data on certain variables may be requested (cognition, ECG, spirometry, etc.)**
- **De-identified open text for selected variables**
- **Sampling weights**
- **Additional data (i.e. linked Air Pollution, Meteorological data, Forward Sortation Areas) may be requested**

Data Access Steps

Application process via access@clsa-elcv.ca

1. Submit application (pre-set deadlines)
   - **Next deadlines: Jan 29; June 11; September 24, 2018**
2. Administrative and Statistical Review
3. Review by Data and Biospecimen Access Committee
4. Notification of applicant
5. CLSA Access Agreement preparation and signatures, ethics approval
   - Security, confidentiality and scientific requirements
6. Raw data provided to approved applicant

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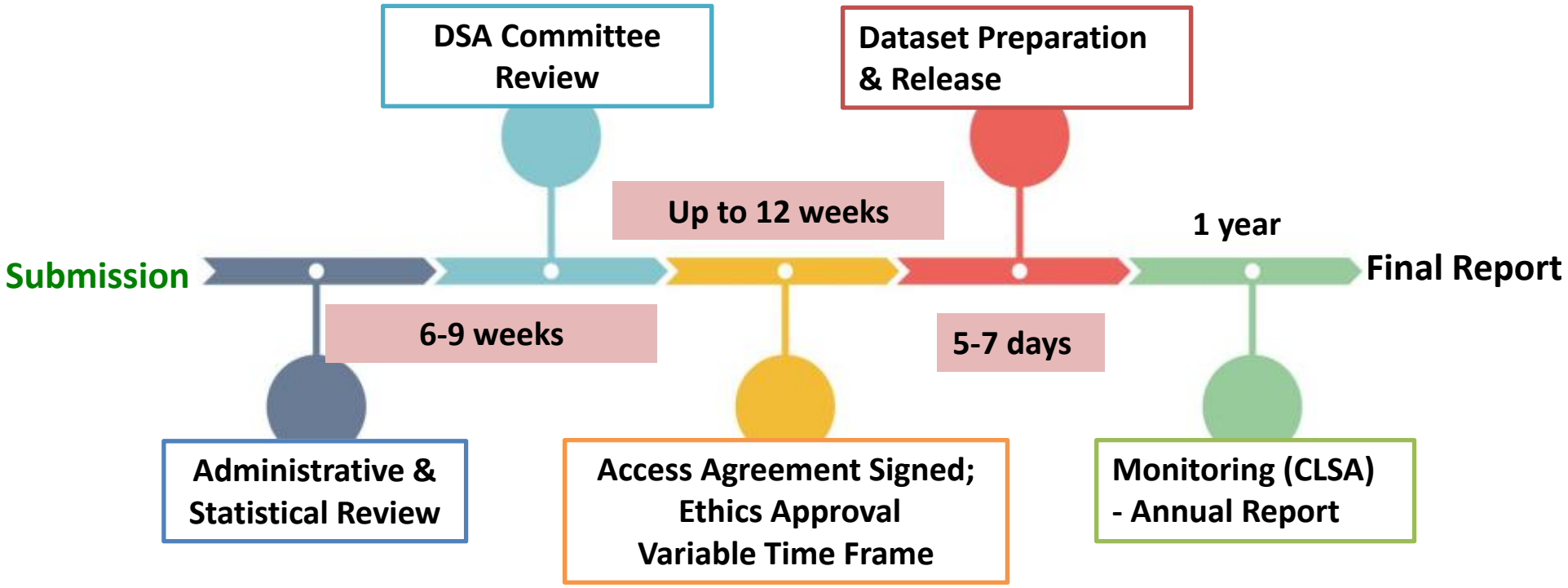
Data Access Timeline



- **Plan on a receiving data 6 months after submission deadline**

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How much does it cost?

- Costing
  - *Partial* Cost Recovery Model
- Alphanumeric data
  - $3,000 for a straightforward alphanumeric dataset
  - Graduate student - No cost for dataset to be used solely for thesis research
  - Postdoctoral fellow – No cost for one dataset to be used solely for the postdoctoral project
- Bio specimen costing
  - In development

Data Access – Resources for Researchers & Trainees

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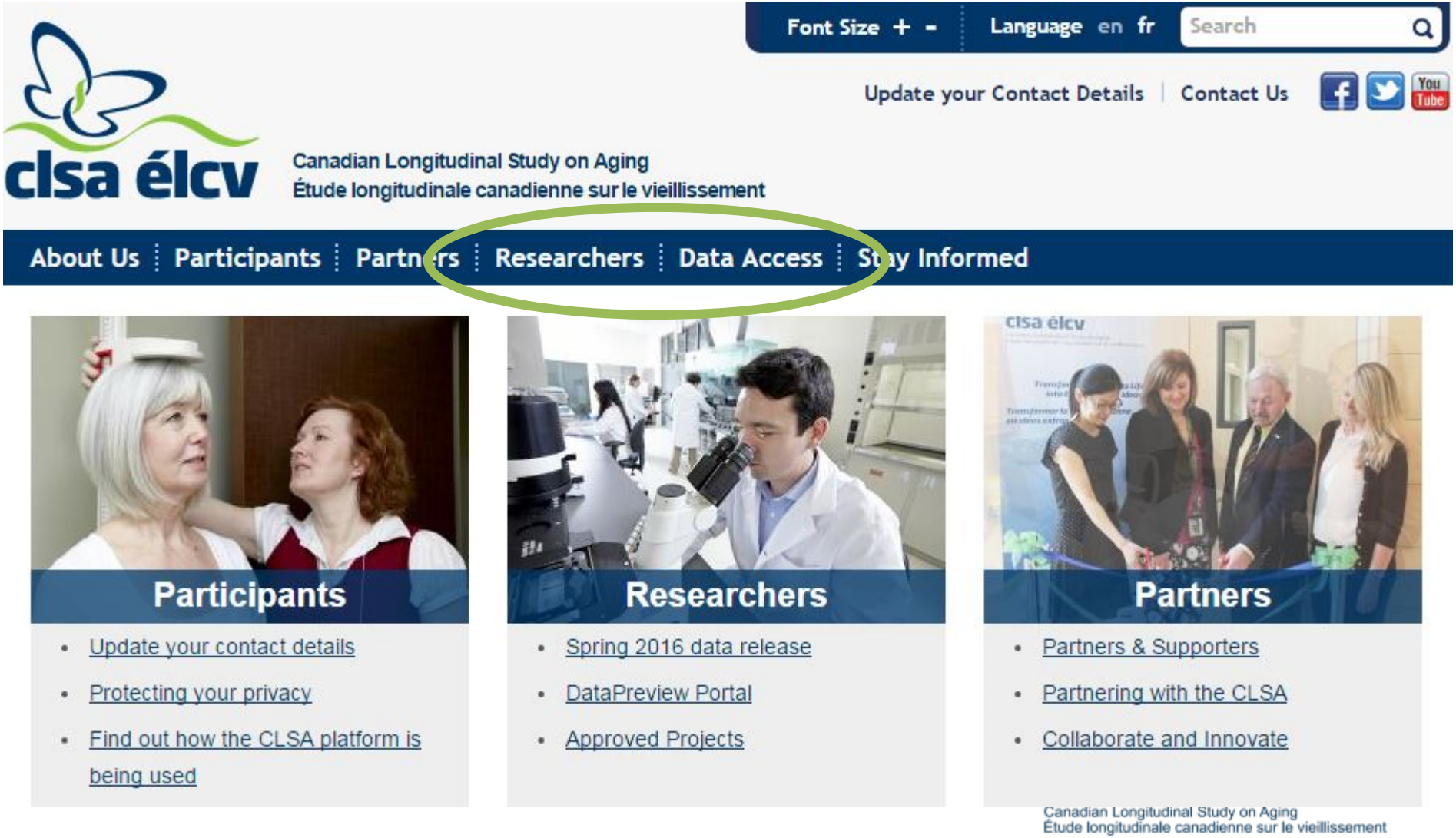
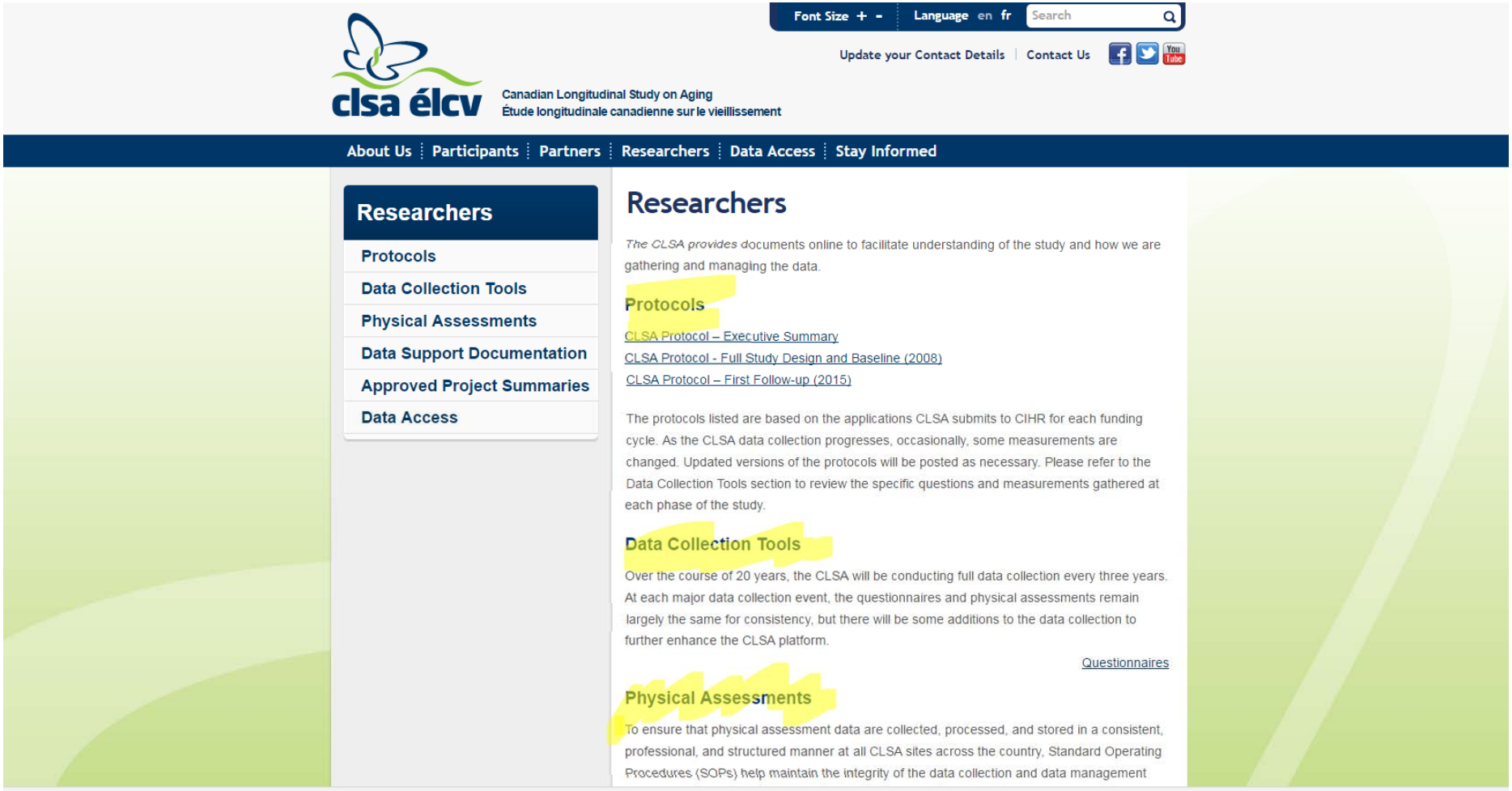
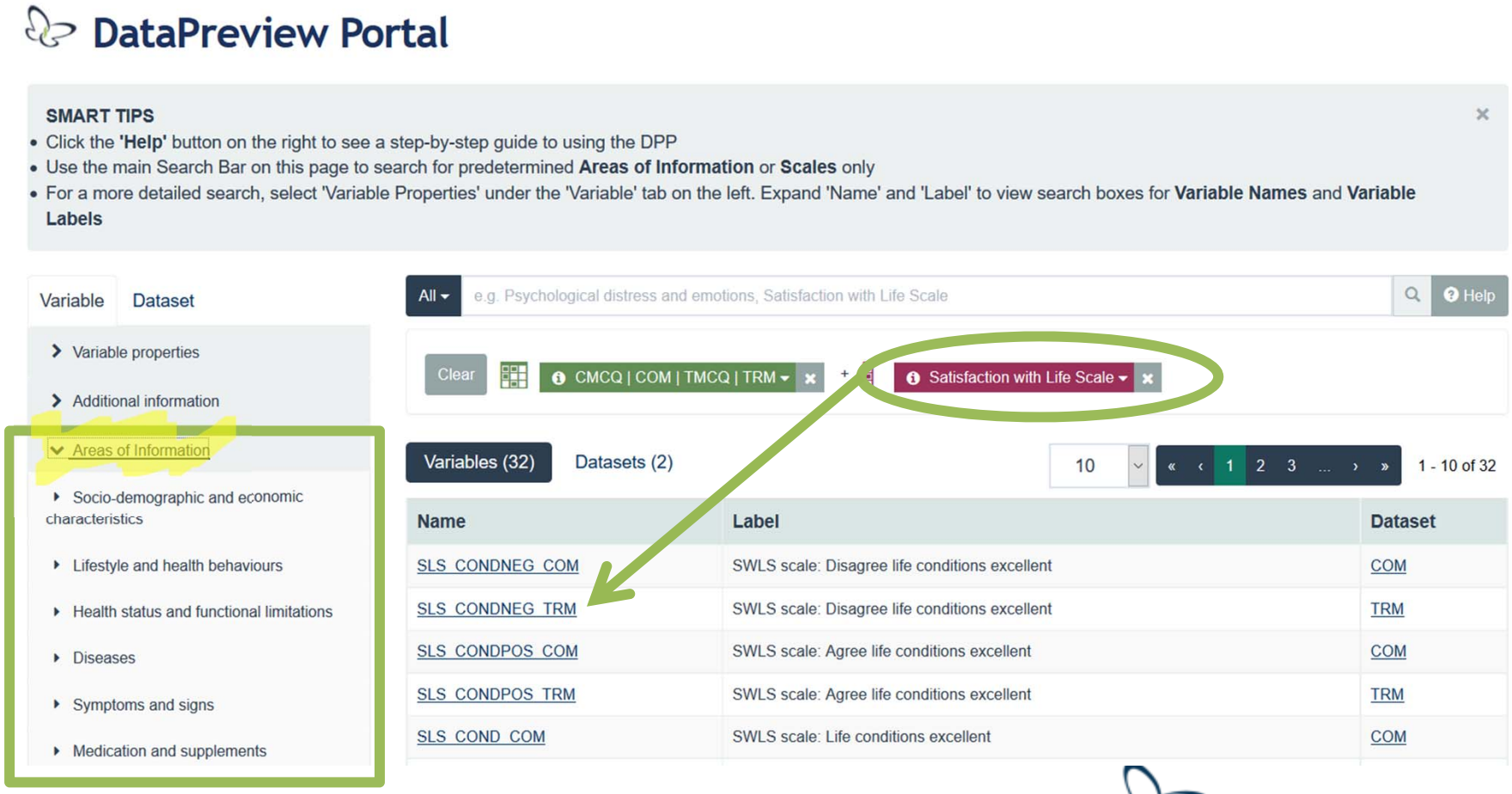
www.clsa-elcv.ca



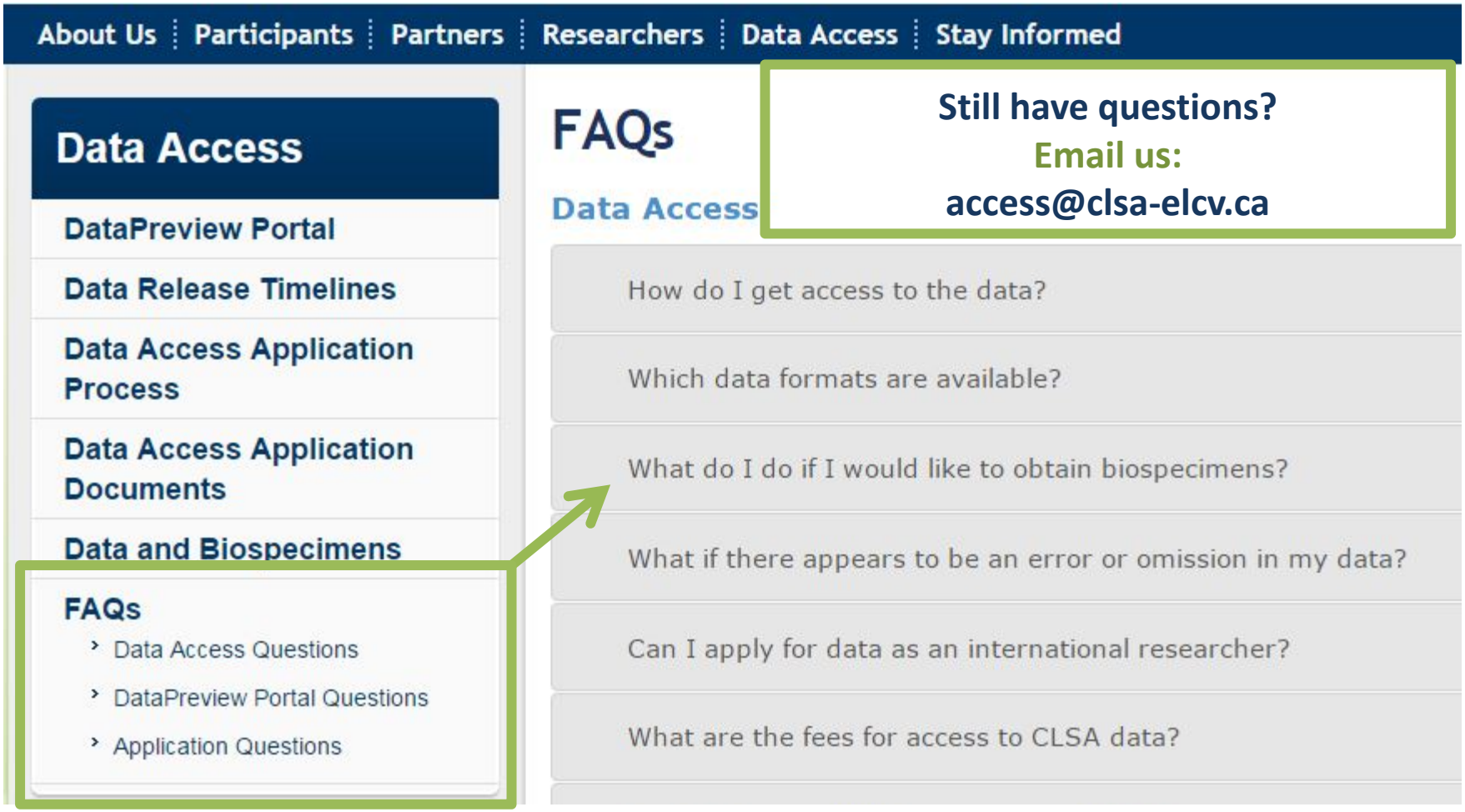
Information for Researchers & Trainees



Data Preview Portal



Need More Information?



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Take Home Messages

- This large cohort was designed, assembled and data collection is ongoing
  - Baseline data and biospecimens have been collected
- Alphanumeric data from questionnaires, physical assessments and basic hematology results on 51,338 participants from across Canada are now available
  - These data are free for student thesis research and for postdoctoral fellow projects

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CLSA Funders and Partners

Variables of interest to FRAN

Nutrition variables

- Seniors in the Community Risk Evaluation for Eating and Nutrition (SCREEN) – II Abbreviated Version
- Short Diet Questionnaire (SDQ)
- Oral health related questions

SCREEN II AB

- Goal: Identify older adults at risk of poor nutrition
- 8 questions, < 5 minutes to administer
  - Weight changes
  - Frequency of skipped meals
  - Appetite
  - Ability to chew and/or swallow
  - Fruit and vegetable consumption
  - Fluid consumption
  - Eating alone
  - Food preparation and quality
- Can use a composite score, or individual questions

Refer to: Keller, Heather. 2012. Getting started with SCREENing. Your guide to implementing SCREEN.

Short Diet Questionnaire

- 36 questions about the usual consumption of different foods and beverages
- Originally validated to estimate the usual consumption frequencies of fat, fibre, calcium, vitamin D, and fruits and vegetables

Refer to: Shatenstein B., Payette H. 2015. Evaluation of the relative validity of the short diet questionnaire for assessing usual consumption frequencies of selected nutrients and foods. *Nutrients, 7*, 6362-6374.

Oral health

- Self-rated oral health
- Number of original teeth and denture use
- Problems eating due to oral health
- Frequency of avoiding certain foods because of oral health
- Specific types of pain and discomfort
- Oral hygiene practices
- Frequency of dentist visits
- Barriers to receiving dental care

Sexuality and relationship variables

- Marital status
- Sexual identity
- Women's health – menopause, HRT use
- Social networks
- Social support availability (MOS scale)

Social networks

- Who lives in the same household
- Frequency of contact with siblings, children, and other family members
- How many close friends and frequency of contact
- How many neighbours are known and frequency of contact

Social support availability

- Measured using the MOS scale (Medical Outcomes Study, Social Support Availability scale)
- Questions about how often someone is available to provide different types of support
  - Emotional/informational support
  - Tangible support
  - Affectionate support
  - Positive social interaction

Refer to: Sherbourne CD., Stewart A. 1993. The MOS Social Support Survey. RAND Corporation.

Body composition

- Body mass index (BMI)
- DEXA
  - Fat mass
  - Derived lean body mass
  - Bone mineral density
- Waist circumference
- Hip circumference