The Canadian Longitudinal Study on Aging (CLSA) Report on Health and Aging in Canada

Findings from Baseline Data Collection 2010-2015

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Canadian Longitudinal Study on Aging
Étude longitudinale canadienne sur le vieillissement

Chapters

Foreword

The Canadian Longitudinal Study on Aging (CLSA) was conceived with the recognition that Canada's population is getting older, and the vision that we can unveil the determinants of health and wellness in our later years. We reached a key demographic point in 2016 when for the first time the number of Canadians over 65 exceeded the number of those aged 14 and under. In fact, by 2031, one in four Canadians will be 65 or older.

As a country, where the average life expectancy is 80 for men and 84 for women, people are living longer. The addition of these extra years of life is a good sign in itself. They demonstrate Canada's high standard of living, innovative public health and high-quality health care. But we have to make sure that these extra years are worth living: More time to work and contribute wealth and wisdom to society, as well as more time to enjoy with family and friends.

By supporting the CLSA, CIHR aims to ensure that research on the determinants of healthy and active aging will be better known and shared with all Canadians, help to empower them to maintain their health and quality of life throughout the lifespan.

The information being collected at sites across the country from the more than 50,000 Canadians participating in the CLSA is an important national resource. Its value speaks to researchers, health policy makers, public health professionals, and anyone else with an interest in maintaining good health in Canadians. Our goal is that CLSA data will guide the development of policies and programs to support healthy aging for decades to come.

This report is only the beginning of the long road towards better knowledge about the determinants of healthy aging. As a baseline report, it provides a necessary starting point to measure the health trajectory of Canadians. It will eventually help us design a blueprint for a longer, healthier life course.

We congratulate the CLSA researchers, participants, and staff on their tremendous work to date. We are very thankful to the research team and to all the Canadians participating in the CLSA who are playing an important role in advancing knowledge.

May this report be the first installment in an investment in a healthier future for Canadians.

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Introduction

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Introduction

Why a Canadian Longitudinal Study on Aging?

Around the world, the population is aging. In 2017 for the first time, the population of Canadians 65 and older was larger than the number of children under 15. It is easy to look at aging as a challenge for the individual and for society and indeed there has been a tendency to look at aging as a set of physical symptoms, organ by organ, illness by illness, and tallying the personal, social and financial burdens imposed on families and societies. Aging has been presented as simply an issue of decline and loss. The perception of what it means to be in one's 60s, 70s, 80s, and 90s has not kept pace with modern medicine, and neither have our ways of optimizing the extra years that modern public health and medicine have given us. If we stop looking at aging only in terms of decline and dependency, we can capitalize on the positive aspects of aging and invest in policies and programs that promote not only living long but also living well. The potential ongoing contribution of older adults to society will be lost if a change in the perception of an inevitable negativity of aging does not take place.

It is precisely as a consequence of the above change in thinking that the need for longitudinal data to inform the decisions to design interventions and policies to improve the health and well-being of today and tomorrow's seniors has been identified by researchers, and by the federal, provincial, and territorial governments. Indeed, after reviewing a number of policy issues concerning Canadian population aging, in 2000 Cheal[1] remarked on the pressing need for data development to not only inform policy but also to advance the science of aging. He called explicitly for longitudinal data to be collected if Canadian policymaking is to be appropriately responsive to complex, emerging issues in an aging population. Longitudinal data collected with the goal of informing policymaking would avert the problem of acting hastily upon myths, common beliefs, or anecdotal information about aging. The Canadian Longitudinal Study on Aging (CLSA) was conceived to fill the data gap that will provide evidence to inform health and social care policies in Canada for today and tomorrow's seniors.

Background on CLSA

One of the many pressing policy implications of an increasingly aging population in Canada is on health and social care affordability. Conservative forecasts[2] suggest that the proportion of the Canadian population aged 65 years or more will increase over the next 20 years to approximately 23% to 25% of the Canadian population, or almost 10 million Canadians, by 2036. This increase is unprecedented. Total health and social care expenditures in Canada now exceeds $300 billion with healthcare alone at approximately $211 billon, the largest expenditure item in provincial budgets. As the baby boom generation moves toward retirement or enters second careers (an emerging phenomenon), the challenges, and opportunities that Canada faces in supporting a diverse and multi-ethnic aging population will intensify. The baby boomers' shifting lifestyle choices make them one of the most compelling demographics to study. A challenge for health and social policymakers is the lack of strong evidence to inform public health, and social policy decision making that is directed toward preventing morbidity and improving the health of Canada's aging population[3].

Prospective population-based studies of aging have established their scientific value for evaluating extrinsic and intrinsic exposures in relation to healthy aging, psychosocial and disease outcomes. The prospective cohort design is advantageous in its ability to measure the occurrence of exposure before the onset of the outcome and to evaluate numerous exposures and outcomes in a single study. However, very few large-scale cohorts have been designed to understand the link between multiple exposures and the *transitions* and *trajectories* of healthy aging.

Recent advances in biosciences (e.g., genetics, epigenetics, and metabolomics), informatics, and population health research have changed the face of health research, presenting new and exciting possibilities for scientific discovery. To maximize the potential of these emerging sciences and to convert it into groundbreaking research and knowledge, novel research platforms need to bridge the biosciences with population and public health sciences. This need led to a call for multidisciplinary, longitudinal studies of aging. Several factors make these more complex studies different from their predecessors. The major difference is the ability to study biological (especially genetics and epigenetics), physical, lifestyle, and psychosocial factors in the same individuals, in combination with large sample sizes, resulting in increased statistical power to address complex interrelationships and to study rare outcomes and events. With the emergence of multi-level analytical techniques, we also have the tools to study the influence of contextual level factors and individual level factors. Thus, in the modern era of longitudinal research, we move beyond merely describing change over time to actually studying the dynamic determinants of change within and between individuals over time. In addition, very few studies of aging have integrated repeated biological sampling as part of their protocol on large number of people to understand the role of changing biomarkers within the same individual over time to elucidate the process of aging, and to study how changing biological processes interact with changing physical, economic, and psychosocial environments to produce deleterious or positive health outcomes.

The CLSA is both a carefully designed research study and a modern research platform designed to support the collection, preparation, and release of data and biospecimens, building capacity for high quality research on aging in Canada and elsewhere. The CLSA will enable researchers to respond nimbly to a wide variety of research questions that inform policy and practice side-stepping the need to design their own studies to answer questions that can be answered using the CLSA platform[4].

If future interventions and policies are to achieve the multiple objectives of improving health, allowing individuals to age optimally into late life, and increasing both quality and length of life, then acceleration of our understanding of the aging process, its modifiers, and consequences is needed. The CLSA fosters innovative research into understanding how biological, physical, psychological, social, and environmental factors individually, and in combination, influence the health and wellbeing of aging individuals. The CLSA as a research platform is based on a conceptual framework that will allow researchers to examine the relationships among precursors (e.g. gene variants or nutrition), changes in quantitative traits (e.g. cognition or inflammatory biomarkers), and the consequences of the changing phenotype on the development or prevention of disease (e.g. dementia or depression), disability (e.g. frailty or physical limitations), and psychosocial outcomes (e.g. emotional distress or social isolation). Data on social factors including work transitions and retirement planning, health care, and economic factors will also provide evidence to inform social and health care policy. The depth and breadth of data collected will allow this program of research to address questions such as:

- What are the determinants of changes in biological, physical, psychological, and social function over time and across ages?
- How important are genetic and epigenetic factors in the aging process?
- Why do some individuals experience healthy aging while others do not?
- Are there identifiable patterns of cognitive functioning in midlife that predict onset of dementia in later life?
- How do work and family transitions intersect with negative/positive changes in social networks and support and how do these transitions influence overall health?

Report Outline

The CLSA is currently completing its first follow-up and the first longitudinal data on the cohort will be available by early 2019. The following chapters describe CLSA methodology (Chapter 2) and present baseline data in the areas of demographic characteristics (Chapter 3), retirement (Chapter 4), social activity & social isolation (Chapter 5), caregiving & care receiving (Chapter 6), general health (Chapter 7), physical function, disability & falls (Chapter 8), psychological health (Chapter 9), lifestyle & behaviour (Chapter 10), transportation (Chapter 11), and lesbian, gay, and bisexual (LGB) aging (Chapter 12). Each chapter highlights key findings from the CLSA baseline data, challenges, and possible next steps. Wherever possible, tables include weighted estimates to reflect the Canadian population.
The version number of the CLSA dataset, the measures included, and the derivation of any composite or derived variables are described in each of the chapters. The proportion of missing data throughout the CLSA was low (<5%), however the examination of some variable combinations in some population partitions can lead to small sample sizes. Authors report how missing data were managed in each chapter, as appropriate. Estimates based on fewer than 5 observations were omitted from data summaries throughout the report.

Acknowledgements

The CLSA is a national and multi-disciplinary state-of-the-art research platform and infrastructure, available for aging research with longitudinal data that will span 20 years or more from over 50,000 participants aged 45-85 at the time of recruitment. The overall leadership of the CLSA is provided by the lead principal investigator, Dr. Parminder Raina, and two co-principal investigators Drs. Christina Wolfson and Susan Kirkland. In addition, the Scientific Management Team (SMT) is supported by Drs. Lauren Griffith (Associate Scientific Director) and Ine Wauben (Managing Director). The CLSA is also supported by 11 locally responsible investigators who lead the data collection effort for the CLSA, working groups and over 250 dedicated CLSA staff (www.CLSA-ELCV.ca). Most importantly, CLSA's success is a result of the contribution of our 50,000+ participants who are dedicated to advancing our knowledge on health and aging and who volunteer their time to participate in the CLSA.

This premier research platform has been made possible through the support of visionary funders, partners, and supporters who share our passion for high-quality research, evidence-based decision-making, knowledge translation, and developing services and products to benefit the health and well-being of people as they age. Funding for the CLSA's operations and infrastructure has been provided by the Government of Canada through the Canadian Institutes of Health Research, the Canada Foundation for Innovation and the provinces of Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Nova Scotia, Ontario, and Quebec. Additional funds that contributed to the CLSA baseline data collection were also provided by the following partners, entities and institutions: Ontario Ministry of Transportation, Bruyère Research Institute, Dalhousie University, McGill University, McMaster University, Memorial University, Simon Fraser University, The Research Institute of the McGill University Health Centre, Université de Sherbrooke, University of British Columbia, University of Calgary, University of Manitoba, University of Ottawa, University of Victoria, Health Canada, Public Health Agency of Canada, Statistics Canada, Veterans Affairs Canada and in-kind contributions from New Brunswick, Prince Edward Island and Saskatchewan.

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The French version of this report is a translation of the English report prepared by third-party translators and sponsored by the Public Health Agency of Canada. If you have any questions about the findings outlined in the CLSA Report, or if you would like more information about the CLSA platform, please contact: info@clsa-elcv.ca.

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CLSA Methodology

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CLSA Methodology

This chapter provides a summary of the study methodology for the baseline CLSA[1,2]. It includes a brief description of the study design, sampling approach, questionnaire and measures development, response rates and the development of sampling weights.

Study design

The target sample size of the CLSA was 50,000 participants; in 2015, the CLSA completed recruitment and baseline data collection from 51,338 community-living women and men aged 45 to 85 years from across Canada[1,2]. Participants were asked to provide a core set of information on demographic and lifestyle/behaviour measures, social measures, physical measures, psychological measures, economic measures, health status measures, and health services use. CLSA participants undergo repeated waves of data collection every three years and will be followed for at least 20 years, or until death (or other reasons for termination of participation). The design and current progress of the CLSA are presented in Figure 1.

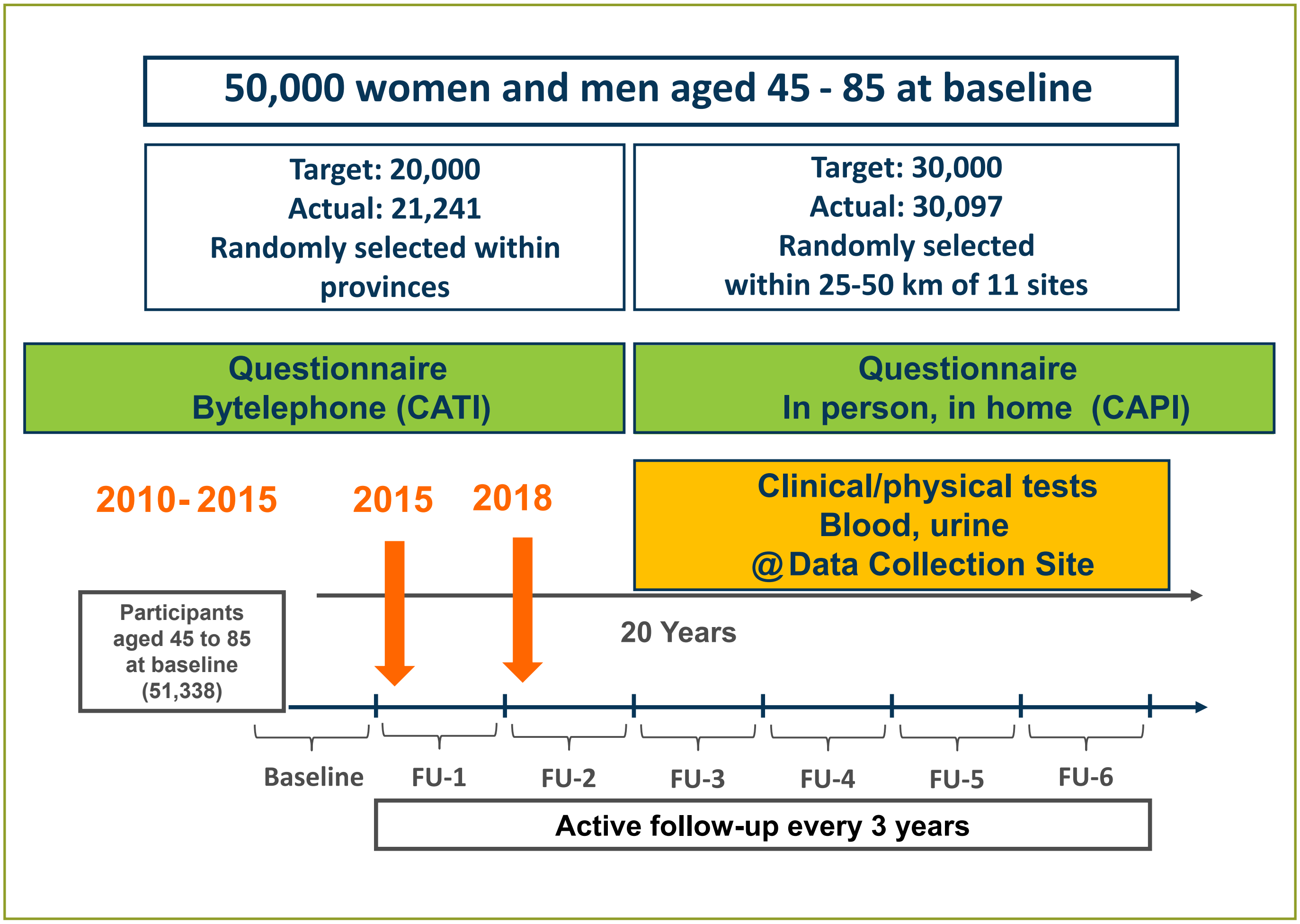

Figure 1 – CLSA Data Collection Timeline

SAMPLING DESIGN

The CLSA participants were selected into one of two study components which use different sampling designs and differing modes of data collection: 21,241 were randomly selected from the 10 Canadian provinces and provided questionnaire data through telephone interviews ("Tracking"); 30,097 were randomly selected from areas extending 25-50 km from one of 11 Data Collection Sites (DCSs) located across Canada, and provided data through an in-home interview and a visit to a Data Collection Site ("Comprehensive"). These locations were selected to represent four regions of Canada: the Pacific Coast (Victoria [University of Victoria], Vancouver and Surrey [University of British Columbia and Simon Fraser University]), the Prairies (Calgary [University of Calgary] and Winnipeg [University of Manitoba]), Central Canada (Hamilton [McMaster University], Ottawa [University of Ottawa], Montréal [McGill University] and Sherbrooke [Université de Sherbrooke]), and the Atlantic Region (Halifax [Dalhousie University] and St. John's [Memorial University of Newfoundland]). Sampling in most locations was restricted to a 25-kilometre radius; however, in locations with smaller population densities (i.e., Victoria, Sherbrooke, St. John's), the radius was expanded to facilitate capture of the necessary number of participants[3].

STUDY PARTICIPANTS

CLSA Tracking participants were recruited using three sampling frames: The Canadian Community Health Survey on Healthy Aging (CCHS-HA)[4], provincial health registries, and random-digit dialling (RDD). Comprehensive participants were recruited using provincial health registries and random-digit dialling sampling frames. Excluded from the CLSA were residents in the three territories, persons living on federal First Nations reserves, full-time members of the Canadian Armed Forces, individuals living in institutions, the inability to respond in English or French, and cognitive impairment[5].

The target and actual sample sizes by province, age, and sex for the Tracking and Comprehensive participants are presented in (Appendix 1, Table 3). The overall target sample size for the Tracking cohort was 20,000 participants. The Tracking sample was divided among the provinces using power allocation with the condition that each province would have at least 125 per age/sex category. This was to provide minimal precision for province-specific analyses. Within the province, the sample was allocated to meet the CLSA overall age-sex distribution (Appendix 1, Table 4). The sampling of the Tracking cohort was intended to provide results that are generalizable to the Canadian population, but in contrast, the sampling for the Comprehensive one was not. While the Comprehensive sample is not nationally representative, it is nevertheless national in scope. The target sample size for the CLSA Comprehensive was 30,000 persons. Nine DCS were to recruit 3,000 participants each, while in British Columbia the Vancouver and Surrey DCS aimed to recruit 1,500 participants each. Sampling weights were created such that the full CLSA sample (Tracking + Comprehensive) is also generalizable to the Canadian population.

Tracking participants completed the questionnaire through computer-assisted telephone interviewing (CATI) while the Comprehensive participants did so through computer-assisted personal interviewing (CAPI) and provided physical measures and biological samples at the Data Collection Sites. All CLSA participants were asked if they would provide their health insurance number (HIN) for linkage with administrative data[6]. Provision of one's HIN as well as provision of biological samples (Comprehensive only) was not mandatory for recruitment; however, 90.2% of Tracking and 96.2% of Comprehensive participants provided their HINs and 98.8% of Comprehensive participants consented to provide biological samples. Baseline data were collected between September 2011 and May 2014 for Tracking participants and between May 2012 and May 2015 for Comprehensive participants. The baseline interview was supplemented with a brief telephone interview to collect some additional data as well as to update contact information, in an effort to minimize loss to follow-up.

RESEARCH ETHICS APPROVAL

The CLSA has worked collaboratively with all associated Research Ethics Boards (REB) across Canada to create a coordinated ethics process. Through this process, the CLSA has received REB approval for the baseline, follow-up one, and subsequent amendments.

STRUCTURE AND CONTENT OF THE BASELINE INTERVIEW

When study planning began, six working groups were established to develop specific biological, physical, psychological, social, and lifestyle and behaviour measures for inclusion in the CLSA[1,5,7]. These working groups comprised multidisciplinary sets of experts involved in aging research. The final list of measures is shown included in **Table 1**. A similar process was undertaken by the Biological working group to inform the biospecimen collection in the CLSA. A list of the biospecimens collected and the biomarkers available from baseline is provided in **Table 2**. All biospecimen processing is done at the Data Collection Sites, and biospecimens are frozen and shipped in nitrogen vapour shippers to the CLSA Biorepository and Bioanalysis Centre (BBC)[8].

TABLE 1 – SUMMARY OF MEASURES COLLECTED IN THE CLSA BY DOMAIN:

Measures Collected by Domain*	Tracking Cohort (n = 21,241)	Comprehensive Cohort (n = 30,097)
LIFESTYLE/BEHAVIOUR		
Alcohol use	✓	✓
Tobacco use	✓	✓
Nutrition	No	✓
Nutritional risk	✓	No
Physical activity	✓	✓
Personality traits	No	✓
HEALTH STATUS		
Activities of daily living	✓	✓
Instrumental activities of daily living	✓	✓
Pain	✓	✓
Sleep	No	✓
Reproductive health	✓	✓
Medications	✓	✓
Use of technology	No	✓
Dietary supplement use	✓	✓
Self-reported function	✓	✓
Health status/successful aging	✓	✓
List of chronic conditions	✓	✓
Chronic disease symptoms	No	✓
Injury	✓	✓
Oral health	✓	✓
Self-reported height and weight	✓	N/A
Self-reported vision and hearing	✓	✓
Falls and consumer products	✓	✓
PHYSICAL MEASURES		
Weight and height	No	✓
Hip and waist circumference	No	✓

Measures Collected by Domain*	Tracking Cohort (n = 21,241)	Comprehensive Cohort (n = 30,097)
Pulse rate and blood pressure	No	✔
Electrocardiogram	No	✔
Spirometry	No	✔
Bone density and bio-impedance (DXA)	No	✔
Hearing	No	✔
Timed 4-metre walk	No	✔
Timed get up and go (TUG)	No	✔
Standing balance	No	✔
Chair rise: balance and coordination	No	✔
Visual acuity	No	✔
Tonometry	No	✔
Retinal scan	No	✔
Grip strength	No	✔
BIOLOGICAL SPECIMENS		
Blood	No	✔
Urine	No	✔
PSYCHOLOGICAL MEASURES		
Depression	✔	✔
Satisfaction with Life	✔	✔
Mini-cognitive function	✔	No
Neuropsychological battery	No	✔
Coping	✔	✔
Psychological distress	No	✔
Post-traumatic stress disorder	✔	✔
Life Space Index	No	✔
SOCIAL AND DEMOGRAPHIC MEASURES		
Social networks and social support availability	✔	✔
Social participation	✔	✔
Informal/formal care	✔	✔
Transitions in work and retirement	✔	✔
Social inequality	✔	✔
Wealth/income	✔	✔
Home ownership	✔	✔
Built environments	✔	✔
Migration, mobility, transportation	✔	✔
Education	✔	✔

Measures Collected by Domain*	Tracking Cohort (n = 21,241)	Comprehensive Cohort (n = 30,097)
Ethnicity, language, religion	✔	✔
Family and living arrangements	✔	✔
Paid and unpaid work	✔	✔
Caregiving	✔	✔
Effort–reward	✔	✔
Workability	✔	✔
Veteran identifiers	✔	✔
HEALTH CARE USE		
Health and social service provider visits	✔	✔
Preventive health services	✔	✔
Data linkage with provincial health databases	✔	✔

** For a detailed explanation of specific measures and the tools and instruments used, please visit the CLSA website at www.clsa-elcv.ca.*

TABLE 2 – BIOLOGICAL SPECIMENS IN THE CLSA: BIOREPOSITORY AND BIOANALYSIS CENTER SUMMARY

	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

Response Rates and Weighting

A CLSA Methodology Working Group (MWG) was assembled and was responsible for the development of the sampling methods for the study. This section considers the response proportions and creation of weights for the CLSA. For each sampling approach, there were several steps for enrollment into the CLSA cohort. The first step, "pre-recruitment", took place when selected people provided their name, contact information, and consent for CLSA researchers to contact them and invite them to participate in the study. A person was designated to be a 'pre-recruit' when s/he provided their contact information or agreed that their contact information could be sent to the CLSA. In the second step, pre-recruits who completed all the required baseline interviews and assessments were considered "recruited". Recruits were only considered to have been "enrolled" in the CLSA once signed consent had been received. The response proportions are a product of the pre-recruitment proportions, the recruitment proportions, and the study enrollment proportions. The calculation of each component of the response proportions differed by sampling frame. For example, with health registries, we knew how many people were sampled in each of the age-sex strata, and this number was the denominator for our pre-recruitment proportion in that province. For random digit dialling (RDD), a commercial company provided a pool of telephone numbers, of which a subset was valid, residential numbers. From those numbers we determined if the household was age-eligible and, if more than one person was eligible in a household, we randomly selected one individual. The pre-recruitment proportion was obtained by multiplying these sub-probabilities (See CLSA Technical Document on sampling at (www.clsa-elcv.ca).

Similar strategies were used to recruit Tracking and Comprehensive participants, but Comprehensive participants had the additional geographical restriction. We enrolled only one Tracking participant per household. Similarly, we enrolled only one Comprehensive participant per household. It was possible, however, to have a Tracking and Comprehensive participant in the same household. The overall response proportion was approximately 15%. However, the participation proportion (the proportion of pre-recruits who became participants) was approximately 50%.

Sampling weights are needed to correct for differences in the sample that might lead to bias and other departures between the sample and the reference population. Such differences can result from selection of units with unequal probabilities, non-coverage of the population, and non-response. In the CLSA, we calculated both inflation weights and analytic weights.

Inflation weights aim to provide researchers with an estimate of how many people in each province (and in Canada) are 'represented' by each CLSA participant. Inflation weights are used to ensure that, when estimating the population value (mean or proportion) of some variable, the value obtained is unbiased, i.e. representative, of the eligible provincial (and Canadian) population. Inflation weights were computed using the reciprocals of the individual inclusion probabilities and then calibrated to the sum of the targeted (eligible) Canadian population using the weights given by Statistics Canada for CCHS-Healthy Aging (HA), since CLSA used CCHS-HA's eligibility criteria. Tracking and Comprehensive participants each had their own weights assigned. The Tracking weights sum to the size of the community-living Canadian population between 45-85 years of age in 2008-2009. The Comprehensive weights sum to the size of that population living within the sampling regions around each DCS. "Overall" weights were also calculated and re-calibrated to the CCHS-HA population weights for analyses using all participants.

Analytic weights are used in regression analyses in which the purpose is to estimate the associations among variables. Analytic weights are essentially inflation weights that have been rescaled to sum to the actual sample size in the CLSA. The Comprehensive analytic weights are the inflation weights rescaled to sum to the sample size within the DCS area of each province. The Tracking and Overall analytic weights are rescaled to sum to the sample size within each province. For a full description of the CLSA sampling weights, refer to the CLSA technical document at (www.clsa-elcv.ca).

A comparison of population characteristics among the weighted CLSA data, the weighted CCHS-HA, and the 2011 Canadian census indicate the study population is generalizable to the Canadian population (See Table 4 in Appendix 1).

CLSA Platform and Data Access

As a research platform, the goal of the CLSA is to provide researchers and trainees with the data and biospecimen resources essential to pursuing leading-edge research. A fundamental principle of the CLSA is to make the data available to the research community while protecting the privacy and confidentiality of study participants and the security of the data, as per the study's Data and Biospecimen Access Policy. The process and timeline for data access is presented in Figure 2. Currently, the CLSA has 3 to 4 deadlines each year at which time applications to use CLSA data are submitted via access@clsa-elcv.ca. Applications for research projects undergo administrative and statistical review to ensure completeness and feasibility. An independent Data and Sample Access Committee (DSAC) then reviews all applications. The CLSA Scientific Management Team (SMT) reviews the DSAC recommendation and upon approval, the applicant is notified and a CLSA Access Agreement is prepared. When this is signed and ethics approval is obtained by the applicant, the dataset is prepared by the staff at the CLSA Statistical Analysis Centre (SAC) and provided to the applicant. The entire process takes up to 6 months. As processing such a large dataset is an ongoing process, each dataset includes a version number to indicate the specific dataset being released. When new versions are available, researchers are notified and offered the most current version.

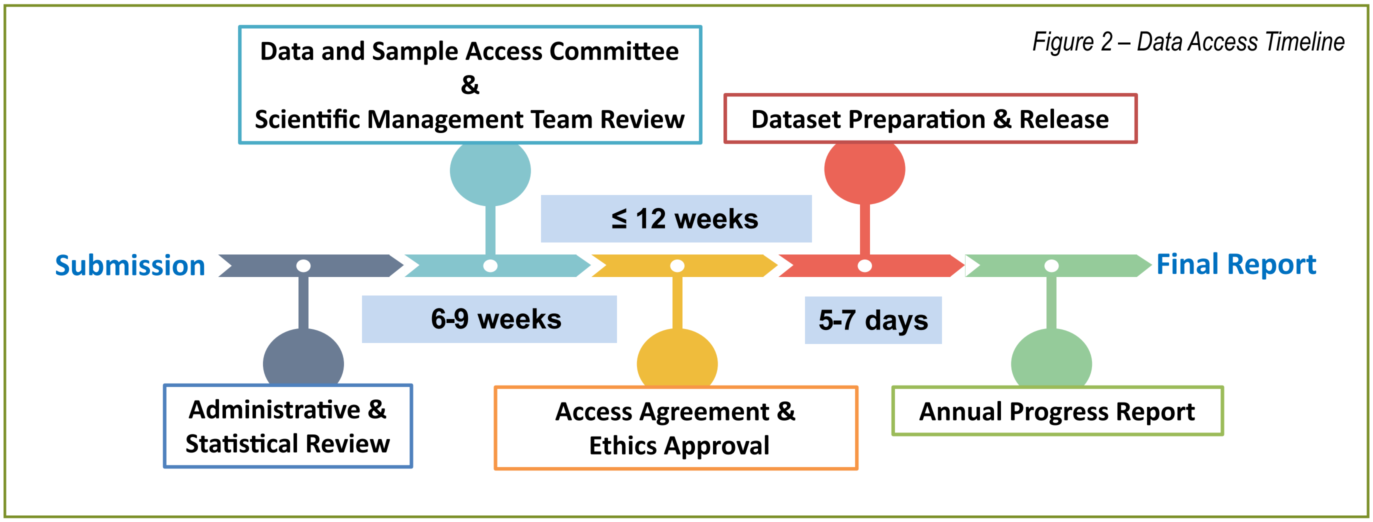
Figure 2 – Data Access Timeline

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Appendix 1

TABLE 3 – TARGET AND ACTUAL SAMPLE SIZE IN EACH CANADIAN PROVINCE, BY AGE AND SEX

			TRACKING COHORT		COMPREHENSIVE COHORT	
Province*	**Age Group**	**Sex**	**Target Number of Participants in Stratum**	**Actual Number of Participants in Stratum**	**Target Number of Participants in Stratum**	**Actual Number of Participants in Stratum**
AB	**45-54**	**Female**	306	339	450	384
AB	**45-54**	**Male**	306	311	450	329
AB	**55-64**	**Female**	306	348	450	509
AB	**55-64**	**Male**	306	314	450	492
AB	**65-74**	**Female**	189	204	300	371
AB	**65-74**	**Male**	189	205	300	375
AB	**75-85**	**Female**	189	190	300	253
AB	**75-85**	**Male**	189	196	300	244
BC	**45-54**	**Female**	379	407	900	831
BC	**45-54**	**Male**	379	360	900	782
BC	**55-64**	**Female**	379	431	900	1030
BC	**55-64**	**Male**	379	403	900	980
BC	**65-74**	**Female**	234	271	600	724
BC	**65-74**	**Male**	234	255	600	737
BC	**75-85**	**Female**	234	255	600	573
BC	**75-85**	**Male**	234	238	600	597
MB	**45-54**	**Female**	212	228	450	415
MB	**45-54**	**Male**	212	224	450	366
MB	**55-64**	**Female**	212	240	450	527
MB	**55-64**	**Male**	212	216	450	511
MB	**65-74**	**Female**	141	141	300	373
MB	**65-74**	**Male**	141	149	300	367
MB	**75-85**	**Female**	141	151	300	279
MB	**75-85**	**Male**	141	135	300	275
NL	**45-54**	**Female**	173	190	450	309
NL	**45-54**	**Male**	173	173	450	274
NL	**55-64**	**Female**	173	189	450	379
NL	**55-64**	**Male**	173	196	450	343
NL	**65-74**	**Female**	125	126	300	265
NL	**65-74**	**Male**	125	128	300	264
NL	**75-85**	**Female**	125	123	300	179
NL	**75-85**	**Male**	125	128	300	201
NS	**45-54**	**Female**	205	227	450	391
NS	**45-54**	**Male**	205	223	450	378
NS	**55-64**	**Female**	205	251	450	499

TABLE 3 – TARGET AND ACTUAL SAMPLE SIZE IN EACH CANADIAN PROVINCE, BY AGE AND SEX (CONTINUED)

			TRACKING COHORT		COMPREHENSIVE COHORT	
Province*	**Age Group**	**Sex**	**Target Number of Participants in Stratum**	**Actual Number of Participants in Stratum**	**Target Number of Participants in Stratum**	**Actual Number of Participants in Stratum**
NS	**55-64**	**Male**	205	233	450	460
NS	**65-74**	**Female**	137	167	300	389
NS	**65-74**	**Male**	137	170	300	424
NS	**75-85**	**Female**	137	131	300	270
NS	**75-85**	**Male**	137	151	300	267
ON	**45-54**	**Female**	658	694	900	803
ON	**45-54**	**Male**	658	674	900	781
ON	**55-64**	**Female**	658	755	900	1070
ON	**55-64**	**Male**	658	722	900	1051
ON	**65-74**	**Female**	439	518	600	780
ON	**65-74**	**Male**	439	460	600	788
ON	**75-85**	**Female**	439	459	600	554
ON	**75-85**	**Male**	439	440	600	591
QC	**45-54**	**Female**	525	581	900	792
QC	**45-54**	**Male**	525	526	900	760
QC	**55-64**	**Female**	525	577	900	1075
QC	**55-64**	**Male**	525	575	900	930
QC	**65-74**	**Female**	350	349	600	786
QC	**65-74**	**Male**	350	366	600	719
QC	**75-85**	**Female**	350	314	600	510
QC	**75-85**	**Male**	350	320	600	491
NB	**45-54**	**Female**	190	210		
NB	**45-54**	**Male**	190	195		
NB	**55-64**	**Female**	190	212		
NB	**55-64**	**Male**	190	201		
NB	**65-74**	**Female**	127	138		
NB	**65-74**	**Male**	127	143		
NB	**75-85**	**Female**	127	131		
NB	**75-85**	**Male**	127	129		
PE	**45-54**	**Female**	150	165		
PE	**45-54**	**Male**	150	160		
PE	**55-64**	**Female**	150	165		
PE	**55-64**	**Male**	150	151		
PE	**65-74**	**Female**	125	127		
PE	**65-74**	**Male**	125	127		
PE	**75-85**	**Female**	125	121		

TABLE 3 – TARGET AND ACTUAL SAMPLE SIZE IN EACH CANADIAN PROVINCE, BY AGE AND SEX (CONTINUED)

			TRACKING COHORT		COMPREHENSIVE COHORT	
Province*	**Age Group**	**Sex**	**Target Number of Participants in Stratum**	**Actual Number of Participants in Stratum**	**Target Number of Participants in Stratum**	**Actual Number of Participants in Stratum**
PE	**75-85**	**Male**	125	127		
SK	**45-54**	**Female**	202	217		
SK	**45-54**	**Male**	202	189		
SK	**55-64**	**Female**	202	221		
SK	**55-64**	**Male**	202	215		
SK	**65-74**	**Female**	134	146		
SK	**65-74**	**Male**	134	144		
SK	**75-85**	**Female**	134	129		
SK	**75-85**	**Male**	134	131		

*** AB=Alberta, BC=British Columbia, MB=Manitoba, NB=New Brunswick, NL=Newfoundland and Labrador, NS= Nova Scotia, ON= Ontario, PE=Prince Edward Island, QC=Quebec, SK=Saskatchewan.**

TABLE 4 – SELECTED SOCIODEMOGRAPHIC, LIFESTYLE, AND HEALTH STATUS CHARACTERISTICS OF CLSA PARTICIPANTS

(n=51,338) compared with CCHS Healthy Aging (n=20,087), CCHS 2011-2012 Annual Component (n=69,639) and the general population (Statistics Canada, Canadian Health Measures Survey Cycle-3, National Health Survey 2011)

		CLSA Combined Cohort %	CCHS Healthy Aging %	CCHS 2011-2012 Annual %	CHMS Cycle-3 %	NHS 2011 %
Sex	**Female**	51.50	51.49	51.48	51.44	51.82
Age (years)	**45-54**	37.56	39.66	36.16	NA	38.21
	55-64	30.88	30.38	32.45	NA	31.36
	65-74	19.17	18.19	20.10	NA	18.98
	75-85	12.39	11.77	11.27	NA	11.46
Marital Status	**Married/living with a partner**	74.74	73.79	65.59	73.54	61.96*
Country of Birth	**Born in Canada**	84.66	74.41	74.68	68.85	73.30
Language	**English language Spoken at Home**	73.23	66.40	65.59	62.67	65.99
Urban-Rural	**Urban-dwelling**	70.46	75.85	75.48	NA	78.60

TABLE 4 – SELECTED SOCIODEMOGRAPHIC, LIFESTYLE, AND HEALTH STATUS CHARACTERISTICS OF CLSA PARTICIPANTS (CONTINUED)

(n=51,338) compared with CCHS Healthy Aging (n=20,087), CCHS 2011-2012 Annual Component (n=69,639) and the general population (Statistics Canada, Canadian Health Measures Survey Cycle-3, National Health Survey 2011)

		CLSA Combined Cohort %	CCHS Healthy Aging %	CCHS 2011-2012 Annual %	CHMS Cycle-3 %	NHS 2011 %
Education	**Post-secondary education**	72.55	55.27	59.72	60.94	54.15
Working Status	**Not retired**	51.59	56.43	NA	NA	NA
	Retired	38.64	35.67	NA	NA	NA
	Partially retired	9.77	7.90	NA	NA	NA
Household Income	**<$20,000**	5.22	9.03	8.75	8.72	9.28
	$20,000-$49,999	23.43	29.07	31.25	27.39	25.24
	$50,000-$99,999	36.06	36.24	33.91	33.37	33.91
	$100,000 or more	19.37	16.22	15.29	16.72	17.64
Self-rated General Health	**Excellent**	20.02	20.45	17.32	14.06	NA
	Very good	39.08	33.80	35.16	34.26	NA
	Good	29.33	30.42	31.67	36.83	NA
	Fair	9.09	11.47	11.55	10.22	NA
	Poor	2.48	3.86	4.30	4.63	NA
Self-rated Mental Health	**Excellent**	30.29	37.55	34.15	31.30	NA
	Very good	39.19	36.19	36.23	39.53	NA
	Good	25.18	20.55	23.37	20.81	NA
	Fair	4.64	4.87	5.03	6.00	NA
	Poor	0.70	0.85	1.24	2.35	NA
Smoking Status	**Current Smoker**	30.60	33.29	33.48	23.64	NA
	Former Smoker	38.03	34.27	33.76	31.55	NA
	Never Smoked	31.37	32.44	32.76	44.81	NA
Alcohol Consumption	**Regular drinker**	72.58	62.13	61.82	68.11	NA

** Legally married , CLSA: Canadian Longitudinal Study on Aging, CCHS: Canadian Community Health Survey, CHMS: Canadian Health Measures Survey, NHS: National Health Survey*

3

Sociodemographic Characteristics and Key Populations

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Sociodemographic Characteristics and Key Populations

Key Insights

The growing number and population proportion of older adults in developed countries have important public health and social policy implications. In 2016, for the first time in Canada, adults over 65 years old outnumbered children between 0 and 14 years old, and it is expected that the proportion of older adults over 65 years will rise from 14% in 2010 to 25% by 2031[1]. The CLSA provides a rich source of data for exploring issues related to aging that are important for scientific research on aging and to inform social and healthcare policy. It offers a unique opportunity to study a broad range of topics necessary to understand the interplay between social, psychological, and physical aspects of the aging process. The purpose of this chapter is to give an overview of the characteristics of the CLSA sample according to key sociodemographic factors.

- The majority of participants in the CLSA self-identify as white (91.8%), born in Canada (84.1%), and most often speak English at home (79.1%).
- 3.7% of CLSA participants self-identify as Indigenous, including North American Indian, Metis, and Inuit.
- Overall, the majority of CLSA participants are married or live in a common law relationship (68.7%), though there are differences between men and women and by age.
- In the oldest age group (75-85) 73.5% of men but only 35.7% of women are married, and the majority of those who are widowed are women (44.8% versus 15.7% for men).
- Almost half (43.8%) of CLSA participants have a pet.
- The majority of CLSA participants report their religion as Christian (64.4%); of these, approximately half (47.4%) state their religion as Catholic.

- 21.0% of CLSA participants state that they have no religion; the proportion is higher among men (24.8%) than women (17.5%).
- CLSA participants are well educated: 74.0% report having a post-secondary degree or diploma, 7.5% report having some post-secondary education, and 11.1% report graduating from secondary school. Only 7.1% of participants report that they did not graduate from high school.
- The highest proportion of CLSA participants (33.4%) reported their total annual household income to be in the $50-100,000 range; 5.7% of participants indicate that their annual total household income is less than $20,000.
- Women aged 75-85 are the group with the highest proportion with a total household income less than $20,000 (12.0%).
- 45.3% of CLSA participants indicate that they are completely retired; 10.8% report that they are partly retired. At age 75-85, 89.5% of women and 86.0% of men report that they are fully retired.

Introduction

The value of taking a life course perspective on aging and its utility in multiple domains of physical, psychological, and social health has been indicated in numerous studies-[2–5]. In the case of marital status, for example, research shows that understanding levels of loneliness is enhanced by knowing marital history as well as current marital status. It is also critical to look at interactions between these domains and to consider the health status, social situation, and economic conditions of older adults in relation to various environments, including built environments (e.g., housing, neighbourhood amenities), social environments (e.g., living arrangements, support networks, family relations, migration behaviours, political and economic domains, individual and household income and community capital), as well as geographic or physical environments (e.g., mobility, transportation, air and water quality). A key contribution of the CLSA is the collection of data that enables linking different domains of the life course and different life course trajectories (individual, family, etc.), for different groups of people (based on sex, socioeconomic status, age, ethnicity, etc.) in order to understand and address various aspects of health and aging, including inequalities in health. Sociodemographic information is collected in the CLSA for two main purposes. First, comparing the demographic profile of the CLSA sample with the Canadian population between the ages of 45 and 85 years allows us to assess potential selection bias and representativeness. Second, demographic factors are related to a large number of health outcomes, both directly and as mediators and moderators.

Sociodemographic Characteristics

We report here on key sociodemographic characteristics known to influence health and aging, and how they are distributed between the combined CLSA Tracking (Version 3.3) and Comprehensive (Version 3.2) cohorts, which include 51,338 participants. The included tables and figures report the characteristics by 10-year age group and sex. Further differentiation is made by province when it is relevant, however, with the exception of **Table 1**; the breakdown by province is not shown. The focus of this chapter is the CLSA sample and therefore all proportions presented are unweighted.

AGE, SEX, AND PROVINCE OF RESIDENCE

Age and sex† are two key factors related to mortality[6, 7]. While life expectancy continues to rise for both women and men, on average, women tend to live longer than men, but require more health care[8–10]. Greater health care use among women may be the result of living longer lives, or due to the fact that they spend more years alone than men. Indeed, there are twice as many women over the age of 85 as men in Canada[11].

The CLSA includes roughly equal proportions of men and women by design (49.0% and 51.0% respectively). Thus, at entry, the proportion of men and women in each age group are roughly equal. The sample was intentionally weighted to include a greater proportion of younger participants 45-64 (58.1%) than older participants 65-85 (41.9%).

Province of residence has also been found to influence health care (Canadian Medical Association, 2016). This is not surprising given that Canada has a publicly-funded system of health care delivered through thirteen provincial and territorial systems; services offered, access to services, and models of payment that differ across provinces. The CLSA provides the opportunity to study how health and social needs and outcomes differ by age, sex, and province of residence. As indicated in the methodology chapter, the CLSA randomly selected and invited individuals within age-sex strata. In addition to age and sex, the sample distribution in the Tracking cohort was designed to be proportional to provincial populations. This was done with the intention of making interprovincial comparisons possible for key variables. For smaller provinces, estimates are more stable when provided by region (e.g. Prairies, Atlantic/Maritimes).

Table 1 presents the frequency and proportion of CLSA participants in each 10-year age-sex-province stratum. Not surprisingly, the provinces with the highest proportion of participants are Ontario (n=11140; 21.7%) and Quebec (n=9672; 18.8%) and the provinces with the smallest proportion of participants are Prince Edward Island (n=1142; 2.2%) and New Brunswick (n=1359; 2.7%).

Ethnicity and Language

Canada is a multi-ethnic country. Ethnic background and race are known to be associated with health and this pattern has been documented in Canada[12,13] and elsewhere[14,15]. In particular, indigenous populations have considerably worse health in terms of morbidity and mortality than the general population, including indigenous people living off reserve[13]. Those who are members of visible minorities and those who are indigenous may face stigma and discrimination which can impact health and well-being[16,17]. However, there is little data on ethnic groups in Canada with which to set research and policy priorities for addressing these healthcare gaps[18].

About 7 million people (20.6% of the total population) identified themselves as foreign-born in Canada, and about 1.5 million people (4.3% of the total population) identify themselves as indigenous[19]. It has been shown that immigrants tend to be healthier than the general population when

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† – The impact of biological sex versus socially-constructed gender are difficult to tease out. In CLSA, biological sex rather than socially-constructed gender was captured.

TABLE 1 – FREQUENCY AND PROPORTION OF CLSA PARTICIPANTS BY PROVINCE, 10-YEAR AGE AND SEX CATEGORIES

Age & Sex		Province										Total
		Alberta	British Columbia	Manitoba	New Brunswick	Newfoundland and Labrador	Nova Scotia	Ontario	Prince Edward Island	Quebec	Saskatchewan	
45-54F	N	701	1202	624	193	488	607	1451	147	1331	197	6941
	%	10.10	17.32	8.99	2.78	7.03	8.75	20.90	2.12	19.18	2.84	
45-54M	N	602	1122	568	182	433	583	1411	150	1260	175	6486
	%	9.28	17.30	8.76	2.81	6.68	8.99	21.75	2.31	19.43	2.70	
55-64F	N	851	1466	759	210	567	744	1822	167	1649	230	8465
	%	10.05	17.32	8.97	2.48	6.70	8.79	21.52	1.97	19.48	2.72	
55-64M	N	821	1374	732	195	538	695	1753	148	1490	209	7955
	%	10.32	17.27	9.20	2.45	6.76	8.74	22.04	1.86	18.73	2.63	
65-74F	N	594	1012	532	149	405	567	1324	140	1158	147	6028
	%	9.85	16.79	8.83	2.47	6.72	9.41	21.96	2.32	19.21	2.44	
65-74M	N	592	1007	522	156	405	600	1287	132	1110	157	5968
	%	9.92	16.87	8.75	2.61	6.79	10.05	21.57	2.21	18.60	2.63	
75-85F	N	453	841	438	139	300	407	1035	123	846	139	4721
	%	9.60	17.81	9.28	2.94	6.35	8.62	21.92	2.61	17.92	2.94	
75-85M	N	450	850	422	135	331	428	1057	135	828	138	4774
	%	9.43	17.80	8.84	2.83	6.93	8.97	22.14	2.83	17.34	2.89	
Total	N	5064	8874	4597	1359	3467	4631	11140	1142	9672	1392	51338
	%	9.86	17.29	8.95	2.65	6.75	9.02	21.7	2.22	18.84	2.71	

they first arrive in Canada[20,21]. This can be attributed to the factors that support immigration, such as good physical health, education, and financial resources. However, it has also been shown that over time, the health of immigrants becomes closer to that of their host country[21]. It is unclear why this happens, but it is likely the result of a constellation of factors including changes in diet, activity patterns, employment, and social factors such as status in the community and sense of belonging.

Socioeconomic differences that exist between immigrants and non-immigrants[22], as well as among ethnic and racial groups[23], are factors that influence health and well-being. Also, health and well-being may differ according to immigrant and/or ethnic status, which are not often distinguished[18].

The CLSA provides the opportunity to study how health, social needs, and outcomes differ as a function of ethnicity and language. However, small numbers within ethnic groups and language groups may preclude subgroup analyses. At recruitment into the CLSA, individuals living on federal land, including reserves, were excluded from participation because of the sample frames available for use. Indigenous people living off reserve were eligible for inclusion. With respect to language, only those able to participate in interviews in English of French were eligible for inclusion, thus potentially limiting the inclusion of ethnic minorities.

The majority of participants in the CLSA self-identify as white (91.8%), born in Canada (84.1%), and most often speak English at home (79.1%). Among those who were born outside of Canada, the highest proportion of immigrants is from Europe (10.7%). The most notable variation is seen for language by province; in the majority of provinces the proportion who reported speaking English most often at home is over 90%, whereas it is 76.3% in New Brunswick and 8.4% in Quebec (provincial data not shown).

Participants were asked about their cultural and racial background as well as their ancestral ethnic/cultural background. Among CLSA participants, 91.8% self-identify as White, 3.7% self-identify as Indigenous, including North American Indian, Metis, and Inuit, 0.8% identifies as South Asian, 0.6% identifies as Black, and another 0.6% identify as Chinese. The remainder of minority groups were combined due to small numbers, and account for 1.6% of CLSA participants. The province with the highest proportion of CLSA participants who identify as Black is Ontario (1.0%); for those who identify as Chinese it is British Columbia (1.5%) and for those who identify as South Asian it is Ontario (1.3%). The province with the least diversity among participants was Prince Edward Island (95.7% identify as white).

In addition to language most often spoken at home, participants were also asked about language first learned and still understood. A total of 69.3% reported that the first language that they learned and still understood was English, 19.9% reported that it was French, and 9.0% reported that it was neither English nor French. Again, this differed significantly by province, primarily Quebec, where 86.6% reported that their first language learned and still understood was French. In terms of participating in the CLSA, 81.4% chose to complete the interview in English and 18.6% chose to complete the interview in French (data not shown).

Marital status, family composition, and household characteristics

Marital status is known to be associated with health and mortality[24]. Those who are married have consistently been shown to have better health and lower mortality than those who are single, widowed or divorced[25]. This is more pronounced for men than women. In Canada, the rate of divorce has been reported to be highest for the 55-59 age group[26]. Accordingly, diversity in living arrangements increases from midlife onward. For example, the proportion of people of both sexes who are living in an apartment or condominium increases with age, as does those who are living in seniors housing[27]. Also, while the proportion of people living in their family home decreases with age, more men than women live with their spouse and live in their family home at older ages[27].

Family structure, number of children and childlessness have an impact on the health of older adults[28–30]. For example, the rate of mortality was found to be higher for childless men and women than for those with children in Norway[31]. However, the advantage of having children was the same regardless of children's sex (i.e., son vs. daughter). Relatedly, cohabitation status rather than marital status may be more closely associated with mortality status[32], perhaps reflecting quality of support.

The wide geographic dispersion of children is a relatively new phenomenon with impact for social connectedness, caregiving, and quality of life. Though having a child has a positive effect on health in later life, whether the number of children impacts the degree of meaningful support is not clear. Pet ownership has also been found to have positive effects on health and well-being[33,34]. In Canada, about 40% of households own at least a dog or a cat[35]. In addition to companionship, it is possible that having a sense of responsibility and purpose is one of the factors related to health of older adults. The CLSA provides the opportunity to study how health and social needs and outcomes differ as a function of marital status, family composition, and household characteristics.

In the CLSA, the majority of participants are married or live in a common law relationship (68.7%), though there are differences between men and women (Figure 1). Not surprisingly, these proportions change with increasing age groups. In the oldest age group (75-85) 73.5% of men but only 35.7% of women are married. As expected, the majority of those who are widowed in this age group are women (44.8% versus 15.7% for men).

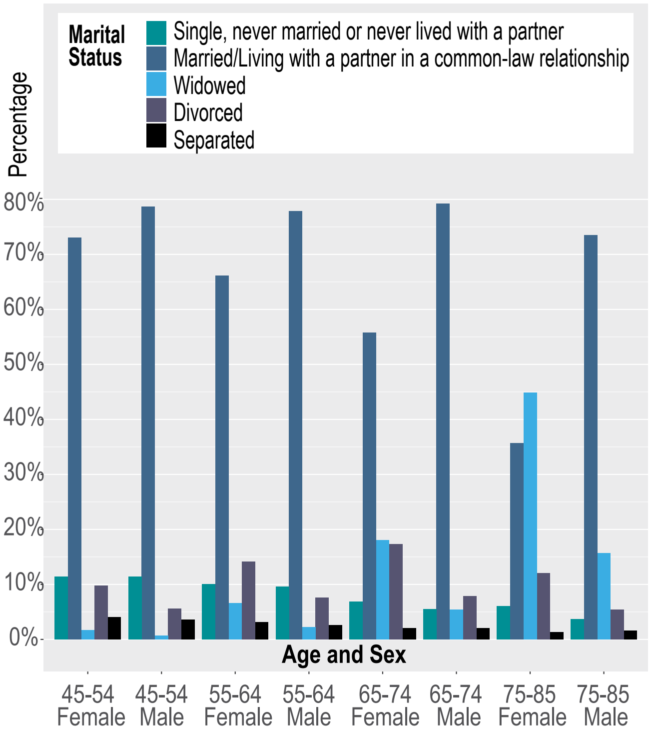

Figure 1 – Marital status of CLSA participants, by 10-year age group and sex

The mean number of children for CLSA participants increases by age group, from 2.0 (SD 1.3) among those aged 45-54 to 3.0 (SD 1.9) among those aged 75-85. These children can include living biological, adopted, or step children. The mean number of living siblings ranges from a high of 3.2 (SD 2.4) in the 55-64 age group to a low of 2.3 (SD 2.3) in the 75-85 age group.

The mean number of people in the household (in addition to the participant) ranges from a high of 2.0 (SD 1.3) among women and men aged 45-54, to a low of 0.5 (SD 0.7) among women and 0.8 (SD 0.7) among men aged 75-85. With respect to living arrangements, 71.2% of CLSA participants live in a single generational household, 27.0% in a two-generational household, and 1.6% in a three-generational household.

Overall, the type of dwelling that the majority of CLSA participants live in is a house (81.3%), the remainder in an apartment or condominium (17.2%) or seniors housing (0.8%). Appreciable differences are seen in the older age groups and by sex. Among those aged 75-85, 60.2% of women and 74.0% of men live in a house; and 3.8% of women and 1.7% of men live in seniors housing. It was a requirement at entry to the CLSA that participants be community-dwelling, however, they will be followed into institutions going forward.

The majority (85.0%) of CLSA participants own their home; the remainder rent their home (14.1%) or have some other living arrangement (0.8%). The only age and sex group that this differs appreciably for is older women. Among women aged 75-85, 72.9% own their own home, 24.9% rent their home, and 2.1% have another living arrangement. By comparison, 83.6% of men aged 75-85 own their own home.

Almost half (43.8%) of CLSA participants have a pet. Pet ownership is highest for the 45-54 year age group, in which 64.2% of women and 57.2% of men own a pet, and lowest for the 75-85 age group, in which 24.9% of women and 24.8% of men own a pet. Participants in Quebec have the lowest rate of pet ownership (39.7%), and those in the Maritime Provinces have the highest rate of pet ownership (NB 48.4%, NS 47.2%, and PEI 49.3%) (Provincial data not shown).

Religion and spirituality

Religion or spirituality has been identified as one of the factors that influence health and mortality. Especially, it has been suggested, that religious belief may be an important determinant of the well-being of older adults[36]. Note, however, that differences in religious affiliation may be related to differences in socio-economic status, including education and income. As Mackenzie and colleagues proposed, if the subjective experience of spirituality is what matters, religious activity, that is attending religious services, rather than religious affiliation may be of more importance. Indeed, church attendance has been reported to positively affect the health of older adults[37,38]. It is possible that attending religious services provides older adults with not only spiritual support, but also physical support. Those who attend religious services may have stronger connection with friends and family, who would provide support when needed[38]. The CLSA provides the opportunity to study how health and social needs and outcomes differ as a function of religious affiliation and religious activity.

The majority of CLSA participants report their religion as Christian (64.4%); of these, approximately half (47.4%) state their religion as Catholic. 21.0% of CLSA participants state that they have no religion, and the remainder identify as non-Christian, including Jewish (1.0%), Muslim (0.4%), Hindu (0.3%), Buddhist (0.5%), Sikh (0.1%) or another religion (1.8%). Higher proportions of men than women report having no religion. There is considerable variation in religion by province. For example, 82% of participants in Quebec identify as Catholic, compared to only 11.5% in British Columbia. The reverse is seen for participants who report no religion – 38.1% in British Columbia and 10.7% in Quebec. With respect to participation in religious activities, 23.6% of CLSA participants report at least weekly participation; 9.9% at least monthly, 18.7% at least once a year, and 46.6% report never participating in religious activities (Figure 2).

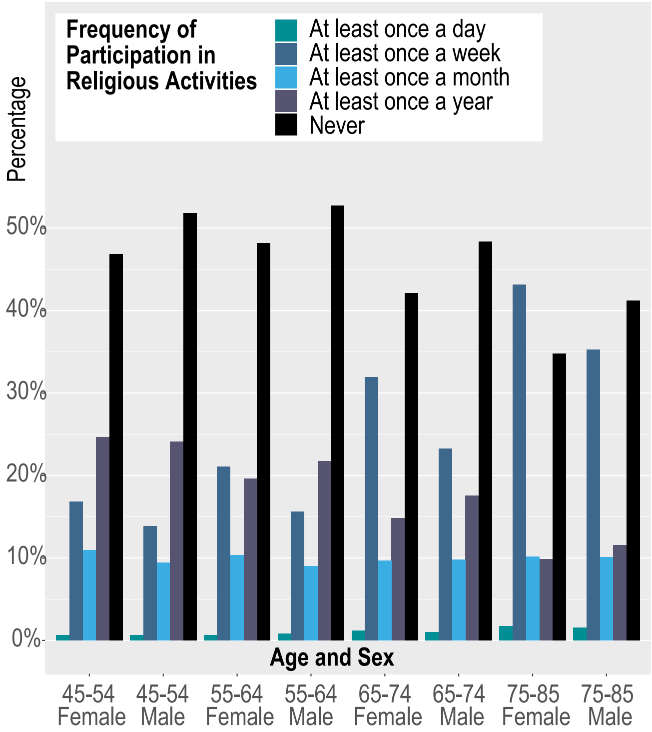

Figure 2 – Participation in religious activities among CLSA participants, by 10-year age group and sex

Education

Education is one of the key social determinants of health and it is well established as a critical factor associated with mortality and morbidity[39–42]. Higher educational attainment has been found to be related to lower morbidity and mortality in all age groups. Educational attainment is also associated with other social determinants of health, including income and occupation. It is also possible that those who have higher education are better integrated into social networks and structures that support health behaviours and provide greater access to health care. However, it is not clear how education is differently related to health between men and women as well as within men and women later in life. The CLSA provides the opportunity to study how health and social needs and outcomes, including mortality, differ as a function of education by age, sex, and province of residence.

The majority of respondents in the CLSA are well educated. As seen in Figure 3, 74.0% report having a post-secondary degree or diploma, 7.5% report having some post-secondary education, and 11.1% report graduating from secondary school. Only 7.1% of participants report having less than secondary school graduation. There is minimal variation by province, but greater variation by age and sex. In the age category 45-54 there is no appreciable difference between men and women in terms of the proportion with a post-secondary degree or diploma, but in older age groups, a higher proportion of men than women have a post- secondary degree or diploma. With respect to age, the proportion with a post-secondary degree or diploma ranges from 81.7% of women and 81.1% of men in the 45-54 age category to 59.8% of women and 66.0% of men with a post-secondary degree or diploma in the 75-85 age category. Inversely, the proportion of women and men with less than secondary school graduation ranges from 2.7% of women and 3.7% of men aged 45-54 to 16.5% of women and 14.0% of men aged 75-85.

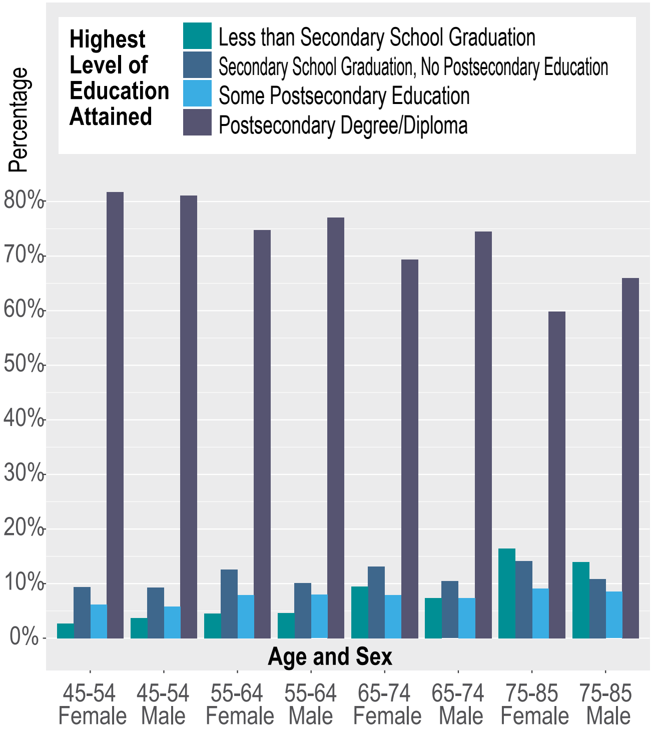

Figure 3 – Highest level of education among CLSA participants, by 10-year age category and sex

Income

Income, as well as education, is known to be one of the key indicators for socio-economic status and has a strong relationship with health[43]. A recent study in Canada[44] supports this pattern, showing that income level affects mortality regardless of the cause of death. Income is related to factors that impact health, including access to health services and health behaviours[45]. However, the relationship between income and health may not be linear. A US study reported that the relationship is much stronger among people with lower income. The median household income in Canada differs across provinces and territories[46]. The CLSA provides the opportunity to study how health, social needs and outcomes, including mortality; differ as a function of income by age, sex, and province of residence.

Unlike many studies and surveys in which the response to questions on income is low, the majority of CLSA participants chose to answer the questions regarding income. Only 6.5% of participants did not answer the question regarding total household income, and 7.2% did not answer the question on total personal income. As seen in Figure 4, the highest proportion of CLSA participants (33.4%) report their total annual household income to be in the $50-100,000 range; 5.7% of participants indicate that their annual total household income is less than $20,000. Women aged 75-85 are the age-sex group with the highest proportion with a total household income less than $20,000 (12.0%). The provinces with the highest and lowest proportion of participants with a household income greater than $150,000 are Alberta (23.0%) and New Brunswick (6.5%) respectively. The provinces with the highest and lowest proportions of participants with a household income of less than $20,000 are Quebec (8.8%) and Alberta and Ontario (both 4.0%) respectively.

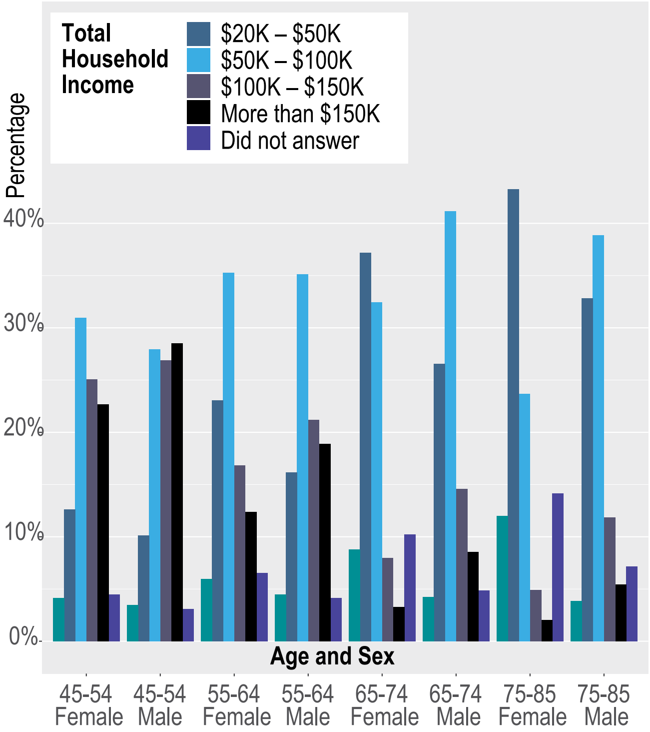

Figure 4 – Total household income category among CLSA participants, by 10-year age and sex

Work and Retirement

In addition to the fact that the proportion of Canadians over the age of 65 now exceeds the proportion of youth age 0-14, the proportion of the population who participate in the workforce is shrinking. Because of this shift, issues such as renewal of the workforce and knowledge transfer are becoming increasingly important. However, the employment rate for adults age 55 and older has been increasing for both women and men[47], leading to an overall older workforce. Moreover, the pattern of employment for older adults is not static. We have witnessed an increasing trend of older adults re-entering the work force after retirement, cycling in and out of both full time and part time employment[48].

The average age of retirement in Canada increased from 61 in 2005 to 63 in 2015[11] and is expected to continue to increase. Health, wealth, disability, and caregiving contribute to retirement planning and retirement age. In general, retirement has been found to be associated with improvements in psychological health and wellbeing, but there is no consistent pattern for physical health[49]. Although Canada has a public pension scheme, many segments of society, such as immigrants and the working poor, may not qualify for a pension or may not receive an adequate pension, contributing to inequities in health for an aging population.

As seen in Figure 5, 45.3% of CLSA participants indicate that they are completely retired; another 10.8% report that they are partly retired. Not surprisingly, the proportion retired increases with age for both men and women. Among women, 5.6% of those aged 45-54 report that they are fully retired, this increases to 37.9% among those aged 55-64. Among men, full retirement increases from 3.3% in the 45-54 age group to 31.0% in the 55-64 age group. At age 75-85, 89.5% of women and 86.0% of men report that they are fully retired.

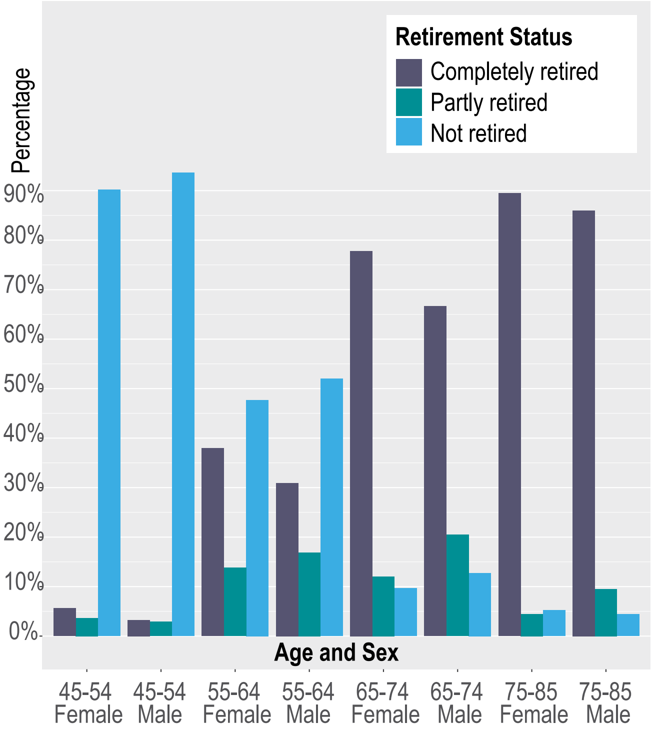

Figure 5 – Retirement status among CLSA participants, by 10-year age and sex

Among those participants who indicate that they are not fully or partly retired, the vast majority (over 99%) of CLSA participants report being in the labour force at some point in their lives, the exception being women in the 75-85 age category, of whom 31.4% indicate that they have never been employed. This likely reflects the way in which the questions were asked, in that older women who had never formally worked in the labour force did not therefore consider themselves retired.

Participants who indicated that they were not fully or partly retired were also asked if they were currently working at a job or business. Among these non-retirees, the vast majority indicate they are currently working; the exception being women aged 75-85 (45.2%). Moreover, 17.2% of respondents indicate that they work more than one job, the highest proportion being among 75-85 year old men (19.9%) (data not shown).

Key populations and Intersectionality

An advantage of a study of the magnitude of the CLSA is that it can allow for the examination of key population subgroups, particularly those that are known to be vulnerable and at risk of inequities in health as they age. These subgroups often lack information about themselves. Such subgroups include, for example, indigenous peoples, visible minorities, immigrants, veterans, and LGB. Indeed, Chapter 12 addresses factors of relevance to health and aging in the LGB community. Other subgroups that the CLSA can elicit useful information on include, for example, urban and rural populations (75% and 25% of CLSA participants, respectively), and those who are frail or live with a particular chronic disease. However, subgroup analyses can be difficult due to small numbers and lack of representativeness even in a study as large as the CLSA. Such analyses must be undertaken with care and sensitivity. A key concern when addressing intersectionality, or the intersection of sociodemographic characteristics such as race, class, and gender, is that cell sizes may become too low for stable estimates and may even risk individual identity. Studies, which address key population subgroups, should be conducted with the active involvement and oversight of individuals from the subpopulation under consideration.

Discussion

Characterizing the population is an important first step toward the long-term goal of understanding the complex interplay of factors that influence health and aging. While participants in the CLSA tend to be well off in terms of characteristics in general, key differences by age group, sex, and province were revealed. Importantly, it was noted that women, particularly older women, fare worse than men on a number of key characteristics known to impact health such as income and living alone. The intersection of characteristics such as race, education, and gender also deepen differences. Understanding and addressing inequities will improve the aging trajectory for all older adults. The CLSA is a rich resource for the investigation of health and aging among Canadians.

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4

Retirement in the Canadian Longitudinal Study on Aging

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Retirement in the Canadian Longitudinal Study on Aging

Key Insights

The Canadian Longitudinal Study on of Aging (CLSA) promises to be an excellent tool for the study of retirement as it will be able to follow individuals before, during, and after their retirement or retirements (as some individuals retire more than once). However, there are important insights from the baseline data including:

- For the age group 55-59, rates of complete retirement for women vary considerably by province, from about 20% in British Columbia to about 30% in Quebec and Newfoundland and Labrador. Comparable differences continue for ages 60 to 64 but start to fade for ages 65 to 69.
- The same provincial variation applies for retirement rates for men albeit with somewhat lower retirement rates below age 65.
- For both women and men, the total (partial plus complete) retirement rates of retirement by ages 70 to 74 vary relatively little by province although considerable differences remain in the partial retirement rates.
- In a question that allowed multiple responses, no single reason received a majority of responses. The fourth most common reason was health, given by about a quarter of all women and men retirees, and of these, reasons of physical health were more commonly reported than those of mental health.
- Taken as a percentage of those retired, about 20% of women and 30% of men “unretire” for some period. A significant minority of each group say they did this for financial reasons but including their earnings only 5% of the unretired report that their standard of living is inadequate.

- Unretirement employment is mostly part-time, particularly for those who worked part-time before retirement.
- Women and men who are completely or partially retired at younger ages are much more likely to have at least one restriction in Instrumental Activities in Daily Living (IADL). However, this difference between those who are retired and those who are not is quite small for ages 60 to 75.
- Income differences within age groups narrow as age increases. The income distribution in the CLSA sample is very similar to that from the 2011 National Household Survey that was associated with the Census.
- Overall, close to 80% of retirees said they managed very well or quite well, while 17% responded "get by alright" and only about 3% responded that they don't manage very well or had financial difficulties.

Introduction

One strength of the baseline CLSA data in studying retirement is that some of the questions are retrospective and hence have some longitudinal information. As is evident, the very large set of survey questions allows the linkage of retirement behaviours with other characteristics, perhaps particularly health, in ways that are not possible with other Canadian data sets. This capability is particularly important because the characteristics of government programs such as taxes and transfers as well as the government provision of in-kind benefits or services such as prescription drugs, other types of medical care and assisted living for the elderly are different in Canada from in other nations. As a result, the conclusions of empirical analysis from the data of other countries may not hold for Canada.[†]

We illustrate the value of the CLSA through a few illustrations using the initial samples, collected over the 2011-2015 period. First, we examine the data on retirement, contrasting across provinces the rates of retirement and the rates of full versus partial retirement. Second, we examine the permanence of retirement and the CLSA evidence regarding the return from retirement to the labour force.

Third, we examine information in the CLSA that describes individuals' restrictions on Instrumental Activities of Daily Living (IADL). This improves our ability to consider the possibility of extending working lives of older Canadians, which we consider a key policy issue. Past studies have shown health to be an important determinant of the decision to retire, even after accounting for financial incentives[1–3]. Recent studies have suggested the working lives of Canadians could be significantly increased[4]. [‡] An extension of working lives might raise aggregate per capita incomes, and hence the average material standard of living. It would also reduce pressure on government budgets by

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† In addition, there is enough variation within Canada to permit potential study of policy effects through interprovincial comparison. Here we only hint at such possibilities.

‡ Milligan and Schirle (2017)4 study the health and mortality of older Canadians, suggesting sizeable potential for raising employment rates of older men and women. However, unlike other countries similarly studied in Wise (2017)4, the Milligan and Schirle (2017)4 study is not based on longitudinal survey data and is limited to using cross-section measures of health and employment status.

increasing tax revenues and reducing the extent and duration of government transfer payments made to the retired[5]. However, one of the conditions for the desirability of such a policy is that there be a significant number within the older population who are physically capable of working. Moreover, we are interested in better understanding the extent to which individuals with significant health issues retire disproportionally.

Finally, we examine some of the information in the CLSA regarding material preparations for retirement. Using those data and incomes data, we also examine inequality and its relationship to age among the older population.

Retirement by Province

Researchers who study retirement often have difficulty operationalizing the concept (see Denton and Spencer, 2009)[6]. What does it mean to be "retired"? Is someone who left their main employment but still works a small number of hours per year retired? Does it matter if they continue working for their original employer, or for a new employer? If someone spent most of their working life out of the paid labour market, are they retired?

The CLSA deals with this question through self-identification, asking individuals whether they are fully or partially retired. (Figure 1) graphs the total rate of retirement (including a breakdown of complete and partial retirements) by province for women and men in age groups 55-59, 60-64, 65-69, and 70-74 (which are the four age brackets that contain most retirement transitions).

For both women and men, total retirement rates (that is complete retirement rates plus partial retirement rates) increase with age. (That is, retirement rates are higher for the lower panels representing higher ages, as opposed to the higher panels representing younger ages). Most retirements are complete retirements and so not surprisingly, complete retirements also increase with age for both women and men. However, for women, partial retirement rates tend to have a mixed pattern with age up to ages 65-69, mostly increasing or staying the same but in some cases dropping slightly. Up to the age 65-69 range, partial retirement rates increase for men in all provinces. But for ages 70-74, partial retirement rates for both women and men in all provinces fall sharply.

There are some interesting differences across provinces. In (Figure 1) for women, for ages 55-59, there is some variation. For example, complete retirement rates for women are around 30% in Quebec and Newfoundland and Labrador but less than 20% in British Columbia. The differences across these provinces in the total retirement rates are even greater. All three of these provinces have women's partial retirement rates around 10% in this age group, which are somewhat lower than those in other provinces.

At higher ages, there is less variation in the total retirement estimates. At ages 65-69 and 70-74, Quebec, New Brunswick, and Newfoundland and Labrador have relatively large women's total retirement rates but less women's partial retirement within retirement. Saskatchewan sticks out in having very high partial rates of retirement for women (around 20%) for ages 55-59 and ages 60-64. However, Saskatchewan's partial retirement rate for women is more typical (around 10%) for higher ages. By age 70-74, high rates of women's complete retirement and low women's rates of partial retirement (typically close to 5%) hold across all provinces, with relatively small variation, although Alberta and Prince Edward Island have higher women's partial retirement rates than the other provinces.

Broadly speaking, the same patterns hold in (Figure 1) for men. Again, there is considerable variation across provinces. For the 60-64 age group, the complete retirement rate for men in New Brunswick approaches 60% while it is only 30% for Alberta, Saskatchewan, and Prince Edward Island. The total retirement rates are not quite as different across provinces because at ages 60-64, some of the provincial differences among men's complete retirement rates are offset by differences in partial retirement rates. Just as for women, Saskatchewan has relatively high partial retirement rates for men. But unlike for women, for Saskatchewan men partial retirement rates remain higher than the other provinces at the older age groups, and still exceed 20% for ages 70-74%. The lowest partial retirement for men at this age is that of New Brunswick at about 10%.

For the most part, we see that differences across provinces, sex, and age groups in the complete retirement rates largely mirror differences across groups in their labour force participation rates. For example, the portion of Ontario women aged 55-59 who were completely retired was 25% in the CLSA sample. The comparable participation rate of Ontario women aged 55-59 was 70% (averaged over the 2010-2015 period, based on the Labour Force Survey).[§] Similarly, while 18% of Ontario men aged 55-59 were completely retired, 78% participated in the labour force. In Quebec, 32% (23%) of women (men), aged 55-59 were completely retired and 65% (76%) participated in the labour force.

The CLSA provides some information regarding individuals' reasons for entering retirement. Answering a question, which allows multiple responses, about 45% of both women and women choose one of their responses as the straightforward "wanted to stop working". This does not appear to give information about voluntary versus involuntary retirement (e.g. Gomez and Gunderson, 2011)[7] as a subsequent question directed specifically at that issue finds that only about one fifth of retirees report that their retirement was not voluntary.

Returning to the multiple response question on retirement reasons, there was not an overall majority response for any reason but the closest was "financially possible" chosen by 38% of women and 49% of men, while the next closest was "completed the required years of service to qualify for pension with 23% of women and 39% of men. Health, "Wished to pursue hobbies or areas of interest" and "agreement with spouse or partner[¶] were next, each with between a quarter and a fifth of the total responses with only small differences between women and men. Retirement incentives and organizational restructuring had percentages around 10% (somewhat higher for men than for women) and mandatory employer policy had a percentage of less than 5%. Retiring to provide care was listed as a reason by 14% of women and about 4% of men. The "Other" category had less than 1% for both sexes.

While health was a significant but not the most common reason given, the CLSA allows some further exploration. Of those that list health reasons, about 55% of women and about 59% of men say that the health reasons were physical while just over 20% of each sex says they were emotional/

[§] Labour Force Survey estimates of the participation rate referred to in this section are found in Statistics Canada's CANSIM Table 282-0002, averaging annual rates over the period 2010-2015.

[¶] See Schirle (2008)[1] on the interdependence of the labour force participation rates of older men with their spouses.

Figure 1 – Percentage of completely and partially retired Canadians by age, sex, and province

mental health including stress. The remainder say there was a combination of the two types of health problems. As the longitudinal aspect of the CLSA develops, it will be possible to study the feedback relationship of retirement on health[8].

"Unretirement"

In the tracking CLSA sample, there are 1,245 women and 1,748 men who had retired but responded that they were currently employed. If for comparative purposes we take this as a percentage of those who report they are currently retired, the values would be about 20% for women and about 30% for men. For women who left retirement for the work force, about 32% returned to their pre-retirement employer, 57% began with a new employer and 10% started a new business. For men, the corresponding percentages are 22%, 60%, and 17%.

Around 70% of women and 54% of men who "unretire" take part-time work. The CLSA also asks whether the work is permanent (lacking a fixed endpoint) as opposed to contract (a fixed endpoint). For those women who have returned to work, a slight majority (52%) report having a permanent position, while 41% report having a term or contract position. Among men, however, men are slightly more likely to hold a contract (50%) than a permanent position (47%). Overall, of those who unretire, less than one-quarter report that they had part-time work immediately before retirement: the very large majority of these works part-time in unretirement. However, even of those who had full-time work before retirement, around 60% unretired to part-time employment.

It is also interesting that about 85% of both women and men who return to work after retiring respond that they have an adequate standard of living, with about 10% saying their standard of living is barely adequate and less than 5% saying inadequate. This is suggestive that the remuneration for such work is sufficient for many individuals. Of those who unretired, only 37% of women and 41% of men said that financial considerations were a factor in their decision.

For some individuals, the primary motivation for returning to work is not financial. For example, 7% of both women and men said that improved health was a factor in their decision to work.

Restrictions on Daily Living and Retirement

While Chapter 8 of this report explores aspects of physical function, disability and falls in some detail, in this chapter we only illustrate one empirical relationship, that among the Instrumental Activities of Daily Living (IADL), retirement status and age. Arguably, IADL restrictions may be a determinant of workplace capability as one indicator of health, which we have noted, has some association with early retirement. In any case, (Figure 2) shows the percentage of women in the CLSA sample who have no IADL restrictions by retirement status and by age. It can be seen that in the age group 45-49, those who are completely retired are less likely to be free of an IADL restriction, although even among those completely retired about 70% have no IADL restrictions, compared to 88% among the partially retired women and 95% among women who are not retired. The difference between these groups of women shrinks somewhat for the 50-54 and 55-59 age groups. There is almost no difference in the IADL-free percentages for those 60 to 75 years old. However, differences across the complete, partially, or not retired groups of women re-appear for the 75-79 and 80-85 age groups. It would appear that IADL restrictions for the 60-75 year old groups likely play a relatively small part in

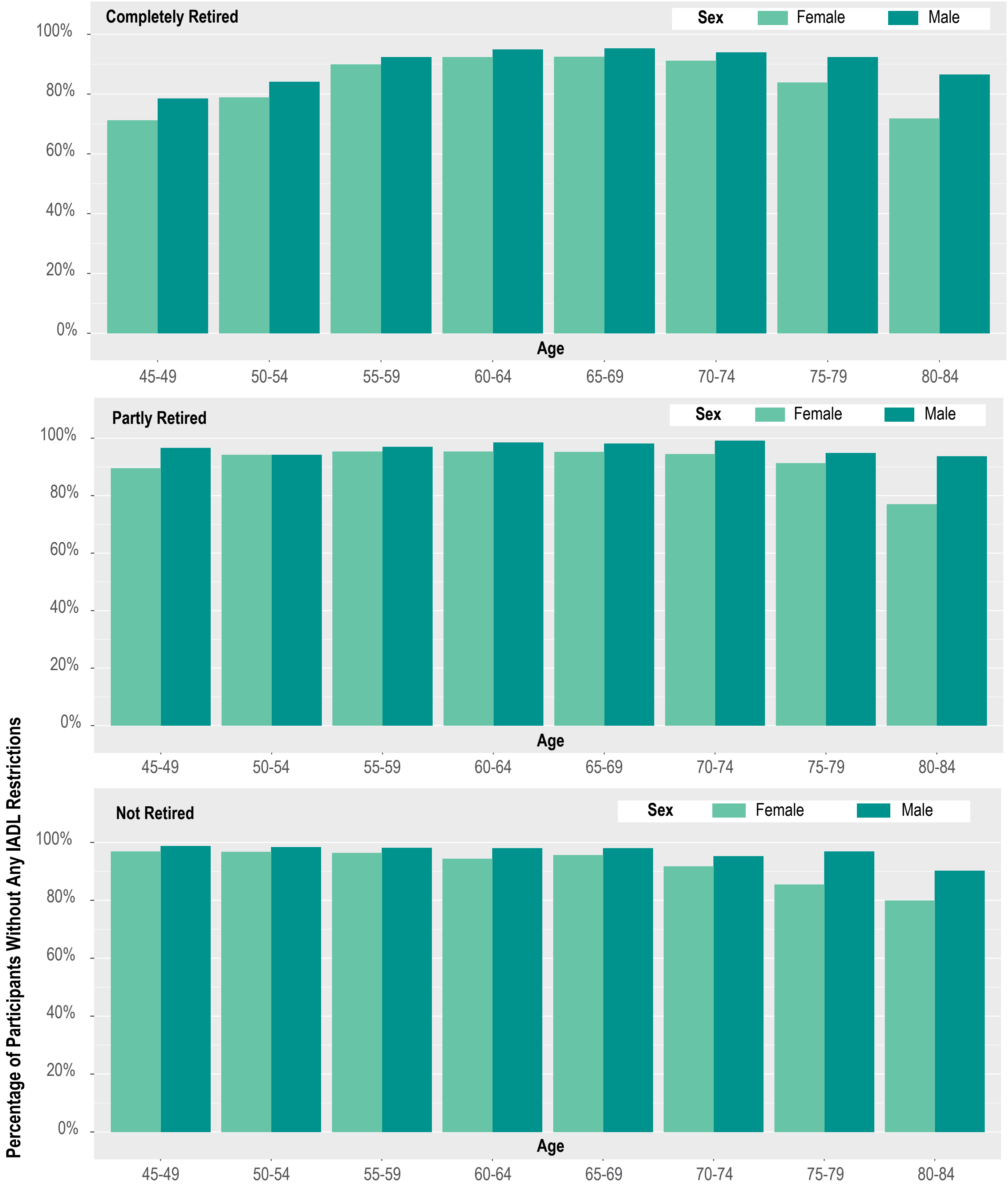

Figure 2 – Percentage of Canadian men and women who have zero restrictions in Instrumental Activities of Daily Living (IADL) by age and retirement status

explaining retirement status among women. When viewed in light of (Figure 2) and various studies showing important effects of retirement income policy affecting men and women in this age group[1,9–12], the IADL results for women age 60-75 might suggest there is room for policy levers to encourage employment for women in this age group.

Indeed the same general findings hold for men, albeit at even lower rates of reported IADL restriction. What is striking is that for both women and men in the CLSA sample, there is no discontinuity during the normal ages of retirement from 60 to 70. For women, reported IADL restrictions appear to become more widespread around age 75. For men the corresponding age is 80.

The Standard of Living in Retirement

Here we examine indicators that help describe the standard of living in the CLSA sample. First, we consider household income. Second, we examine reports of whether one's standard of living was expected to be adequate before their retirement. We relate these pre-retirement expectations to individual reports of how they are getting along financially.

In (Figure 3), we present the raw household income distribution where for brevity we have pooled men and women in the CLSA sample. It can be seen that incomes fall with age, but that much of that is due to large reductions in the percentage of households with incomes in excess of $100,000 (see also Veall, 2009)[13]. In that sense incomes become equal within an age group at higher ages. Consistent with studies of senior poverty showing an increased likelihood of low income with higher age[14], the percentages of individuals in the CLSA sample with household incomes less than $20,000 increase steadily with age. However, even for the age group 80-85, the percentage with income below $20,000 does not reach 10%. With age, a growing proportion of the CLSA sample has an income between $20,000 and $50,000. At ages 65-69, 30% have incomes in this range and by ages 80-85; it is close to 40%.

When we construct a similar profile of household income using the 2011 National Household Survey (NHS, associated with the Census) we see strikingly similar patterns. Shown in (Figure 4), we see a growing proportion of NHS households in the income range between $20,000 and $50,000. The proportions are slightly higher in the NHS, as 34% of households aged 65-69 have income in this range.

We now turn to information on individuals' standards of living in the CLSA. The CLSA allows us to relate what retirees reported as their pre-retirement expectations regarding standard of living to current responses. While the questions were on two different surveys and hence there is a small amount of attrition, and there is the additional potential issue of recall bias, nonetheless it is striking that just under 80% of retirees said that pre-retirement they expected their standard of living in retirement to be adequate. Of these about 85% said that in retirement, they manage very well or quite well and 12% said that they "get by alright". Fewer than two per cent responded that they do not manage very well or have financial difficulties.

About 12% of retirees said that before their retirement they had expected their retirement standard of living would be "barely adequate". Of these 57% said that in retirement, they manage very well or quite well, 34% said they "get by alright" and only about 7% reported that they do not manage well or have financial difficulties.

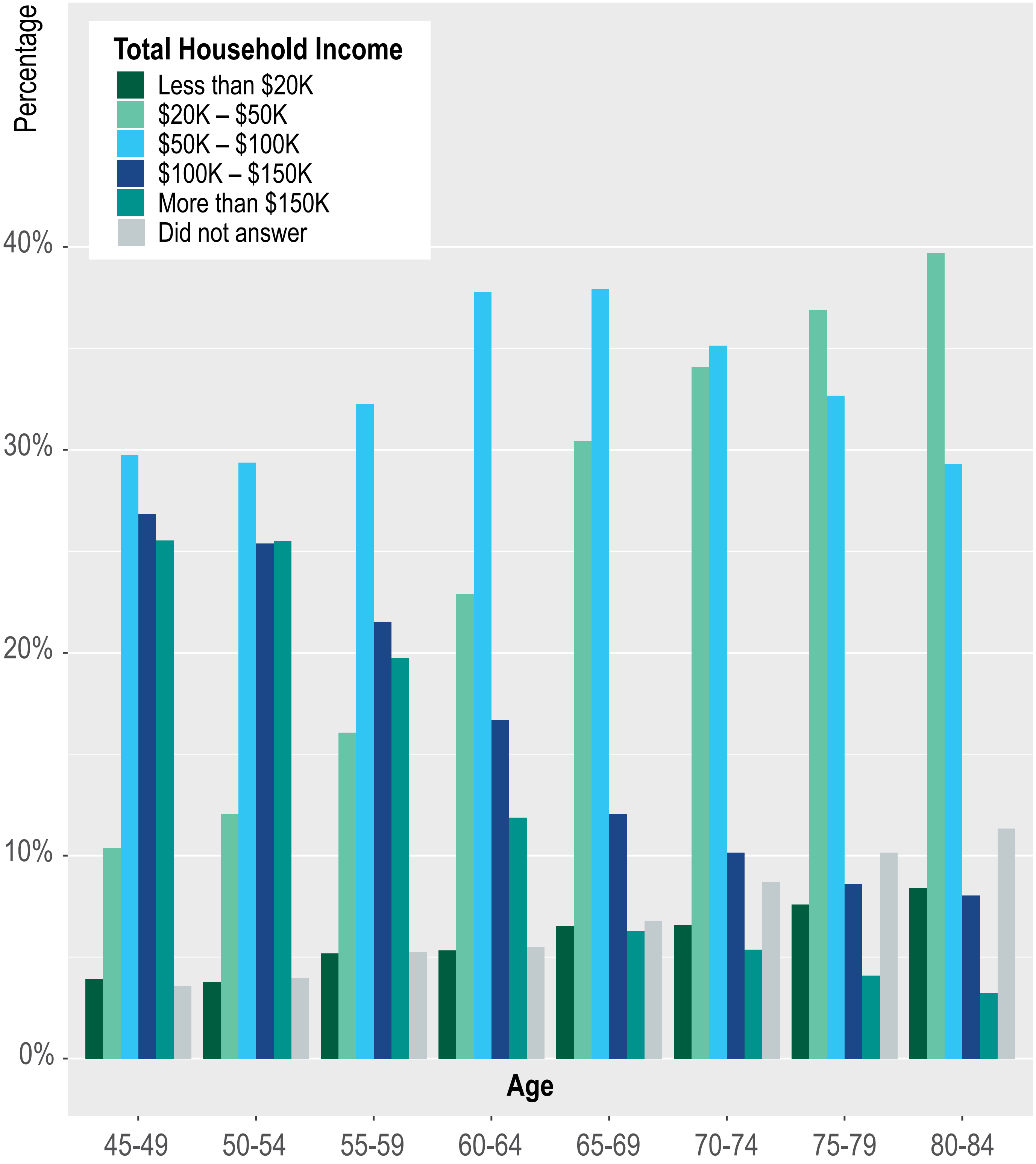

Figure 3 – Percentage of CLSA respondents in each household income bracket by age

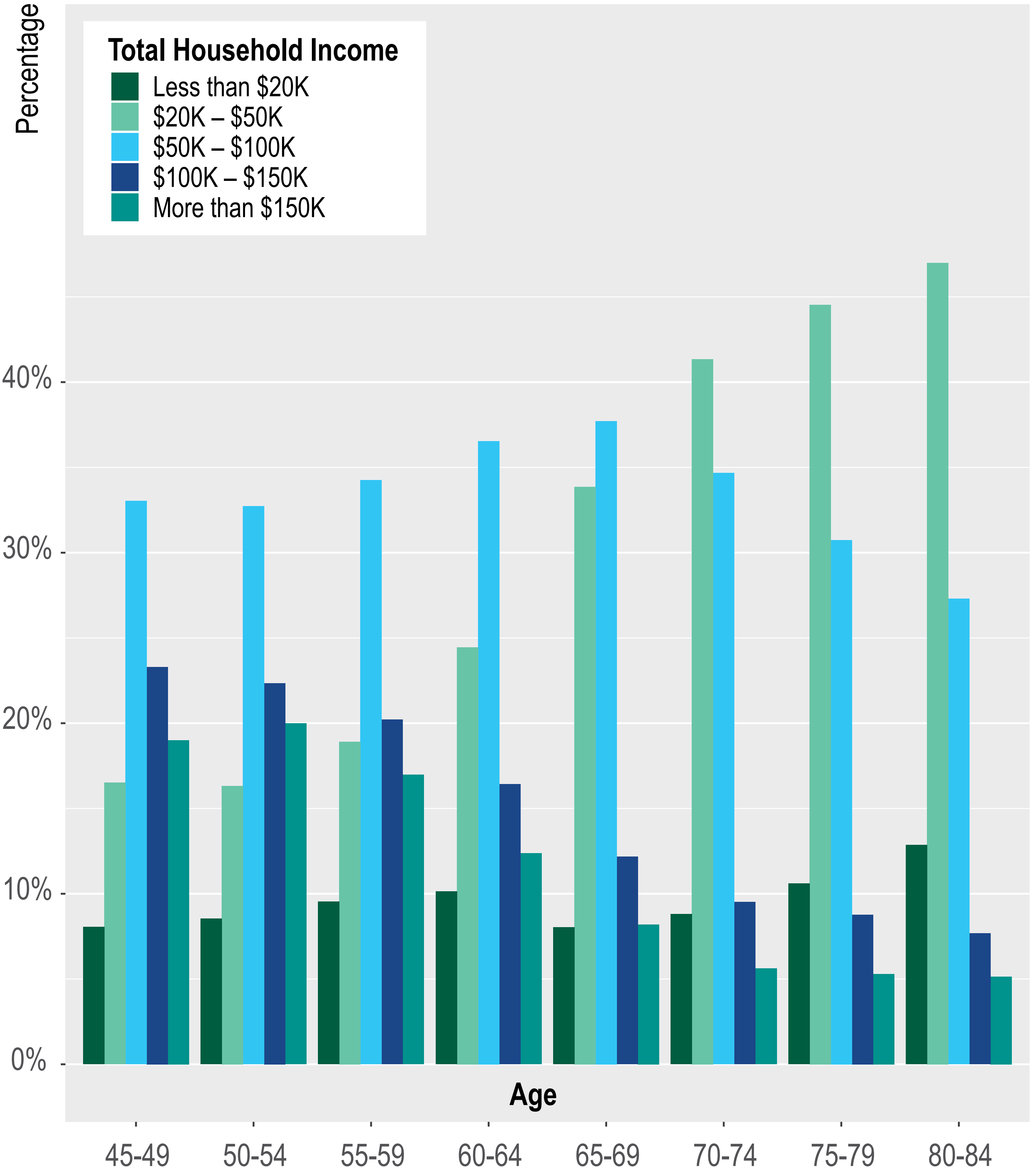

Figure 4 Percentage of NHS respondents in each household income bracket by age

In addition, about 7% of all retirees expected pre-retirement that their retirement standard of living would be “inadequate”. Of these, 50% said that they actually manage very well or quite well and about 34% say they “get by alright”. About 15% say they don’t manage well or have financial difficulties.

Overall, close to 80% of retirees said they managed very well or quite well, while 17% responded “get by alright” and only about 3% responded that they don’t manage very well or had financial difficulties. The picture that emerges is that retirees recall themselves as having predicted their retirement standard of living reasonably well, if somewhat pessimistically and that only a small percentage of retirees self-report as having difficulties managing financially.

Discussion

Even without the longitudinal aspect, the Canadian Longitudinal Study on Aging (CLSA) provides important information about the nature of retirement and its relationship to health and standard of living. Provincial variation in retirement behaviour suggests that industry mix and potentially economic policies may make a difference. The data on Instrumental Activities in Daily Living suggest activity restrictions play an important role in early retirement, less of a role between ages 60 and 74, and then become more important again at age 75 for women and age 80 for men. The income distribution in the CLSA sample is equal for those at older ages. About 60% to 65% of those approaching retirement report that they expect to have an adequate standard of living (as opposed to “barely adequate” or “inadequate”) during retirement.

In this short chapter, we did not explore any of these issues in depth. The objective here is rather to illustrate the nature of the data and to survey the lay of the land for future research. Clearly, the prospects for analysis increase exponentially when the second wave survey results (Follow-up 1) become available and true longitudinal research is possible.

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5

Loneliness, Social Isolation, and Social Engagement

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Loneliness, Social Isolation, and Social Engagement

Key Insights

The purpose of this chapter is to investigate patterns of loneliness, social isolation, and social engagement in the CLSA, and how they relate to factors, including age group, sex, marital status, and living arrangement. Associations with perceived happiness, life satisfaction, and depression are also shown. The results provide an exploratory lens on this topic that can be used as impetus for future research into this important topic.

The analyses in this chapter reveal that:

- Social isolation is a multifaceted concept as indicated by the variation in associations across different measures.
- The percentage of individuals reporting being lonely at least some of the time is higher among women of all ages than for men, and this percentage rises with age only for women.
- The preference for more activity is high overall, but declines across the age groups.
- The mean number of community activities (range = 0 - 8 activities) hovers around 4 over the age groupings, the mid-point on the scale, but it is slightly higher for women than for men.
- The mean scores in the MOS Social Support Scale range between 78.81 (women 45-64) and 82.78 (men 65-74); thus reflecting relatively high levels of social support across all age and sex groups.
- The percentage of persons reporting being lonely some or all of the time is highest among the non-married/non-partnered groups: widowed, divorced/separated, and single in that order. In addition, loneliness is higher among married women than married men, but this sex difference reverses for all other non-partnered groups. Rates of reported loneliness decrease over the three age groups, except for married women.

- The desire for more participation in activities is highest among the divorced/separated marital status group, and exhibits a strong inverse association across age groups.
- Perceived loneliness is considerably more prevalent among persons living alone versus those who live with somebody. This pattern is more pronounced among men, and is maintained across age groups with only slight variations.
- The preference to participate in more activities is highest for middle-aged persons (45-64) compared to 65-74 and 75+ age groups, and this pattern is consistent across living alone or not.
- Individuals reporting that they are lonely at least some of the time are considerably less likely to report being happy and this trend decreases with age. Those who report being rarely or never lonely also report high levels of happiness; this finding is constant across the age and sex groups.
- Persons who express a desire to participate in more activities tend to report lower levels of happiness than those who have no desire for more activities, regardless of age or sex category.
- Individuals who report being lonely at least some of the time report lower life satisfaction than those stating that they are rarely or never lonely.
- The desire to engage in more activities is slightly associated with lower levels of life satisfaction.
- Loneliness is strongly associated with scores on the CES-D depression screen.
- The desire to engage in more activities is only modestly associated with the CES-D depression measure, but strongly with the CES-D depression screen.
- The CLSA data offer potential opportunities to further examine and understand the complex causes and consequences of loneliness, social isolation, social engagement, and aging.

Introduction

Social engagement is a fundamental aspect of the human condition. Social isolation reflects the absence of social engagement and social connectedness within family, friendship, and community social networks. It is a multifaceted concept that is commonly defined as a low quantity and quality of contact with others, and considers the number and types of social network contacts, feelings of belonging, sense of engagement with others, and related attributes[1–5]. These social dimensions have gained attention in the gerontological literature, given that social networks comprised of family and friends tend to shrink with age, resilience declines, and one's ability to live independently in the community becomes challenged in old age[6–8]. In addition, social isolation has been linked to higher health care utilization and poor health in older age[9,10].

While social isolation typically pertains to the objective social contacts in an individual's social network, loneliness is the subjective perception that intimate and social needs are not being met. Thus, social isolation and loneliness share conceptual and empirical dimensions, but they are also unique. For instance, a person with moderate social connections may feel lonely; and conversely, an individual socially isolated may not feel lonely because they prefer this arrangement. Subjective perceptions of loneliness and objective assessments of social isolation are both important correlates of health and well-being in middle and later life, including mental health, frailty and chronic illnesses, and mortality[7,9,11].

In previous studies, the prevalence of social isolation has been variable, depending on population and survey type. It has been estimated that approximately 16% of seniors felt isolated from others often or some of the time, based on the 2008/09 Canadian Community Health Survey[12]; and 22.7% felt lonely, based on analyses of the 2010-2013 CLSA Baseline Tracking Cohort (21,241)[13]. However, the prevalence of those who are chronically isolated or lonely is estimated to be considerably lower; approximately 10 per cent report being affected by social isolation for lengthy periods of time[3,14].

Another way to look at social connections is in terms of social engagement, social activity, or social capital, all of which have been found to be important for health and well-being[5,15,16]. Social connections may take the form of quantity and/or quality of the family and friendship social networks, differing configurations, or types of network groups[6], as well as activities in community organizations, such as volunteering, leisure, or religious activities, all of which contribute to social isolation/engagement over the life course[17]. While most middle-aged and older people are embedded in a mutually supportive social network, and are typically socially engaged, there is a subset of individuals who experience levels of social isolation and loneliness that is deleterious to their mental and physical health, and well-being.

Research gaps remain in the identification of risk and protective factors associated with social isolation, loneliness and social engagement, and their effects on health and well-being, especially among vulnerable older groups. Some of the groups that have received attention include but are not limited to persons who are: widowed, in poverty, living alone, living in rural or remote areas, caregivers, members of marginalized groups, and those experiencing episodic or lifelong physical and mental health[2,3,7,11,13].

The CLSA Sample

The combined Comprehensive and Tracking Cohorts (Versions 3.2 and 3.3, respectively CLSA, n=51,338) were used in these analyses (see Chapter 2 in this report for full details). The data were weighted using the trimmed CLSA combined weighting factors for descriptive analyses. We utilized the full sample of persons aged 45 to 85. There were only small percentages of missing data, but these were removed from all figures and charts.

While there are numerous potential measures of loneliness, social isolation and social engagement, as well as correlates and outcomes of these measures, this report focuses on a few key factors only. This chapter provides descriptive patterns of associations, but does not include tests of statistical significance.

Measures

AGE AND SEX GROUP DISAGGREGATION

The prevalence rates (including confidence intervals) of selected indicators of loneliness, social isolation and social engagement were disaggregated by age group (45-64; 65-74; and 75+), and by men and women. Note that the CLSA only included participants up to age 85.

LONELINESS, SOCIAL ISOLATION AND SOCIAL ENGAGEMENT

This report will detail patterns of social isolation (including loneliness) and social engagement using CLSA baseline data. Four measures were used in the subsequent analyses. 1) *Loneliness* was based on a single item from the Center for Epidemiological Studies Depression (CES-D) Scale[18] that assessed how often a participant felt lonely over the past week. This measure ranged from “all of the time, 5-7 days”, “occasionally, 3-4 days”, “some of the time, 1-2 days” to “rarely or never, less than 1 day”. This Likert scale was recoded into a dichotomy of “at least some of the time” and rarely or never”. Analyses involving associations between the single item loneliness scales were not conducted with scores on the CES-D due to potential bias; however, they were conducted for the depression screen, given the small effect that this would have on meeting the CES-D cut-point. 2) *Desire to Participate in More Activities* was a yes, no response set. 3) *Frequency of Community/Social Participation* was calculated as a count of activities in which the participant engaged more frequently than once per month over the past 12 months. We used all eight activities reported in the CLSA data set: sport, religious, volunteer, educational, or cultural, clubs or fraternities, neighbourhood associations, other recreational, and family/friends outside of the home. Social participation was a categorical measure developed by researchers at the CLSA. This variable asked the frequency of participation in activities with family or friends in the past 12 months. The answers ranged from “once a day”, “at least once a week”, “at least once a month”, “at least once a year”, and “never”. This question was recoded into “at least once a week or more” and “at least once a month or less”. 4) *Social support* was measured using the Medical Outcome Study (MOS) Social Support Survey Scale[19]. The MOS consists of 19 items measuring the social support elements of emotional/informational support, affection support, tangible support, and positive social interaction. Each question ranges from 1 (none of the time) to 5 (all of the time). The scale has a range of 19-95 with higher scores indicating greater levels of social support.

CORRELATES AND OUTCOME MEASURES

In order of presentation in tables, the following measures were used. 1) *Marital Status* was coded into married/living with a partner, never married or never lived with a partner, divorced/separated, and widowed. 2) *Living Alone* was coded as yes and no, based on a living arrangement item. 3) *Happiness* was based on a single ordinal item, dichotomized into: rarely or never and all of the time/some of the time/occasionally and all of the time (given the negative skewness of the distribution for this variable). 4) The five-item Diener *Satisfaction with Life Scale*[20] ranges from 5 to 35 with higher scores indicating greater life satisfaction. Individual questions are answered on a scale from 1 (strongly disagree) to 7 (strongly agree). 5) The *CES-D-10 Depression* Scale[18] contains 10 questions on specific depression symptoms such as hopefulness, appetite, and concentration. Each question has possible answers from 0 (rarely or none of the time, less than 1 day) to 3 (most or all of the time, 5-7 days), with the total score ranging from 0-30. 6) *CES-D-10 Depression Screen* is a dichotomous classification of depression based on CES-D-10 scoring.

Age and Sex Patterns of Loneliness, Social Isolation, and Social Engagement

LONELINESS AFFECTS OLDER WOMEN MOST

Table 1 shows patterns of our four measures: loneliness, desire to participate in more activities, community participation, and the MOS Social Support Scale by age group (45-64, 65-74 and 75+) and sex. Two key trends can be observed in these data. The percentage of individuals reporting being lonely at least some of the time is higher among women of all ages than for men, and this percentage rises with age only for women. For example, it is reported by 23.10% of women aged 45-64, 24.71% for those aged 65-74, and a high of 30.83% for those aged 75+. For men, the percentages are 20.44%, 17.91%, and 19.41%, respectively by age group. Indeed, it appears that loneliness is relatively stable, with a slight curvilinear pattern for men across this age spectrum.

THE DESIRE FOR MORE ACTIVITIES IS HIGH AND DECLINES WITH AGE

Table 1 also provides the percentage of persons reporting that they desire to engage in more activities by age group and sex. The preference for more activity is high overall, but declines across the age groups. It is also slightly higher for women than for men. Agreeing with a desire for more activities declines from a high of 48.86 for women aged 45-64, to 35.42% for those aged 65-74, and to 32.75% for the oldest age group. For men, the percentages are 46.90%, 31.15%, and 30.51%, respectively.

TABLE 1 LONELINESS, DESIRE TO PARTICIPATE IN MORE ACTIVITIES, COMMUNITY PARTICIPATION, AND THE MOS SOCIAL SUPPORT SCALE BY AGE GROUP AND SEX

Isolation measure	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Lonely at least some of the time (%)	23.10%	20.44%	24.71%	17.91%	30.83%	19.41%
Desire to participate in more activities (%)	48.86%	46.90%	35.42%	31.15%	32.75%	30.51%
Participation in community activities – Mean (SD)	3.75 (1.77)	3.59 (1.76)	4.05 (1.85)	3.83 (1.90)	3.94 (1.92)	3.77 (1.98)
MOS Social Support Scale – Mean (SD)	83.87 (16.00)	83.20 (17.58)	82.93 (16.66)	83.75 (17.71)	79.99 (17.54)	81.75 (18.70)

COMMUNITY/SOCIAL PARTICIPATION REMAINS STABLE ACROSS AGE GROUPS, SLIGHTLY HIGHER AMONG WOMEN

Table 1 also presents the mean level of the eight community participation measures by age group and sex. The mean frequency (range = 0-8) of participation hovers around 4 across the age groupings, but it is slightly higher for women than for men. For women, it ranges from a low of 3.75 (45-64) to 4.05 (65-74), whereas for men, it ranges from 3.59 (65-74) to 3.83 (75+).

SOCIAL SUPPORT IS HIGH AND REMAINS STABLE ACROSS AGE GROUPS

Table 1 also provides the mean level (range = 0-100) of the MOS Social Support Scale by age group and sex. Note that this is a composite scale measuring domains of emotional/informational support, affection support, tangible support, and positive social interaction. Mean scores in the MOS range between 83.87 (women 45-64) and 83.75 (men 65-74); thus reflecting relatively high levels of stable social support across all age and sex groups.

In sum, loneliness affects older women more than men, yet the desire to participate in more activities declines with age. The mean number of community/social activities and the MOS Social Support Scale are relatively stable across the age groups, and only the former shows a slightly higher mean number of community/social activities for women than for men.

Patterns of Loneliness and Social Isolation across Marital Status, Age, and Sex

INTERACTIONS AMONG MARITAL STATUS, AGE, AND SEX ON LONELINESS

As shown in *Figure 1a* (full Tables shown in Appendix 1), there are three major patterns: a) perceived loneliness is significantly higher among widowed, divorced/separated, single, and married/partnered in that order (compare grouped columns across martial statuses); b) loneliness is higher among married women than married men, but this sex difference reverses for all other non-coupled marital statuses; and c) loneliness decreases across the three age groups, except for married women. Among married women, the percentage of persons reporting being lonely at least some of the time was reported by 18.71% of those aged 45-64, 17.52% for those 65-74, and 20.40% for those aged 75+. For married men, the respective rates were 14.83%, 12.66% and 12.89%. In sharp contrast, loneliness is reported at considerably higher rates among the widowed. Among widowed women, the percentage of reporting being lonely at least some of the time was reported by 39.63% of those aged 45-64, 42.20% for those 65-74, and 41.21% for those aged 75+. For widowed men, the respective rates were 56.34%, 59.23%, and 50.16%. As observed in *Figure 1a*, the patterns of loneliness for the single and divorced/separated groups fall between these extremes, and are relatively similar to one another, with some nuances such as single women 75+ reporting the lowest rate of loneliness (27.63%).

To summarize, overall, the pattern of feeling lonely is most pronounced for widowed individuals, especially widowed men aged 45-64, although the other age groups also experience high rates of loneliness. Thus, the marital status effect on loneliness is the strongest, followed by age group and sex effects, but the combination of these variables results in some interesting interactions. For instance, the highest reported loneliness occurs for widowed men aged 45-64, and the lowest occurs for married men aged 75+. Whereas, the highest loneliness rates among married individuals are reported among older women (75+), compared to the other age group and sex categories (see Figure 1a). These results are consistent with literature showing that marriage is a stronger protective effect for men, and that widowhood experienced earlier in the life course is more challenging than in later life[21].

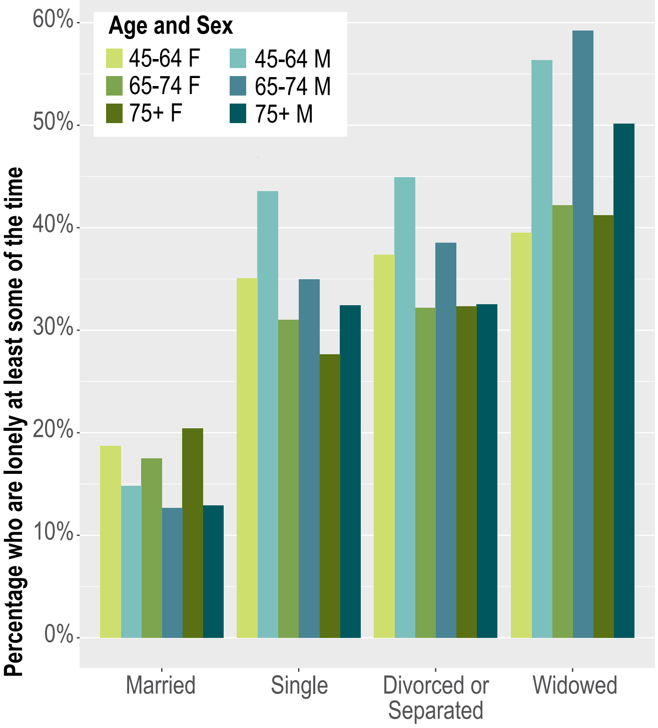

Figure 1a – Percentage who are lonely at least some of the time stratified by marital status, age, and sex

THE DESIRE FOR MORE ACTIVITIES DECLINES WITH AGE, HIGHEST AMONG DIVORCED/SEPARATED PERSONS

As shown in *Figure 1b*, there is a clear inverse age pattern of a desire to participate in more activities, especially between ages 45-64 and the older two age groups, among all marital status groups. While the most pronounced trend is the decline over age, the highest preference for increased participation occurs for divorced/separated persons of all age and sex groups.

For example, among divorced/separated women, the desire for more participation in activities is 50.90% for those aged 45-64, dropping to 36.16% and 37.63% for those aged 65-74 and 75+ respectively. Among married women, it is 43.98 %, dropping to 36.93% and 28.57% among those aged 65-74 and 75+ respectively. Whether this is indicative of aging-relating declines in need for activity participation and/or adaptive processes (e.g., accepting of lowered levels of activity as one ages) is left for further study.

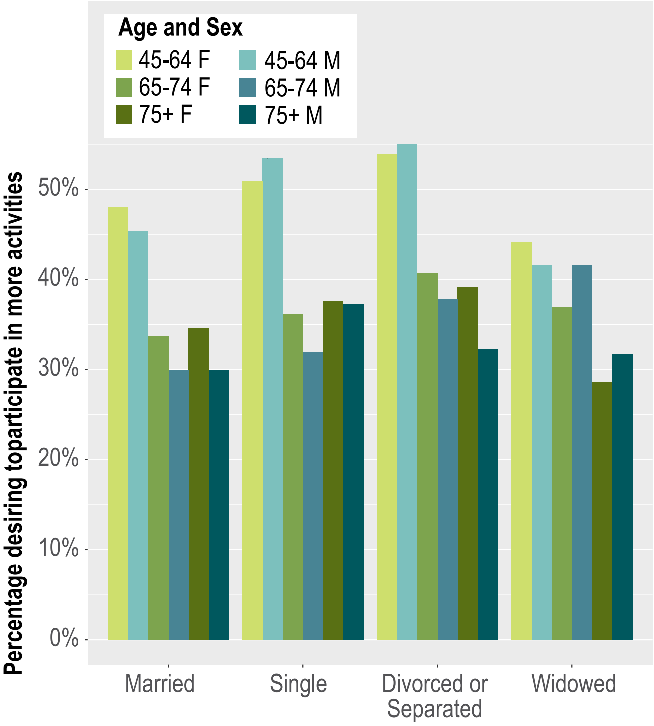

Figure 1b – Percentage who desire to participate in more activities stratified by marital status, age, and sex

Patterns of Loneliness and Social Isolation Across Living Arrangement, Age, and Sex

LONELINESS IS HIGHEST FOR PERSONS LIVING ALONE, ESPECIALLY MEN

Three salient observations can be made when examining *Figure 1c*: a) reported perceived loneliness is considerably more prevalent among persons living alone than those who do not live alone; b) this pattern is more pronounced among men; and c) the above trends are maintained across age groups with only modest variations. The percentage of persons reporting being lonely at least some of the time ranges between approximately 40% and 50% among persons living alone of all age and sex groups, whereas this percentage is only about 13% and 21% for persons not living alone. Comparing perceived loneliness, among men living alone, 50.98% aged 45-64, 47.95% aged 65-74, and 44.90% of those aged 75+ report being lonely, compared to 40.71%, 39.14%, and 40.82% among women living alone of those ages, respectively (see Figure 1c, Table 1c). While not all persons living alone are subjectively socially isolated, living arrangement is a significant correlate of this condition irrespective of other demographic factors.

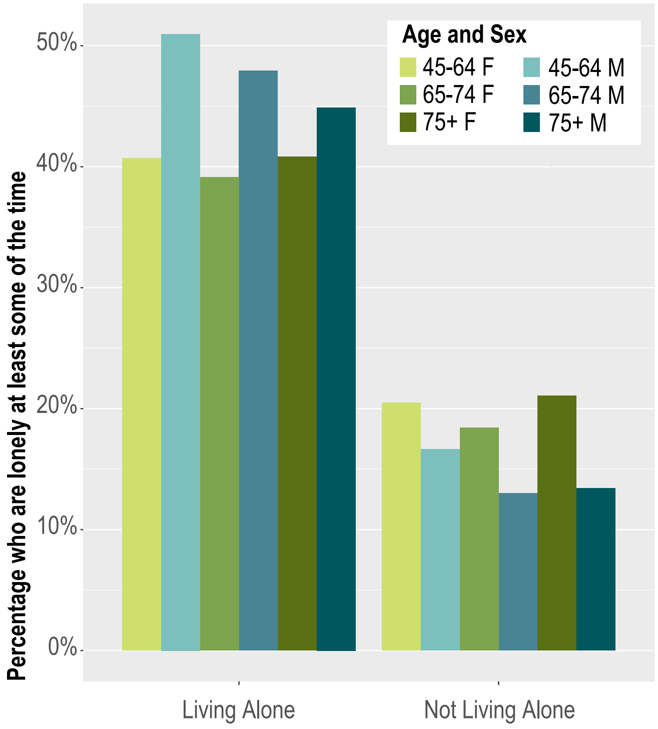

Figure 1c – Percentage who are lonely at least some of the time stratified by living arrangement, age, and sex

THE DESIRE FOR MORE ACTIVITIES DECLINES WITH AGE, HIGH ACROSS LIVING ARRANGEMENTS

Figure 1d presents percentages of reporting a desire to participate in more activities by living arrangement, age, and sex. The strongest pattern is that this preference is highest for middle-aged persons in the sample. While some small differences can be observed for those living alone or not (slightly higher among those living alone) by age and sex, the desire for more participation is consistently high. Among women living alone, for example, the percent with a desire for more participation is 49.70% for those aged 45-54, declining to 38.78%, and 31.78% for those aged 65-74 and 75+ respectively. Similar rates can be seen for men living alone (see Figure 1d, Table 1d). It would appear that aging or age-related changes are more influential than living arrangement for a desire to increase participation in activities.

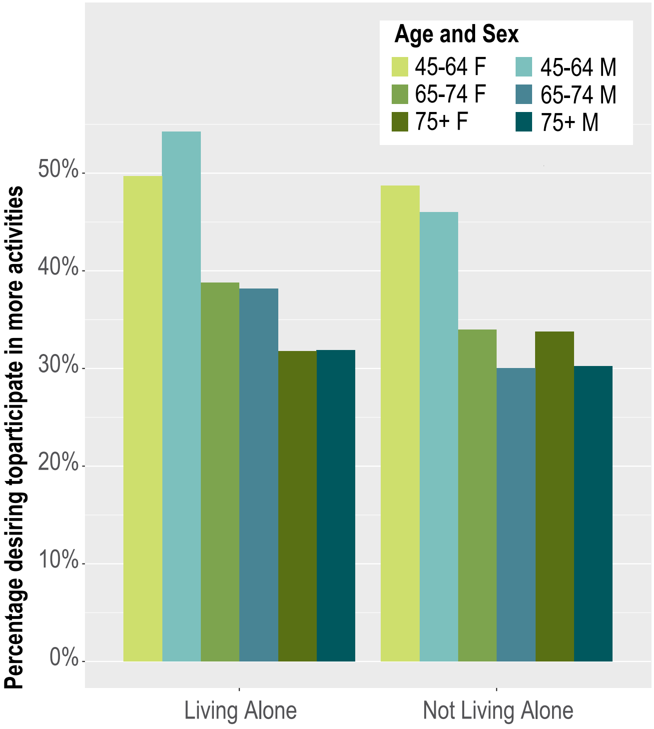

Figure 1d – Percentage who desire to participate in more activities stratified by living arrangement, age, and sex

Patterns of Loneliness and Social Isolation by Happiness, Life Satisfaction, and Depression

LONELINESS IS ASSOCIATED WITH LOWER HAPPINESS AND INCREASES WITH AGE

Figure 2a shows the distribution of persons who are happy all of the time by whether they report being lonely. Two trends emerge: a) individuals reporting that they are lonely at least some of the time are considerably less likely to report being happy (all of the time); and b) this pattern decreases with age. Among women who are lonely, the percentage reporting being happy is 40.11% among those aged 45-54, rising to 48.38% for 65-74 year olds, and a high of 51.04% for those 75+. Similarly, for men reporting being lonely, the percentages are 37.38%, 45.49%, and 54.88%, respectively by age group. Among those who are rarely or never lonely, the happiness percentages are very high and relatively even across the age and sex groups, ranging between 67.98% (men 45-64) and 76.53% (women 75+). As expected, loneliness is associated with other subjective states such as happiness, but this association appears to diminish somewhat in the oldest age groups.

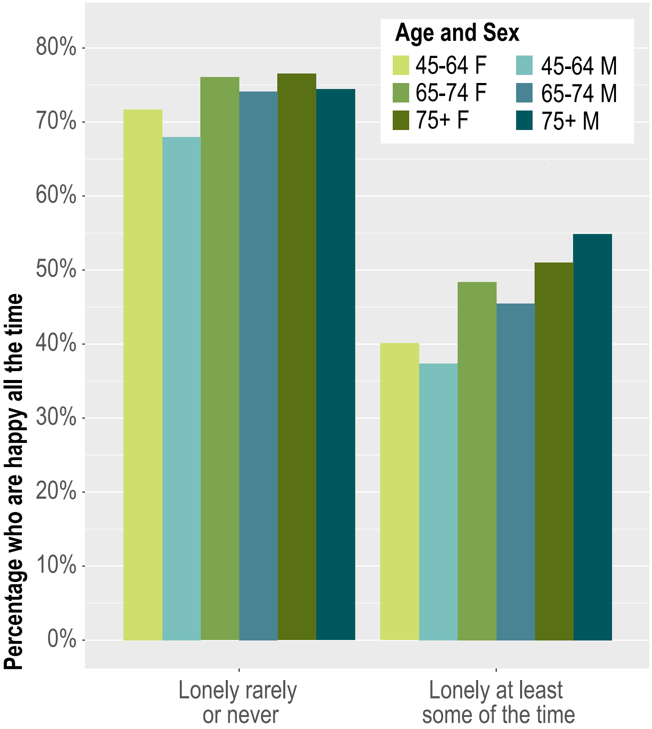

Figure 2a – Percentage who report being happy all of the time, stratified by reported loneliness, age, and sex

DESIRE FOR MORE ACTIVITIES IS CONSISTENTLY ASSOCIATED WITH LOWER HAPPINESS

As shown in *Figure 2b*, persons who desire to participate in more activities tend to report lower levels of happiness (all of the time) than those who have no desire for more activities, regardless of age or sex category. However, these differences are smaller than those observed for perceived loneliness. Among those who desire more activities, the percentage reporting being happy ranges between 55.20% (men aged 45-64), to a high of 65.61% (men 75+); whereas for those reporting no

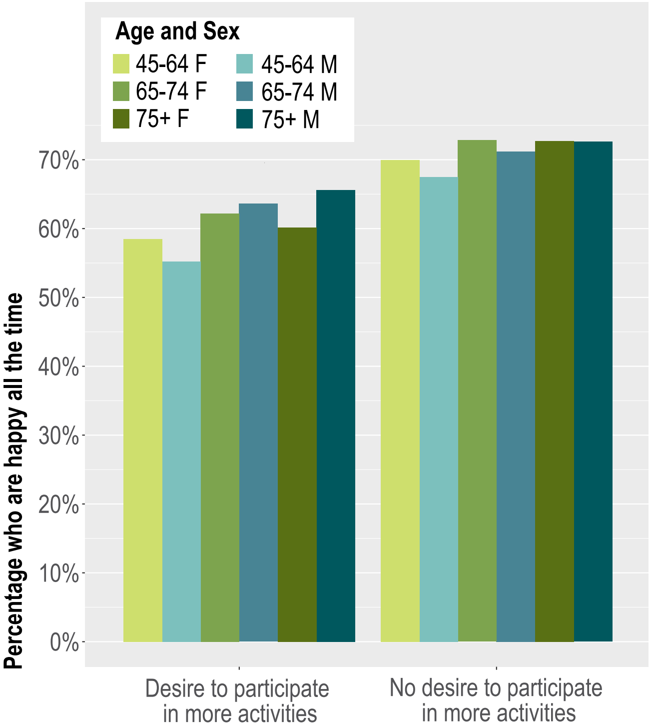

Figure 2b – Percentage who report being happy all of the time, stratified by desire to participate in more activities, age, and sex desire for more activity, the propensity to be happy ranges from a low of 67.48% (men 45-64) to a high of 72.86% (women 65-74). The rates for women are very similar to those for men for all age groups. These patterns underscore the impact social isolation has on indicators of subjective well-being.

LONELINESS IS LINKED TO LOWER LEVELS OF LIFE SATISFACTION

As expected, persons who report being lonely at least some of the time have lower mean levels on the Life Satisfaction Scale than those stating that they are lonely rarely or never (Table 2c).
For instance, the mean Life Satisfaction (LS) Scale scores among those reporting being lonely range from a low of 23.40 (women 45-64) to a high of 26.70 (men 75+). In contrast, there is little variation across age groups among those reporting being rarely or never lonely, with the mean scores ranging from a low of 29.01 (men 45-64) to a high of 29.99 (men 65-74). That the variation across age groups is greater for the lonely group mirrors the findings for happiness across age (older individuals are happier even though lonely), and suggests the possibility that resilience and adaptation processes are at play.

DESIRE FOR MORE ACTIVITIES IS ONLY SLIGHTLY ASSOCIATED WITH LOWER LEVELS OF LIFE SATISFACTION

Table 2d indicates only modest differences in Life Satisfaction (LS) Scores across the desire for more activities categories, as well as little age and sex variation. Those who desire to participate in more activities have LS scores ranging between 26.29 (women 65-74) and 27.65 (men 75+), whereas among those who do not desire greater participation, the range is also narrow: from a low of 29.08 (men 45-64) to a high of 30.00 (men 65-74). As in the above associations, these patterns could be due to the high levels of reported life satisfaction (skewness), and reduced variability in this measure.

LONELINESS IS STRONGLY ASSOCIATED WITH THE DEPRESSION SCREEN

The likelihood of meeting the CES-D screen was higher among those reporting being lonely (Table 2e). For example, among the lonely, the highest prevalence of a positive screen for depression was 50.46% (women 45-64), compared to only 9.42% among women aged 45-64 who reported being rarely or never lonely. Although these findings indicate that loneliness is associated with depression, there may be some bi-directionality in this association. That is, loneliness may lead to depression, and conversely, depressed individuals may cut off their social ties.

THE DESIRE FOR MORE ACTIVITIES IS ASSOCIATED WITH DEPRESSION

As shown in **Table 2f**, depression scores are slightly higher among persons reporting that they desire more activities than those who do not. These associations are much more pronounced when we examine results using the positive screen for depression. For instance, the highest percentage of persons flagged using the depression screen (30.77%) was among women aged 75+ who desire more activities, compared to only 16.60% for women aged 75+ who do not desire more activities. There are also strong differences between women and men, whereby women screened for depression are much more likely to report a desire for participating in more activities (see Table 2f). For example among those who desire more activities, men 75+ were flagged for depression at only 18.87% compared to 30.77% for women of that age group. These findings underline the importance of social isolation for mental health among middle-aged and older adults.

COMMUNITY/SOCIAL PARTICIPATION IS ASSOCIATED WITH DEPRESSION SCREEN

Overall, the mean number of participation types varies only slightly across the age and gender categories but is slightly higher among persons who did not meet the cut point for the depression screen compared to those who did (Table 2g). For instance, among those identified with depression based on the screening instrument, the mean number of community/social participation ranges from a low of 2.93 for men aged 45-64 and a high of 3.60 for women aged 65-74. Among those not screened with depression, the mean number of community/social participation is slightly higher, ranging from a low of 3.70 for men aged 45-64 and a high of 4.15 for women aged 65-74. These small differences may reflect the absence of variability in community/social participation in the CLSA.

Discussion

Social isolation has been receiving increased attention in the gerontological academic, government, and broader literature[1,4,6,7] This chapter offers an initial examination into subjective and objective components of social isolation using the newly released baseline data of the Canadian Longitudinal Study on Aging, combined Tracking and Comprehensive Cohorts. These analyses are intended to showcase the potential of the CLSA data in addressing important research and policy-relevant questions.

Although social isolation has been defined differently, and measures fall into a wide spectrum, we include loneliness, the desire to participate in more activities, levels of community participation, and the MOS Social Support Scale. These indicators of social isolation are investigated across three age groups (45-64, 65-74, and 75+), as well as for women and men. A number of patterns emerge depending on the measure of social isolation used. We also present these data by living alone/not and marital status, given the importance of these dimensions in determining patterns of social isolation. Strong associations emerge between social isolation measures and marital status, as well as for living alone/not. Finally, associations are examined between selected measures of social isolation and four potential correlates: happiness, life satisfaction, depression score, and a depression clinical screen. Robust associations are found between the selected social isolation variables and these four outcomes.

Overall, these exploratory analyses reveal a number of salient patterns and associations in the measures of social isolation investigated, but warrant further research.

While it is beyond the scope of this chapter to analyze all of these linkages and domains, they none-the-less underline the importance of addressing loneliness, social isolation and social engagement as growing social issues facing Canada's aging population. The CLSA offers opportunities to advance knowledge in these important research areas.

Future research in this area needs to drill deeper into the causal fabric surrounding social isolation, and the full range of potential short and long-term outcomes of episodic, mild, and chronic levels of social isolation. First, this will require longitudinal data to elaborate the complexity in these processes and linkages, such as elaboration of moderating, mediating, interaction, and bidirectional associations. Second, there is a need to examine age changes over time, in order to separate age, period, and cohort effects where possible. Third, gaps remain in the investigation of a broader range of potential measures of social isolation and related concepts in the CLSA. This includes development of composite indices and scales that can capture the multidimensionality of social isolation as expressed in conceptual, theoretical, and empirical studies. Fourth, we need research that focuses on social isolation among groups of vulnerable older adults, such as: those experiencing cognitive, sensory or physical losses; immigrant and/or ethnic older adults; Indigenous elders; lesbian, gay, bisexual, or transgendered seniors; caregivers with heavy burden; and those living in rural or remote area. Finally, research is required that estimates and specifies the short- and long-term health care implications of social isolation, which may be enhanced through linkages of CLSA and administrative data. The field of social isolation and aging is expanding rapidly, and data such as the CLSA offer new insights into this field of study.

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Appendix 1

TABLE 1A PERCENTAGE WHO ARE LONELY AT LEAST SOME OF THE TIME STRATIFIED BY MARITAL STATUS, AGE, AND SEX

Marital status	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Widowed	39.63%	56.34%	42.21%	59.23%	41.21%	50.16%
Divorced or Separated	37.38%	44.92%	32.20%	38.55%	32.32%	32.53%
Single	35.05%	43.55%	30.99%	34.97%	27.63%	32.45%
Married	18.71%	14.83%	17.52%	12.66%	20.40%	12.89%

TABLE 1B PERCENTAGE WHO DESIRE TO PARTICIPATE IN MORE ACTIVITIES STRATIFIED BY MARITAL STATUS, AGE, AND SEX

Marital status	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Widowed	48.01%	45.40%	33.68%	29.93%	34.56%	29.94%
Divorced or Separated	50.90%	53.50%	36.16%	31.92%	37.63%	37.28%
Single	53.86%	54.99%	40.74%	37.81%	39.08%	32.25%
Married	43.98%	41.59%	36.93%	41.63%	28.57%	31.66%

TABLE 1C PERCENTAGE WHO ARE LONELY AT LEAST SOME OF THE TIME STRATIFIED BY LIVING ARRANGEMENT, AGE, AND SEX

Living arrangement	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Living alone	40.71%	50.98%	39.14%	47.95%	40.82%	44.90%
Living with at least one other person	20.47%	16.65%	18.41%	13.01%	21.08%	13.42%

TABLE 1D PERCENTAGE WHO DESIRE TO PARTICIPATE IN MORE ACTIVITIES STRATIFIED BY LIVING ARRANGEMENT, AGE, AND SEX

Living arrangement	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Living alone	49.70%	54.23%	38.78%	38.19%	31.78%	31.86%
Living with at least one other person	48.74%	46.00%	33.96%	30.01%	33.76%	30.22%

TABLE 2A PERCENTAGE WHO REPORT BEING HAPPY ALL OF THE TIME, STRATIFIED BY REPORTED LONELINESS, AGE, AND SEX

Frequency of loneliness	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Rarely or never	71.69%	67.98%	76.05%	74.12%	76.53%	74.43%
At least some of the time	40.11%	37.38%	48.38%	45.49%	51.04%	54.88%

TABLE 2B PERCENTAGE WHO REPORT BEING HAPPY ALL OF THE TIME, STRATIFIED BY DESIRE TO PARTICIPATE IN MORE ACTIVITIES, AGE, AND SEX

Desire to participate in more social activities	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Yes	58.50%	55.20%	62.18%	63.61%	60.15%	65.61%
No	69.96%	67.48%	72.83%	71.22%	72.72%	72.61%

TABLE 2C LIFE SATISFACTION STRATIFIED BY REPORTED LONELINESS, AGE, AND SEX

Age group and sex		Rarely or never lonely		Lonely at least some of the time	
		Mean	Std Dev	Mean	Std Dev
45-64	Women	29.50	5.70	23.73	7.98
	Men	29.01	5.74	23.40	7.93
65-74	Women	29.47	5.46	24.93	7.23
	Men	29.99	4.97	25.39	7.07
75+	Women	29.43	5.09	25.72	6.65
	Men	29.81	4.96	26.70	6.10

TABLE 2D LIFE SATISFACTION STRATIFIED BY DESIRE TO PARTICIPATE IN MORE ACTIVITIES, AGE, AND SEX

Age group and sex		Desire to participate in more social activities			
		Yes		No	
		Mean	Std Dev	Mean	Std Dev
45-64	Women	26.82	7.33	29.48	5.84
	Men	26.50	7.04	29.08	6.02
65-74	Women	26.29	7.05	29.48	5.46
	Men	27.34	6.47	30.00	5.08
75+	Women	26.32	6.70	29.25	5.19
	Men	27.65	6.05	29.89	4.85

TABLE 2E POSITIVE SCREEN FOR DEPRESSION (CES-D) STRATIFIED BY REPORTED LONELINESS, AGE, AND SEX

Frequency of loneliness	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Rarely or never	9.42%	7.25%	10.55%	5.97%	11.64%	7.46%
At least some of the time	50.46%	42.31%	44.45%	39.56%	42.80%	33.76%

TABLE 2F POSITIVE SCREEN FOR DEPRESSION (CES-D) STRATIFIED BY DESIRE TO PARTICIPATE IN MORE ACTIVITIES, AGE, AND SEX

Desire to participate in more social activities	Age group and sex					
	45-64		65-74		75+	
	Women	Men	Women	Men	Women	Men
Yes	23.94%	18.30%	26.05%	18.28%	30.77%	18.87%
No	14.02%	11.01%	14.90%	9.11%	16.60%	9.79%

TABLE 2G LIFE SATISFACTION STRATIFIED BY POSITIVE SCREEN FOR DEPRESSION (CES-D), AGE, AND SEX

		Positive screen for depression (CES-D)			
		Yes		No	
Age group and sex		Mean	Std Dev	Mean	Std Dev
45-64	**Women**	3.14	1.78	3.89	1.74
	Men	2.93	1.79	3.70	1.73
65-74	**Women**	3.60	1.95	4.15	1.81
	Men	3.38	1.94	3.90	1.89
75+	**Women**	3.48	1.95	4.08	1.90
	Men	3.48	2.06	3.82	1.96

6

Caregiving and Care Receiving

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Caregiving and Care Receiving

Key Insights

This chapter presents trends in caregiving and care receiving by sociodemographic characteristics, self-reported health, and type of care given/received. In addition, descriptive statistics summarize the relationships of caregiving and care receiving with quality of life indicators (e.g., social activities and life satisfaction). All results are based on a subsample of CLSA participants who report providing care, receiving care, or both caregiving/receiving.

- Overall, 38.2% of participants report only providing care, 8.1 report only receiving care, and 6.2% are both caregivers/receivers.
- Caregiving rates are highest among those aged 55-64 years (48.5%) and care receiving is most prevalent among those aged 75 and over (36.1%).
- Women make up a greater proportion of those who report caregiving (53.9%), receiving care (57.7%), and both caregiving/receiving (64.0%) than men.
- Care receivers (9.7%) and those who report being both caregivers/receivers (6.2%) more frequently reported poor health than caregivers (0.9%).
- Rates of common chronic conditions among care receivers and those who are both caregivers/ receivers are nearly double that of caregivers.
- Care receivers report rates of “getting out” with family and friends that are lower than caregivers, raising concern about the potential for social isolation.
- Overall, care receivers (20.3%) and those who are both caregivers/receivers (19.5%) report dissatisfaction with life at nearly twice the rate of caregivers (10.6%).

Introduction

Caregiving has become a common role for Canadian families as the numbers of older adults with comorbidity, disability, and frailty who needs help with daily activities (e.g. meal preparation, transportation) continues to grow[1]. In future years, these numbers are projected to increase rapidly even as family capacity to provide care decreases[2]. An estimated 8 million Canadians are caregivers for family members or friends because of a health condition or limitation that affects daily activities[3]. Increasingly it is clear that caregiving can have negative consequences with caregivers reporting depression and financial difficulties at a higher rate than non-caregivers[3,4]. While most older adults prefer to receive care in their homes, homecare is not covered under the Canada Health Act even when it is considered "medically necessary"[5]. As a result, there is variability across and within provinces and territories in access to and provision of homecare services. In 2012 about 2.2 million (8%) Canadians age 15 and older received homecare but about 15% had "partially met" needs and another 461,000 Canadians had "unmet" needs for home care[6].

The CLSA is the first longitudinal study to collect data on caregiving and care receiving from a population sample of Canadians aged 45-85. It offers a unique opportunity to examine patterns of caregiving and care receiving (e.g., who provides care, what types of care, impact on social networks and relationships), negative aspects of caregiving and care receiving (e.g. effects on work, psychological and physical health), as well as positive aspects of caregiving and care receiving (e.g., predictors of positive outcomes, impact of assistive devices/physical environment). Interestingly, 6.2% (n=3179) of CLSA participants both give and receive care. Only in a large national dataset can such a specific subgroup be collected in a large enough sample size to be analyzed.

This brief chapter offers a glimpse into the possibilities of the CLSA for exploring and comparing caregivers and care receivers on sociodemographic characteristics, types of care and the relationship of caregiving and care receiving with relevant health-related variables such as health status, social activities, and life satisfaction. Additional analyses are needed using longitudinal data to explore trends and relationships that will provide findings to inform public policy.

Measures

This chapter compares characteristics of CLSA participants who are caregivers, care receivers and those who report being both caregivers and care recipients. Descriptive analyses were run on baseline data gathered between 2011 and 2015 in the combined CLSA Tracking (Version 3.3) and Comprehensive (Version 3.2) datasets. Since this chapter reports on a subsample of participants, unweighted data are used. The CLSA has several detailed measures about caregiving and care receiving; these are described below.

CAREGIVING MEASURES

Participants were asked a range of questions about caregiving that include: the type of care, number of people providing care, whether they live with the care recipient, the sex of the care recipient, their relationship with the care recipient, and intensity (number of weeks in past year providing care and hours per week of caregiving). See **Box 1** for a summary of the questions about caregiving.

Box 1 *Questions about assistance provided and to whom*

1. During the past 12 months, have you provided any of the following types of assistance to another person because of a health condition or limitation?
   a. Personal care such as assistance with eating, dressing, bathing or toileting
   b. Medical care such as help taking medicine or help with nursing care (for example, dressing changes or foot care)
   c. Managing care such as making appointments
   d. Help with activities such as housework, home maintenance or outdoor work
   e. Transportation, including trips to the doctor or for shopping
   f. Meal preparation or delivery
2. During the past 12 months, how many people in total have you provided any type of assistance to because of a health condition or limitation, including financial assistance?
3. Is the person to whom you provided the most assistance living [in/outside] your household?
4. Is the person to whom you provided the most assistance male or female?
5. What is the relationship between you and [this person]?
6. During the past 12 months, about how many weeks did you provide assistance to this person?
7. About how many hours per week, on average, did you spend assisting this person?

CARE RECEIVING

Many of the questions on caregiving and care receiving are similar. Additional questions on care receiving are asked depending on whether the respondent receives professional assistance or assistance from family or a friend. Questions about professional care are summarized in **Box 2**. One question explores how much of the cost of the help received was paid by the participant or other family members.

Box 2 *Questions about assistance received from professionals or organizations*

1. During the past 12 months, did you receive short-term or long-term professional assistance at home, because of a health condition or limitation that affects your daily life, for any of the following activities?
   a. Personal care such as assistance with eating, dressing, bathing or toileting
   b. Medical care such as help taking medicine or help with nursing care (for example, dressing changes or foot care)
   c. Managing care such as making appointments
   d. Help with activities such as housework, home maintenance or outdoor work
   e. Transportation, including trips to the doctor or for shopping
   f. Meal preparation or delivery
2. During the past 12 months, about how many weeks did this person/organisation help you?
3. About how many hours per week, on average, did this person/organisation provide you with such help?
4. Did you (or someone else in your family) pay directly for some or all of the help that you received? Responses: paid all of the cost, paid part of the cost, no cost involved (volunteer or included in health plan) or didn’t pay any of cost

Care provided by family, friends or neighbours is also examined and questions explore: type of care provided or activity assisted with, number of people providing assistance, weeks received care in the last year, hours per week received care, type of activity received most assistance and a number of questions about the person who provided the most time and resources to the care recipient (e.g. living arrangement, relationship, age, sex, and length of time receiving assistance in months), and intensity (weeks in past year and hours per week). Questions about care received from family or friends are summarized in **Box 3**.

Box 3 *Questions about assistance received from family or friends*

1. During the past 12 months, did you receive short-term or long-term assistance from family, friends, or neighbours because of a health condition or limitation that affects your daily life, for any of the following activities?
    a. Personal care such as assistance with eating, dressing, bathing or toileting
    b. Medical care such as help taking medicine or help with nursing care (for example, dressing changes or foot care)
    c. Managing care such as making appointments
    d. Help with activities such as housework, home maintenance or outdoor work
    e. Transportation, including trips to the doctor or for shopping
    f. Meal preparation or delivery
2. During the past 12 months, about how many different people (among your family, friends, and/or neighbours) provided you with such assistance?
3. During the past 12 months, about how many weeks did this person/these people provide you with such assistance? Include assistance from all family members, friends and neighbours in your estimate
4. About how many hours per week, on average, did this person/these people provide you with assistance? Include assistance from all family members, friends and neighbours in your estimate
5. You mentioned that during the past 12 months, you received assistance with [activity]. For which type of activity did you receive the most assistance?
6. We are interested in finding out a little bit more about the person who has dedicated the most time and resources to helping you
    a. Is the person from whom you received the most assistance living [in/outside] your household?
    b. Is the person who provided the most assistance male or female?
    c. How old is [this person]?
    d. What is the relationship between you and [this person]?
    e. How long have you been receiving assistance from [this person]? (months)
    f. During the past 12 months, about how many weeks did you receive assistance from [this person]?
    g. About how many hours per week on average did [this person] spend assisting you with [activity]?
7. There are many reasons why people retire. Which of the following reasons contributed to your decision to retire? [providing care to a family member or friend].

Health

Refer to Chapter 7 for a detailed description of self-reported health and chronic conditions.

SOCIAL ACTIVITIES WITH FAMILY/FRIENDS

Participants were asked, “In the past 12 months, how often did you participate in family or friendship-based activities outside the household?” The 5-point scale included at least once a day, at least once a week, at least once a month, at least once a year, and never.

Life Satisfaction

Life satisfaction was measured using the Satisfaction with Life Scale, a 5-item measure of global life satisfaction using a 7-point Likert scale ranging from strongly agree to strongly disagree. A high score indicates greater satisfaction[7].

Sociodemographic Characteristics

AGE

The prevalence of caregiving is highest among participants aged 55-64 years (48.5%). Caregiving is least common among those age 75 years and over (36.1%). Care receiving is highest among those age 75 and over (21.9%) and, unsurprisingly, is lowest among those ages 45 to 54 years (11.9%). The proportion who are both caregivers and care receivers is highest among those aged 75 and over (7.4%) and slightly less common among all participants age 64 and under (5.9%). The mean age of care receivers (Mean 66.6 yrs., Std. Dev. 11.3) was slightly higher than the mean age of caregivers (Mean 61.7 yrs., Std. Dev. 9.8). (Figure 1)

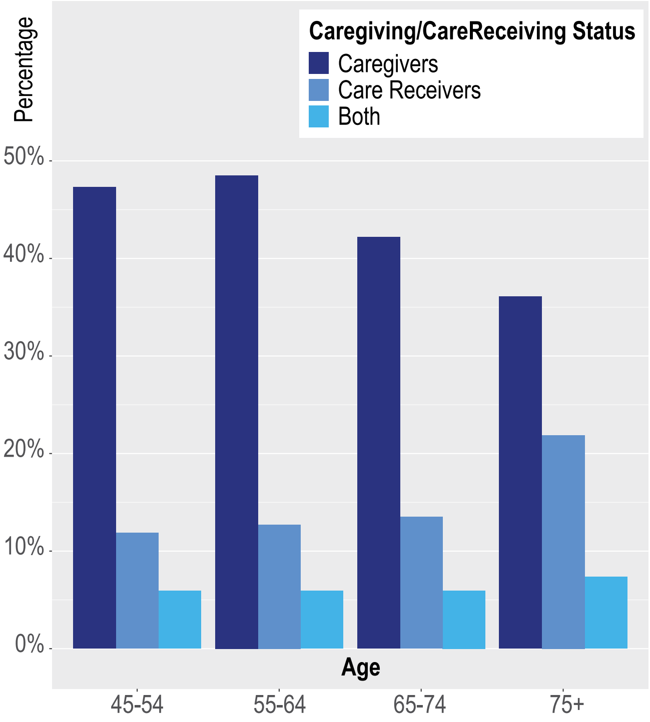

Figure 1 – Prevalence of caregivers, care receivers, and those who are both stratified by age

SEX

A greater proportion of caregivers (53.9%), care receivers (57.7%) and both caregivers/receivers (64%) were women in this population.

MARITAL STATUS

Caregivers more commonly reported their marital status as married (71.7%) than care recipients (55.4%). Participants who are both caregivers and receivers fall in between (61.7%). Care receivers most frequently indicated that they were widowed (18.5%) compared to caregivers (8.1%) and those who are both caregivers/receivers (12.7%). Divorce/separation rates were higher among care receivers (15.9%) and those who are both caregivers/receivers (15.6%) than among caregivers (12.0%). Interestingly, a similar proportion of caregivers indicated that they were never married (8.1%) as care receivers (10.2%) and those who are both caregivers/receivers (10.0%).

EDUCATION

Care receivers indicated that they did not graduate high school more commonly (11.2%) than caregivers (5.6%) or those who are both caregivers/receivers (7.4%). Both caregivers (76.3%) and participants who are both caregivers/receivers (72.4%) have higher rates of post-secondary degree completion than care receivers (66.6%).

LIVING ARRANGEMENTS

The most common situation was living with spouse only with similar proportions among caregivers (45.3%), care receivers (38.1%) and participants who are both caregivers/receivers (40.6%). A higher proportion of care receivers (35.1%) and those who were both caregivers/receivers (29.8%) report living alone than caregivers (19.6%). Variability was noted in the proportions living with spouse and child between caregivers (21.4%), care receivers (13.6%), and participants who are both caregivers/receivers (15.1%).

EMPLOYMENT STATUS

In looking at employment, a higher proportion of caregivers were retired (41.9%) than working 30+ hours week (34.4%). In contrast, rates of retirement among care receivers (60.6%) was substantially higher than those working 30+ hours/week (18.5%). Participants who are both caregivers/receivers were in the middle with 52.8% reporting being retired and 22.3% still working 30+ hours/week.

Health

SELF-REPORTED HEALTH

A higher proportion of caregivers (64.6%) report “excellent” or “very good: health than care receivers (35.0%) or those who are both caregivers/receivers (38.2%). The proportions of participants reporting “good” health are similar for caregivers (28.0%), care receivers (34.5%), and those who are both caregivers/receivers (36.6%). Significant variation is seen in the proportion of participants who report “fair” health among care receivers (20.6%) and those who are both caregivers/receivers (18.7%) having 3 times the rate of caregivers (6.5%). Similarly, care receivers (9.7%) and those who are both caregivers/receivers (6.2%) report “poor” health in much higher proportions than caregivers (0.9%).(Figure 2)

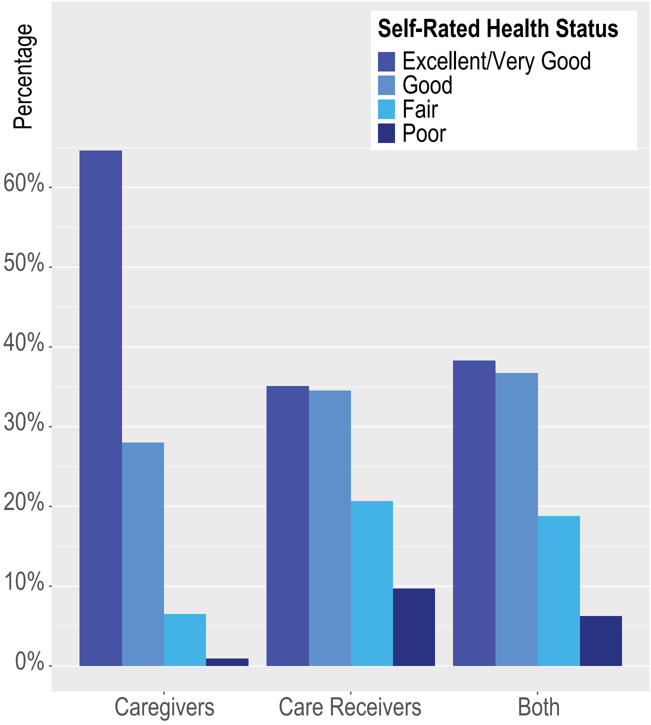

Figure 2 – Comparison of self-rated health status among caregivers, care receivers, and those who are both

BASIC AND INSTRUMENTAL ACTIVITIES OF DAILY LIVING (BADL/IADL)

The CLSA recruited a sample of community-dwelling older adults, so the prevalence BADL/IADL limitation at baseline is low (See Chapter 8 of this report for more information on this topic). As expected, this proportion is higher among care receivers (36.5%) and those who are both caregivers/receivers (26.2%) than in caregivers (2.8%), since those with limitations in activities required for daily living need care from others.

CHRONIC CONDITIONS

Rates of six chronic conditions were examined for caregivers, care recipients, and those who are both caregivers/receivers: heart disease, COPD, cancer, diabetes, stroke, and depression. Depression was common among caregivers (15.7%) and care receivers (23.6%) and those who are both caregivers/receivers (26.6%). Diabetes was also a common condition for caregivers (15.1%), care receivers (27%), and those who are both caregivers/receivers (23.4%). Cancer was the third most common condition for caregivers (13.9%) and those who are both caregivers/receivers (22.7%). As with other chronic conditions, the rate of heart disease among care receivers (19.8%) and those who are both caregivers/receivers (16.5%) were nearly double the rate of caregivers (8.7%). Future analyses should examine these variations in chronic conditions controlling for covariates such as age and sex. In addition, the severity of the chronic conditions is not apparent in these descriptive analyses. (Figure 3)

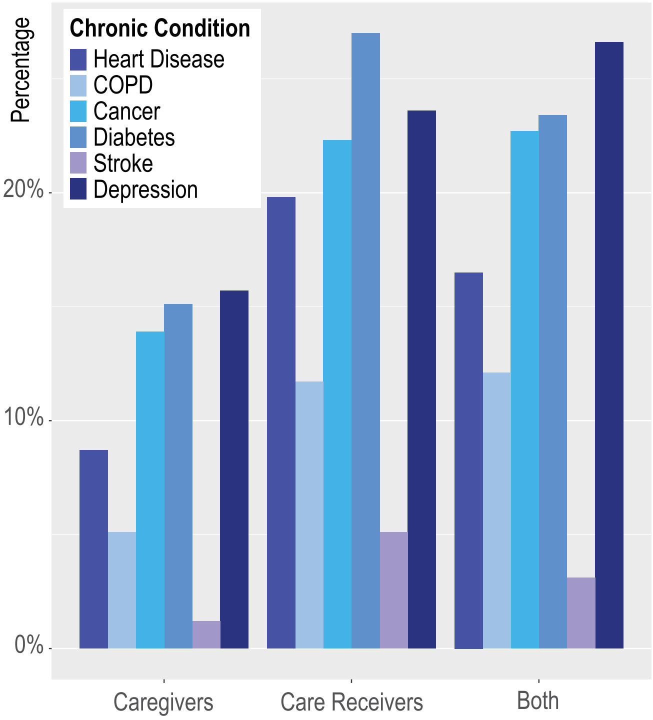

Figure 3 – The prevalence of common chronic conditions among caregivers, care receivers, and those who are both

Quality of Life

SOCIAL ACTIVITIES

There is growing concern over loneliness and social isolation among caregivers and care recipients. Although one-half of caregivers (56.5%) and those who are both caregivers/receivers (55.8%) report getting out at least once a week or more for family or friendship-related activities, this rate is lower among care receivers (46.1%). Further raising concerns, 14.1% of care receivers report only getting out at least once a year or never getting out compared to 7.1% of caregivers and 9.1% of those who are both caregivers/receivers.

LIFE SATISFACTION

Overall, care receivers (20.3%) and those who are both caregivers/receivers (19.5%) report nearly twice the rate of dissatisfaction with life compared to caregivers (10.6%). Care receivers (3.9%) had the highest rates of extreme dissatisfaction compared to caregivers (1.1%) and those who are both caregivers/receivers (2.9%). Not surprisingly given the preceding findings, lower rates of care receivers (31.9%) and those who were both caregivers/receivers (32.9%) reported being extremely satisfied than caregivers (43.4%). Yet, mean levels of life satisfaction were similar for caregivers (Mean 28.2, Std. Dev. 6.3) and care receivers (Mean 25.8, Std. Dev. 7.6).

Discussion

The cross-sectional data reported from the baseline CLSA offer a glimpse at the characteristics of 3 caregiving/receiving subgroups. Next steps for caregiving and care receiving research using CLSA data should focus on descriptive analyses of the types of assistance being given/received, the intensity/duration, caregiver/receiver relationships, and living arrangements. Findings also point to the need for multivariate modeling to understand factors affecting caregiving and care receiving—including any differences across provinces. The subgroup of participants who are both caregivers/receivers is intriguing and one that marks a new area for investigation. To our knowledge, the CLSA is the first population-based longitudinal study that enables comparison of these 3 subgroups. Another area unique to the CLSA is the rare opportunity to examine caregiving and care receiving needs among several groups who are aging with a lifelong disability (e.g., polio, multiple sclerosis, rheumatoid arthritis, or traumatic brain injury)[8–10]. Future analyses using CLSA data should include longitudinal analyses to examine how caregiving and care receiving changes over time.

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7

Health

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Health

Key Insights

- The majority of CLSA participants rated their general health as good to excellent at the study baseline.
- With few exceptions baseline lifetime prevalence of most chronic conditions was similar to those presented in other research with comparable age and sex distributions.
- Differences in the frequency of health conditions between the CLSA and other studies are most likely a result of CLSA inclusion/exclusion criteria.
- The CLSA will be an excellent vehicle for the study of health conditions in relation to a variety of other environmental, social, psychological characteristics over the life of the study.

Introduction

As the population ages, changes in physical and mental health are common. Within the CLSA, participants are asked to report not only on conditions diagnosed by physicians but also on their perceived health status (both mental and physical). Self-rated health is a subjective measure and likely captures aspects of health that are difficult to capture through questions related to actual diagnosed conditions. The literature suggests that as people age, they assess their own health in relation to both their circumstances and expectations. In addition, it has been reported that self-rated health can affect actual health status (e.g. all-cause mortality[1]) and influence health behaviours[2].

The CLSA did not include a clinical assessment by physicians, nurse or other health care practitioners for the purposes of diagnosing diseases or identifying previously diagnosed diseases.
For the most part information regarding diseases diagnosed by a physician were ascertained through self-report questions, an approach that has previously been used in a variety of other large-scale studies and is typically part of national Statistics Canada surveys.

As described in Chapter 2 (Methodology) of this report, more detailed information is available on current diseases, conditions, and medications collected on the approximately 30,000 Comprehensive participants[3]. These were collected either as part of the contraindications questionnaire administered prior to the start of the data collection site visit or during the assessment itself, as part of the "Disease Symptom Questionnaire". Several disease ascertainment algorithms have been developed for the CLSA[4,5] but since some require data not yet released for use (i.e., medications and/or biomarker results) we do not present results based on these algorithms, focusing instead on those conditions for which we have equivalent self-report data on all participants (as per Table 1).

In this chapter, we provide a snapshot of self-reported physical health conditions and self-rated health status at the time of the baseline CLSA assessment. Data on self-reported mental health conditions derived from the baseline CLSA assessment are presented in Chapter 9 (Psychological Health and Well-Being). We do not include information on dementia in this report since the presence of cognitive impairment was an exclusion criterion for the CLSA recruitment. Although a small number of CLSA participants did answer yes to the question "Has a doctor ever told you that you have dementia or Alzheimer's disease?" as part of the baseline questionnaire we do not consider this information to be reliable enough to report here or upon which to base prevalence estimates. As the CLSA continues, however, the identification of incident dementia (including Alzheimer's disease) will be possible.[6]

While it is known that the prevalence of multimorbidity as defined by the coexistence of two or more chronic conditions,[7] increases dramatically with age, in this chapter we report on the presence of self-reported individual conditions at the time of the CLSA baseline assessment. An examination of multimorbidity is beyond the scope of this chapter and requires more detailed assessment of the presence of conditions beyond a simple report, or count, of individual conditions[8].

Measures

The self-report questions on which the results in this chapter are based are of the form "has a doctor ever told you that you have…" or "has a doctor ever told you have/had…" In the CLSA, this question is asked in relation to many chronic (i.e., conditions that are expected to last or have already lasted 6 months or more) conditions. See **Table 1** for the list of conditions reported on in this chapter. For selected conditions (e.g. Parkinsonism/Parkinson's disease, epilepsy) additional questions were asked of all participants but results from these analyses are reported elsewhere[9]. In addition, we report on self-rated general health and self-rated healthy aging. Descriptive statistics (i.e. percentages) are presented stratified by age and sex for all CLSA participants at baseline. Prevalence estimates using the CLSA sampling weights (overall and stratified by sex) along with bootstrapped confidence interval are computed for all health conditions in this chapter.

Results

The CLSA Tracking (Version 3.3) and Comprehensive (Version 3.2) combined cohorts were used for the data summaries presented (n=51,338). Simple histograms (stratified by age and sex) for the self-rated healthy aging, self-rated health, and the conditions listed in **Table 1** are presented in *Figures 1 to 28*. These figures display the percentage of CLSA participants, stratified by age and sex, who self-reported the noted conditions (i.e. unweighted results). General observations from the Figures are presented below. **Table 2** includes the overall (and sex-specific) weighted prevalence estimates (per 1,000 population) for each of the health conditions.

SELF-RATED HEALTH

In response to the question "In general, would you say your health is excellent, very good, good, fair or poor" at each age level and for both sexes between 86% and 90% of participants responded that their health is good/very good/excellent. CLSA participants were also asked to rate their "healthy aging" by being asked the following: "In terms of your own healthy aging, would you say it is excellent, very good, good, fair, or poor?" In each age-sex subgroup, 89% or more of participants reported that their healthy aging is good/very good/excellent.

MUSCULOSKELETAL (OSTEOPOROSIS/RHEUMATOID ARTHRITIS)

In the CLSA, women were far more likely to self-report a diagnosis of osteoporosis. The proportion increased with age from less than 3% of women aged 45-59 to close to 30% of women in the oldest age group (80-85). For men the proportion reporting osteoporosis was less than 6% in each age group although an increase with age was also evident (from 0.66% in the youngest age group to 5.97% in the oldest age group). This pattern reflects what is known of the epidemiology of osteoporosis[10] with a lower prevalence in males and an increasing incidence in both sexes with age. Statistics Canada data reveal similar estimates with an overall prevalence of osteoporosis in men of 3.4% increasing from 2.5% in men aged 50-70 to 5.3% in men aged 71 and over. Corresponding estimates for women are 19.2% overall increasing from 14.7% in women aged 50-70 to 29.5% in women aged 71 and over[11]. These figures are very much in line with the CLSA findings at baseline. In men, self-report may represent under diagnosis, as prevalence proportions based on bone density are considerably higher. For example, in the CaMOS study, men over age 70 years had a prevalence of 8%.[12] See **Table 2a** for prevalence estimates where the female preponderance is confirmed and the sex-specific confidence intervals do not overlap.

For Rheumatoid Arthritis (RA), we see a similar sex differential with RA reported more frequently in women. The prevalence increases with age, rising from 3% in the youngest age group to nearly 7% in the oldest age group. In men, the corresponding figures are 1.7% in the youngest and 4.7%

in the oldest age group. See **Table 2a** for prevalence estimates. As with osteoporosis, the female preponderance is confirmed with non-overlapping confidence intervals.

RESPIRATORY CONDITIONS (ASTHMA/CHRONIC OBSTRUCTIVE PULMONARY DISEASE)

In the CLSA, the reporting percentage for asthma was stable across age groups in women (15-16%) until the age of 70 years, at which point older participants were less likely to report being diagnosed with asthma (10-13%). The pattern was similar in men with the 10-12% reporting the condition in the younger age groups falling to 8 or 9% after the age of 75. See **Table 2a** for prevalence estimates. The lifetime-estimated prevalence of asthma is much greater in women than in men at 134.9 per 1,000 population as compared to 100.5 per 1,000 population with non-overlapping confidence intervals.

For Chronic Obstructive Pulmonary Disease (COPD) the percentage of participants who reported being told of a diagnosis of COPD ranged from less than 5% in the younger age groups (< 55 years of age) to 9% in the oldest age groups (70 and over). The unweighted data showed only slight differences between men and women. From **Table 2a** we see a slightly higher prevalence of COPD in women than in men. This finding differs from current literature[13] and requires further evaluation within the CLSA.

Cardiovascular Disease

HIGH BLOOD PRESSURE

The proportion of CLSA participants reporting High Blood Pressure (HBP) was high and increased consistently with age in both sexes, with prevalence being higher in men than in women except in the two oldest age groups (75-79 and 80-85). With age, the percentages went from a low of 14.5% (in women) and 18.5% (in men) at the younger age range to 61.3% and 55.7% respectively at the older age ranges. See **Table 2b** for prevalence estimates.

HEART DISEASE

There was a marked difference between the sexes in the reporting of heart disease. This difference became particularly apparent with increasing age. At the 60-64 age, range men were twice as likely to report a diagnosis of heart disease as women (12.5% vs. 6.8% respectively). The likelihood of heart disease increased in both sexes with age. See **Table 2b** for prevalence estimates in which the male preponderance was confirmed with a population prevalence estimate of 113.3 per 1,000 in men and 68.5 per 1,000 in women.

PERIPHERAL VASCULAR DISEASE

Reporting of a diagnosis of peripheral vascular disease increased with increasing age but the differences between men and women were small. Women reported this condition slightly more often. Reporting percentages by age ranged from 3.87% to 12.8% in women and 2.57% to 11.22% in men. See **Table 2b** for prevalence estimates.

DIABETES

The proportion reporting diabetes was consistently higher in men than in women especially in the older age groups. Among women, the proportion reporting (by age) ranged from 8 to 18% compared to men where it was 9 to 24%. In **Table 2b**, we see that prevalence of diabetes in the CLSA target population was high at 153.4 per 1,000 overall, higher in men (166.2 per 1,000) than in women (141.3 per 1,000) and the confidence intervals do not overlap.

Neurological Conditions

PARKINSON'S DISEASE

The proportion of CLSA participants reporting Parkinsonism/Parkinson's disease is below 1% in women across all ages. There was an increase across the age categories from 0.08% to 0.78%. In men, the percentage reporting is higher in the oldest age groups where the rate was twice that of women. Results for men ranged from 0.08% to 1.16%. **Table 2c** presents the weighted prevalence estimates overall, and by sex. The overall estimated prevalence is low at 0.36% (95% CI 0.28% to 0.44%) and the male preponderance was confirmed.

MULTIPLE SCLEROSIS

For multiple sclerosis (MS), in the CLSA we see the well-known female: male ratio is at least 2:1 in all age categories except for 75-79. MS reporting, unlike most other conditions, did not increase with increasing age. Indeed, there was a sharp drop in reporting at older ages. This could reflect increased mortality among those with severe long-standing MS. It could also be due to the increased likelihood of institutionalization at older ages in individuals who have had MS for many years (individuals residing in a facility were excluded from the CLSA at baseline). This drop with age is seen in both men and women. In **Table 2c**, the prevalence of MS among community-dwelling residents of Canada between the ages of 45 and 85 is estimated at 0.59 with 95% CI of 0.5% to 0.69%. MS prevalence is most often reported per 100,000. Using the CLSA data and applying the sampling weights the prevalence of MS was estimated at 590/100,000 (490/100,000 to 700/100,000).These figures are higher than other data from Canada[14,15]. In interpreting these high figures, it must be kept in mind that in addition to excluding institutionalized individuals at baseline, the CLSA does not include participants who were younger than 45 years of age at recruitment.

EPILEPSY

The reporting of a diagnosis of epilepsy in the CLSA does not yield any specific pattern with respect to sex or age. The percentage of participants who reported a diagnosis of epilepsy was below 1.15% in all age/sex categories. In **Table 2c**, we see an overall prevalence of 0.91% (95% CI 0.78% to 1.05%). The estimated population prevalence decreased with age. Much like MS, the age distribution of the CLSA is very different from that normally used in prevalence studies of epilepsy where younger adults and children are included.

MIGRAINE

Women frequently reported migraine in the CLSA with reporting percentages ranging from 12% (in the oldest age group) to 22% (in the youngest age group). The reporting frequency in women had a clear decrease with increasing age. The same pattern of decreasing reporting frequency was seen in men though there is a lower frequency at each age (i.e. 4.4% in the oldest age group to 8.65% in the youngest age group). In **Table 2c**, we see the marked difference between males (78.4 per 1,000) and females (203.6 per 1,000) confirmed with non-overlapping confidence intervals.

STROKE/TIA

In reporting on stroke and TIA, caution is required given that these events can occur more than once in an individual. Indeed TIA is often a pre-cursor of a stroke. The way the question was asked, an individual who experienced multiple TIAs or more than one stroke would be counted only once, suggesting the potential for underreporting in the absence of additional information on the number of such events. What is seen overall with stroke is an increase in reporting with age. As well, the reporting percentage is consistently higher in men. This sex differential becomes most apparent at and after age 65. The reported rates are low with values (in relation to age group) ranging from ≤0.5% in the younger age groups for both sexes to 3% in women and 4.95% in men at older ages.

Interestingly the percentage reporting of TIA is very similar in men and in women with an increase in reporting with age. This ranges from a low of ≤ 0.5% in the age range 45-49 to a high of 10% in the oldest age group (80-85) for both men and women.

In **Table 2c**, we present the weighted prevalence estimates for stroke and for TIA. These results confirm the sex difference particularly for stroke.

Psychiatric Disorders (Mood Disorder/Anxiety Disorder)

MOOD DISORDER

The question asked in the CLSA is; “Has a doctor ever told you that you have a mood disorder such as depression (including manic depression), bipolar disorder, mania, or dysthymia?” A positive answer to this question does not allow differentiation amongst the conditions. The frequency of positive reporting to this question was higher in females at all age groups. In both males and females, the highest percentages seen are in the 55-59 age group (24.7% in women and 15.3% in men). The frequency declined at older ages with the lowest frequency in the oldest age group (10.7% in women and 5.9% in men). **Table 2d** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights. The prevalence of mood disorder in women was estimated at 193.9 per 1,000 (186.4, 201.5) while for males the prevalence was much lower at 122.4 per 1,000 (115.9, 129.1).

ANXIETY DISORDER

The question asked in relation to anxiety disorder in the CLSA is; “Has a doctor ever told you that you have an anxiety disorder such as a phobia, obsessive-compulsive disorder, or a panic disorder?” There was an overall decrease in frequency of reporting as age increased. Reporting was more frequent in women. Percentages by age in women decreased from 12.41% to 5.8%. For men the corresponding figures are 7% to 2.47%. **Table 2d** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights. Again, we see a difference in prevalence by sex with women having a higher prevalence (98.9 per 1,000) than men (59.6 per 1,000) with non-overlapping confidence intervals.

Gastrointestinal Disorders

INTESTINAL/STOMACH ULCERS

The frequency reporting intestinal/stomach ulcers increased with age, except for a slight decrease in the older age group. This pattern was observed in men and women with very little difference in frequency at each age group. The percentage reporting for women ranged from 5.56% to 9.65% and in men, it was from 5.13% to 10.4%. In both sexes, the maximum reporting frequency occurred in the age group 75-79 years. **Table 2e** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights; the similarity in prevalence between men and women was confirmed.

BOWEL DISORDERS

The question asked concerning bowel disorders was “Has a doctor ever told you that you have a bowel disorder such as Crohn’s Disease, ulcerative colitis, or Irritable Bowel Syndrome?” Unfortunately, a positive response to this question cannot distinguish between these disorders. Women answered this question in the affirmative approximately twice as frequently as men with percentages ranging from 10.42% to 14.5% compared to men where the range was 5.65% to 6.68%. There was no meaningful pattern with age. **Table 2e** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights and the female preponderance is confirmed with a two to one female to male prevalence ratio. In the follow-up waves of the CLSA, this question has been modified.

Kidney Disease

Reports of kidney disease were slightly more frequent in men than in women. There was an increase with age with the reporting frequency for men ranging from 1.49% to 5.42%. For women the figures were 1.46% to 5.07%. **Table 2e** contains estimated the prevalence (overall and by sex) using the CLSA sampling weights. In men between the ages of 45 and 85 the estimated prevalence was 27 per 1,000 (24, 30.2) and in women the comparable estimate was 22.3 per 1,000 (19.8, 24.9).

Hyperthyroidism

The following question was asked of all participants in the CLSA: “Has a doctor ever told you that you have an OVER-active thyroid gland (sometimes called hyperthyroidism or Graves’ disease)?” Women were more likely to report hyperthyroidism. There was a slight increase with age reaching a peak at age 70-74 with a subsequent decline in the oldest age groups. In men, there was little evidence of a difference with age but reported rates are slightly higher in the oldest age groups. Throughout the age spectrum, the frequency of reporting was less than 2% in men. In women, the frequency varied between 3% and 4.5%. **Table 2f** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights. The female preponderance of hyperthyroidism was confirmed with an approximate 3 to 1 female to male prevalence ratio and non-overlapping confidence intervals.

Hypothyroidism

The question asked in the CLSA was; “Has a doctor ever told you that you have an UNDER-active thyroid gland (sometimes called hypothyroidism or myxedema)?” Hypothyroidism was reported more frequently by women with a range of 12.5% to a high of 25% in the oldest age group. For men higher rates are also seen with increasing age (range 2.5% to 10.8%). **Table 2f** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights. As with hyperthyroidism the estimated CLSA population prevalence for hypothyroidism in women (165.4 per 1,000) was three times that in men (49.1 per 1,000) with non-overlapping confidence intervals.

Cancer

In this section we report on the answer to the question “Has a doctor ever told you that you had cancer?” Following a positive report to this question, participants were asked, “What type(s) of cancer were you diagnosed with?”, but we will not report on this question here. Since as with other questions (stroke, TIA) individuals may have experienced more than one type of cancer. They are only counted once when using this question. Positive reporting increased with increasing age group. In the younger age groups (45-69), reporting was more frequent among women, while in older age groups the frequency was higher in men. In women, the percentages with positive reporting ranged from 6.2% to 24.4% while in men the corresponding range is 3.2% to 33.9%. **Table 2f** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights. Given the way the question was asked, we can frame the results in **Table 2f** as the estimated prevalence of any cancer. Overall, the estimated prevalence was 132.6 per 1,000 with a higher prevalence in women (143 per 1,000) than in men (121.6 per 1,000) with non-overlapping confidence intervals. The prevalence of the individual cancers will be studied further.

Vision

Self-rated vision is presented in Chapter 8 (Physical Function, Disability and Falls). In this section, we report on cataracts, glaucoma and macular degeneration based on the separate self-report questions that were asked.

CATARACT

Cataract reporting increased dramatically with age particularly after age 60 in both sexes. Cataracts were more likely to be reported by women with a range of 2.5% to 79.71% in the oldest age group. In men, the figures were 2.03% to 67.3%. **Table 2g** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights. The estimated prevalence of cataracts in the CLSA target population is 206 per 1,000 (201.5, 210.6) with an important difference between males and females. Women had a much higher estimated prevalence (237.5 per 1,000) than men (172.4 per 1,000).

GLAUCOMA

In both sexes, the frequency of reporting a diagnosis of glaucoma increased with age with a slight female predominance. The range reporting glaucoma varied from 1.19% at age 45-49 in women to 13.72% in the oldest age group. For men the range was 0.54% in the youngest age group to 11.85 in those aged 80 to 85. **Table 2g** contains the estimated prevalence (overall and by sex) using the CLSA sampling weights. The estimated prevalence was higher in women (42.2 per 1,000) than in men (35.7 per 1,000) with minimal overlap in the confidence intervals.

MACULAR DEGENERATION

As with cataracts and glaucoma, the percentage reporting a diagnosis of macular degeneration rose with increasing age. There was a female preponderance beginning at 70-74. In women, the range of reporting frequency by age was 0.8% in the youngest age group to 17.03% in those aged 80 to 85 years of age. In men, the equivalent figures are 0.75% to 11.8%. **Table 2g** contains the estimated prevalence (overall, by sex and by age group) using the CLSA sampling weights. The estimated prevalence figures confirmed an overall female preponderance with an estimate of 37.2 per 1,000 as compared to 27.7 per 1,000 in men with non-overlapping confidence intervals.

Discussion

Patterns of responses to the self-report questions for the chronic conditions for the most part mirrored population trends for age/sex categories. However, the weighting up of the data using the sampling weights in some instances produced prevalence estimates that differ from other available data. There are several possible explanations, some of which are relevant for all conditions while others are only pertinent for specific conditions. The age range of the CLSA at baseline is best suited to the estimation of prevalence for late adult onset diseases, and the results presented here support that. It is important to interpret these results in relation to the study's age range at baseline. Another important consideration is the exclusion of individuals living in institutions at baseline. This criterion is likely to have excluded individuals with conditions that are associated with major disability at older ages (e.g. PD, MS). Finally, the method of data collection in the CLSA likely served as a filter in terms of the abilities of individuals to participate. Individuals recruited into the Comprehensive cohort were required to complete a visit to a data collection site as part of their baseline assessment. The ability to travel to a DCS may be related to disability at baseline. Individuals in the Tracking cohort, who completed their assessment through telephone interviews, were not required to travel to a site outside their home. They would have been able to participate even with a level of disability that would hamper participation in the Comprehensive cohort.

A further limitation is the use of self-report of diagnosis of a condition or disease. For some conditions, additional questions about disease symptoms were included with disease ascertainment algorithms developed. An important current activity in the CLSA is to implement the disease ascertainment algorithms as medication data and biomarkers become available to validate self-report. In a recent study[16] to examine the accuracy of a self-reported diagnosis of MS, those individuals who reported a diagnosis of MS were compared with those who did not on a series of measures believed to be affected by MS (i.e. chair rise, grip strength, visual acuity, standing balance, 4 metre walk, and timed get up and go). Findings were that individuals with self-reported MS performed significantly worse on each of the measures except for one.

In general, it is acknowledged that participants in observational studies are often healthier and wealthier than non-participants. This may be the case for the CLSA. In a recent publication, Fry et al (2017)[17] examined the "representativeness" of the UK Biobank and found that UK Biobank participants were less socioeconomically deprived, less likely to have negative lifestyle risk factors including less likely to be obese, less likely to smoke, and less likely to drink alcohol on a daily basis. They also found participants to have fewer self-reported health conditions and lower prevalence of several chronic conditions. They concluded that caution was warranted in estimating the prevalence of chronic conditions based on the UK Biobank given the evidence of healthy volunteer bias. However, they also concluded that valid assessments of exposure-disease relationships could be made.

In this chapter, we present preliminary analyses that are only subdivided by age group and sex and are based on the self-report of CLSA participants. Further analyses are being pursued considering the more objective measures of disease (e.g. DXA, measured blood pressure, etc.) as well as the disease symptoms included as part of the assessment for participants in the Comprehensive cohort. Readers are referred to the CLSA website to view the summaries of approved projects. As the study progresses and more waves of data collection are accrued, the research community has the opportunity to study not only the incidence of diseases but also the impact of existing health conditions on the aging process. This preliminary snapshot of the frequency of selected health conditions reported by CLSA participants at the study baseline and the consistency of the findings in relation to other published research confirms the CLSA as an important research vehicle for the study of the aging process.

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TABLE 1 LIST OF SELF-REPORTED CHRONIC DISEASES IN THE CLSA CONSIDERED IN THIS REPORT

Musculoskeletal Conditions	Rheumatoid Arthritis Osteoporosis
Respiratory Conditions	Asthma COPD
Cardiovascular Conditions	High Blood Pressure Peripheral Vascular Disease Heart Disease Diabetes
Neurological Conditions	Parkinson’s Disease Multiple Sclerosis Epilepsy Migraine Stroke or CVA Mini Stroke or TIA
Psychiatric Disorders	Mood Disorder Anxiety Disorder
Gastrointestinal Disorders	Intestinal/Stomach Ulcers Bowel Disorder
Kidney Disease	
Cancer	
Endocrine Disorders	Hyperthyroidism Hypothyroidism
Vision Disorders	Cataracts Glaucoma Macular Degeneration

TABLE 2A LIFETIME PREVALENCE SELF-REPORTED SELECTED MUSCULOSKELETAL AND RESPIRATORY CONDITIONS. PER 1,000 POPULATION

	Osteoporosis	**Rheumatoid Arthritis**	**Asthma**	**COPD**
	Prevalence (95% CI)	Prevalence (95% CI)	Prevalence (95% CI)	Prevalence (95% CI)
All	84.9 (81.4, 88.7)	43.6 (40.7, 46.6)	118.2 (113.7, 122.8)	54.6 (51.6, 57.7)
		By Sex		
Male	25.1 (22.1, 28.1)	36.8 (33.0, 40.9)	100.5 (94.5, 106.7)	50.4 (46.4, 54.4)
Female	141.4 (135.1, 147.8)	50.1 (45.8, 54.5)	134.9 (128.2, 141.6)	58.6 (54.3, 63.1)

TABLE 2B LIFETIME PREVALENCE OF SELF-REPORTED SELECTED CARDIOVASCULAR DISEASES AND DIABETES

	High Blood Pressure	**Heart Disease**	**Peripheral Vascular Disease**	**Diabetes**
	Prevalence (95% CI)	**Prevalence (95% CI)**	**Prevalence (95% CI)**	**Prevalence (95% CI)**
All	340.5 (334.2, 346.6)	90.2 (86.6, 93.9)	60.1 (56.9, 63.4)	153.4 (148.5, 158.4)
		By Sex		
Male	350.4 (341.2, 359.6)	113.3 (107.7, 119.2)	55.4 (51.1, 59.9)	166.2 (159.2, 173.3)
Female	330.9 (322.3, 339.5)	68.5 (64.0, 73.05	64.6 (60.1, 69.3)	141.3 (134.6, 148.1)

TABLE 2C LIFETIME PREVALENCE OF SELF-REPORTED SELECTED NEUROLOGICAL DISEASES

	Parkinsonism	Multiple Sclerosis	Epilepsy	Migraine	Stroke	TIA
	Prevalence (95% CI)	**Prevalence (95% CI)**	**Prevalence (95% CI)**	**Prevalence (95% CI)**	**Prevalence (95% CI)**	**Prevalence (95% CI)**
All	3.6 (2.8, 4.4)	5.9 (5.0, 6.9)	9.1 (7.8, 10.5)	142.9 (137.9,147.9)	15.8 (14.1,17.5)	26.5 (24.5, 28.5)
By Sex						
Male	4.6 (3.3, 6.1)	3.5 (2.6, 4.5)	8.9 (7.2, 10.9)	78.4 (72.8, 84.2)	19.0 (16.4, 21.8)	28.9 (25.9, 32.2)
Female	2.5 (1.7, 3.5)	8.2 (6.7, 10.0)	9.2 (7.4, 11.1)	203.6 (195.3,211.7)	12.7 (10.7, 14.8)	24.1 (21.6, 26.8)

TABLE 2D LIFETIME PREVALENCE OF SELF-REPORTED SELECTED PSYCHIATRIC DISORDERS

	Mood Disorder	Anxiety Disorder
	Prevalence (95% CI)	**Prevalence (95% CI)**
All	159.2 (154.2, 164.4)	79.9 (76.1, 83.6)
By Sex		
Male	122.4 (115.9, 129.1)	59.6 (54.9, 64.5)
Female	193.9 (186.4, 201.5)	98.9 (93.1, 104.8)

TABLE 2E LIFETIME PREVALENCE OF SELF-REPORTED GASTROINTESTINAL DISORDERS AND KIDNEY DISEASE

	Ulcers	Bowel disorders	Kidney Disease
	Prevalence (95% CI)	Prevalence (95% CI)	Prevalence (95% CI)
All	70.6 (67.1, 74.2)	83.5 (79.7, 87.40	24.6 (22.7, 26.6)
By Sex			
Male	73.0 (67.8, 78.4)	54.2 (49.7, 58.8)	27.0 (24.0, 30.2)
Female	68.3 (63.7, 73.2)	111.0 (104.8, 117.2)	22.3 (19.8, 24.9)

TABLE 2F LIFETIME PREVALENCE OF SELF-REPORTED HYPERTHYROIDISM AND HYPOTHYROIDISM AND CANCER

	Hyperthyroidism	Hypothyroidism	Cancer
	Prevalence (95% CI)	Prevalence (95% CI)	Prevalence (95% CI)
All	20.4 (18.6, 22.3)	109.0 (104.8, 113.0)	132.6 (128.0, 137.2)
By Sex			
Male	10.9 (8.9, 13.2)	49.1 (45.1, 53.3)	121.6 (115.8, 127.8)
Female	29.2 (26.2, 32.4)	165.4 (158.6, 172.2)	143.0 (136.4, 149.6)

TABLE 2G LIFETIME PREVALENCE OF SELF-REPORTED VISION DISEASES

	Cataracts	**Glaucoma**	**Macular Degeneration**
	Prevalence (95% CI)	**Prevalence (95% CI)**	**Prevalence (95% CI)**
All	206.0 (201.5, 210.6)	39.1 (36.6, 41.6)	32.6 (30.4, 34.8)
		By Sex	
Male	172.4 (166.2, 178.8)	35.7 (32.5, 39.2)	27.7 (24.9, 30.6)
Female	237.5 (231.1, 244.3)	42.2 (38.6, 45.9)	37.2 (33.8, 40.5)

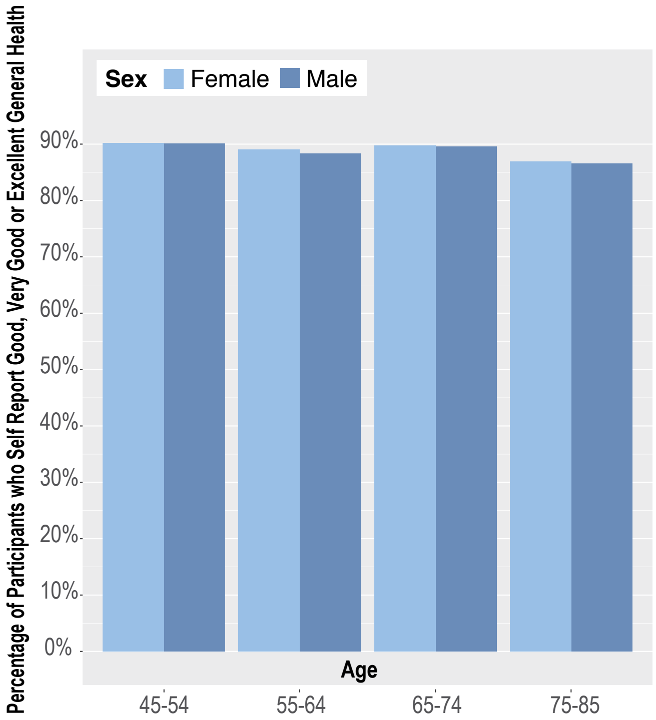

Figure 1 – Percentage of participants who self-report good, very good, or excellent general health stratified by age and sex

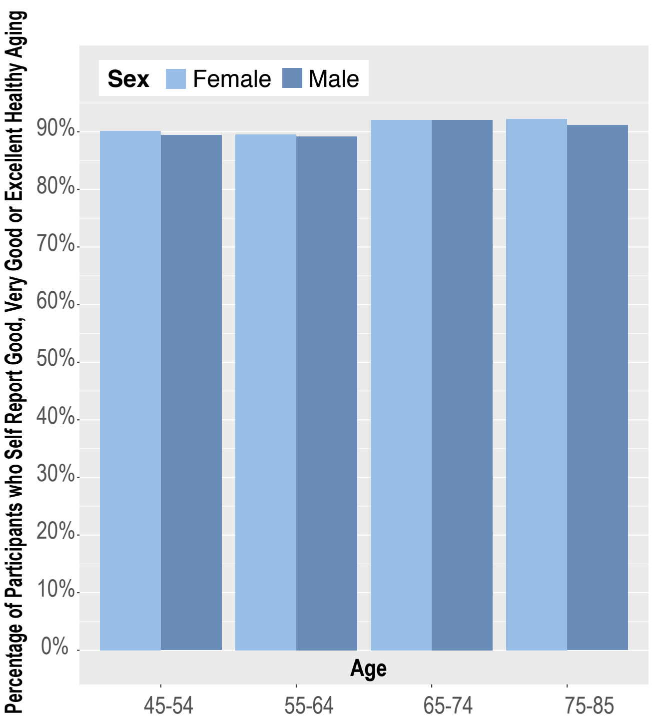

Figure 2 – Percentage of participants who self-report good, very good, or excellent healthy aging stratified by age and sex

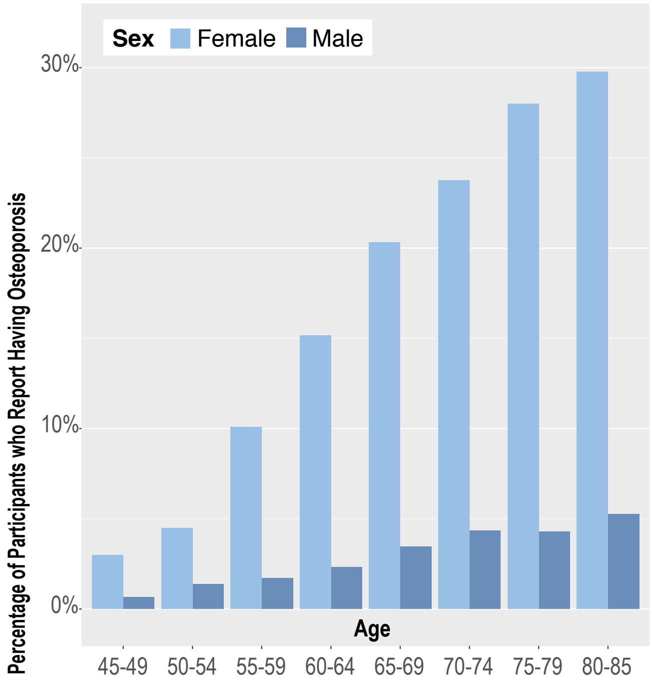

Figure 3 – Percentage of participants who report being told by a doctor that they have osteoporosis stratified by age and sex

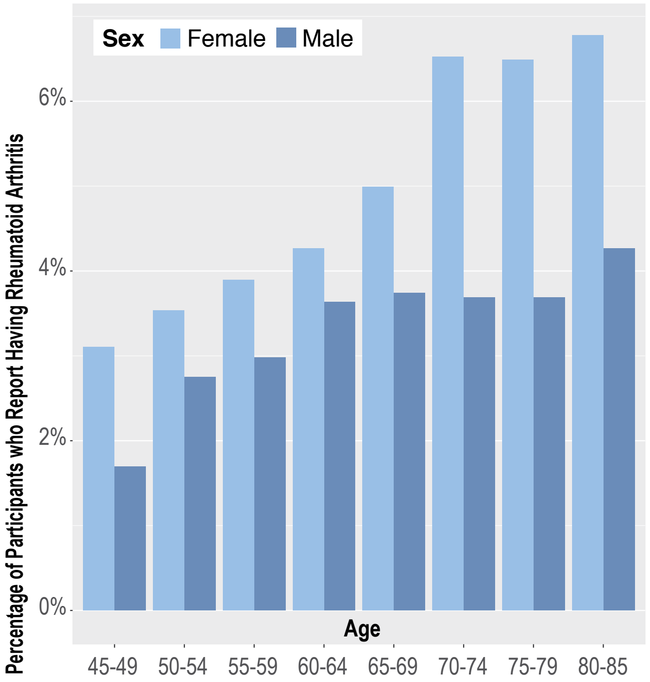

Figure 4 – Percentage of participants who report being told by a doctor that they have rheumatoid arthritis stratified by age and sex

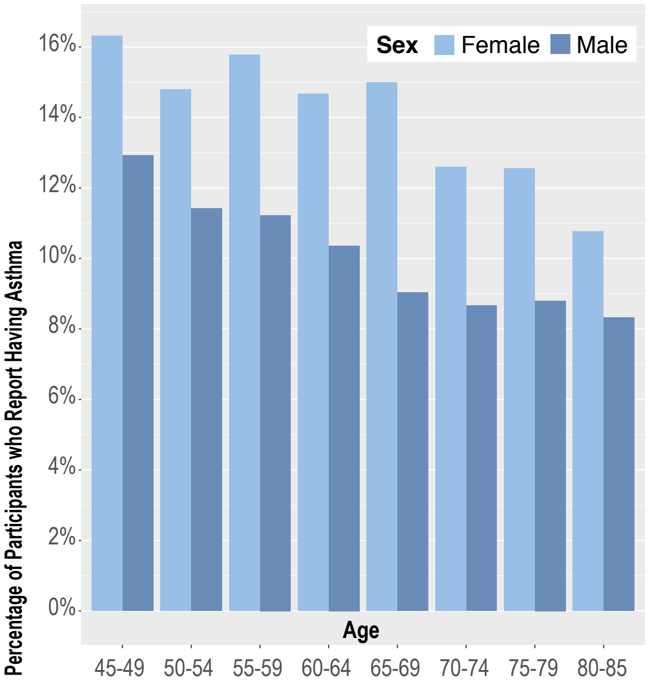

Figure 5 – Percentage of participants who report being told by a doctor that they have asthma stratified by age and sex

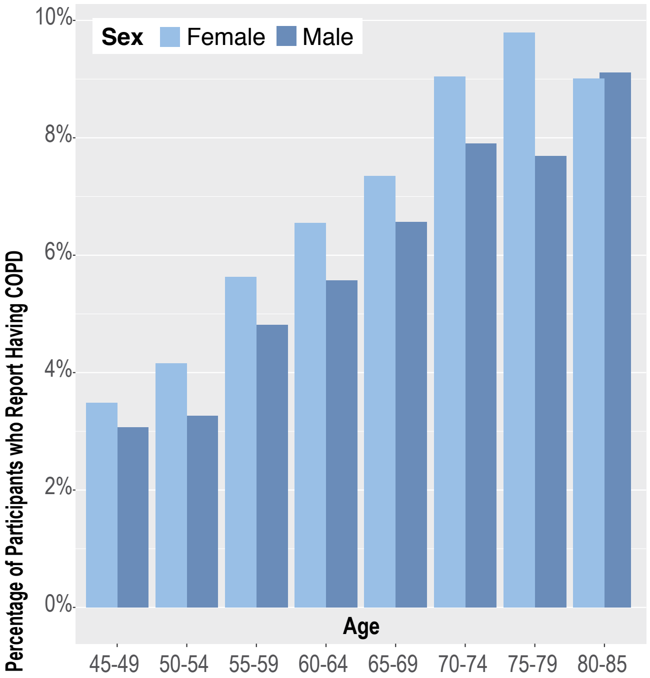

Figure 6 – Percentage of participants who report being told by a doctor that they have COPD stratified by age and sex

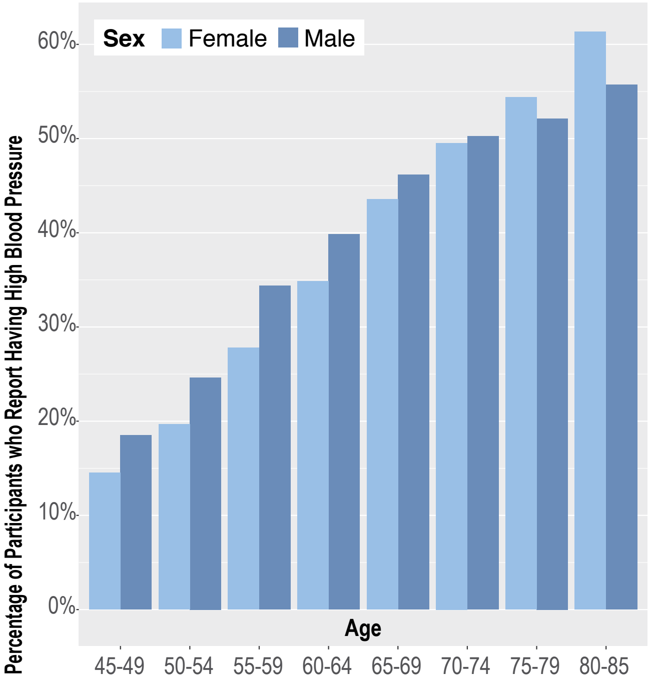

Figure 7 – Percentage of participants who report being told by a doctor that they have high blood pressure stratified by age and sex

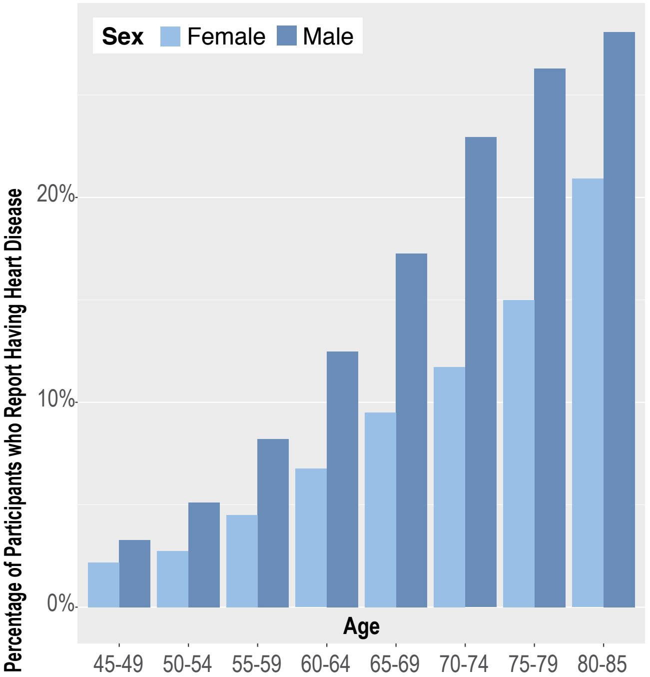

Figure 8 – Percentage of participants who report being told by a doctor that they have heart disease stratified by age and sex

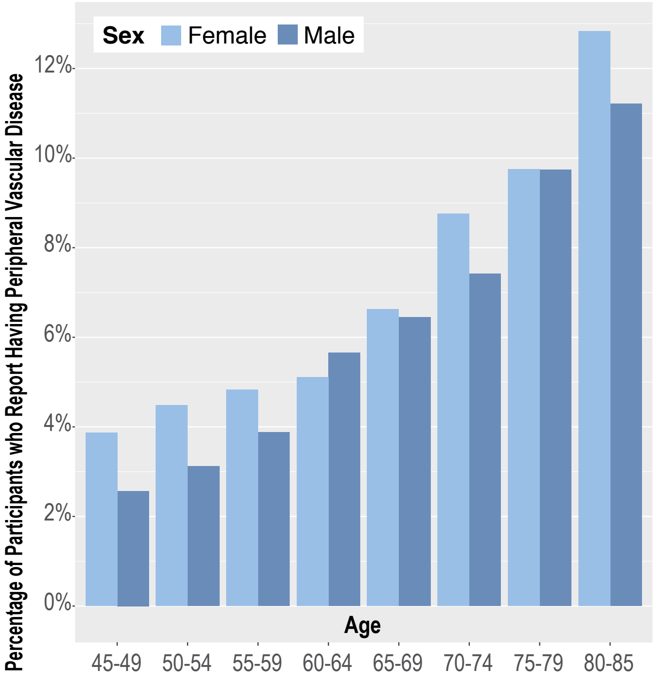

Figure 9 – Percentage of participants who report being told by a doctor that they have PVD stratified by age and sex

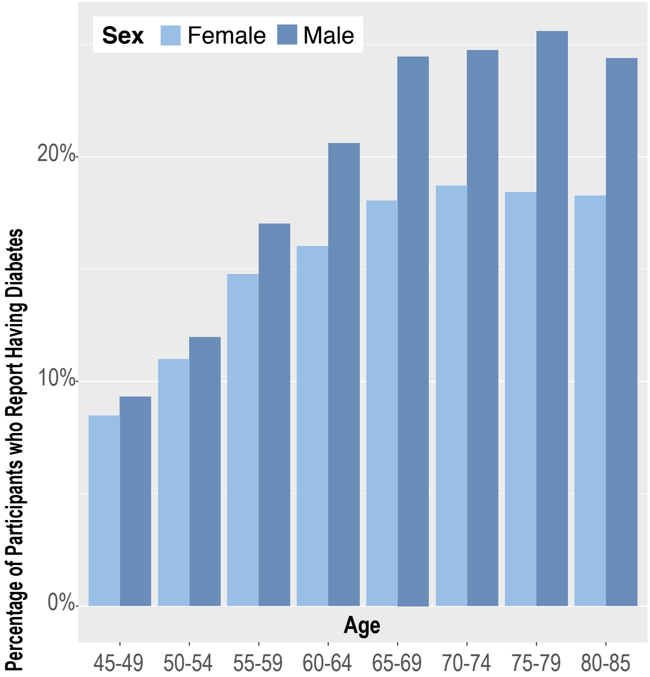

Figure 10 –Percentage of participants who report being told by a doctor that they have diabetes stratified by age and sex

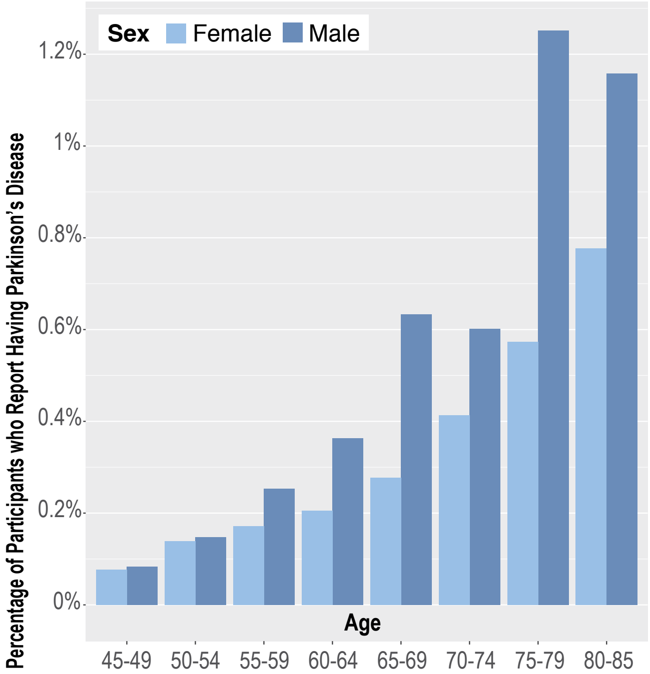

Figure 11 – Percentage of participants who report being told by a doctor that they have Parkinson's disease stratified by age and sex

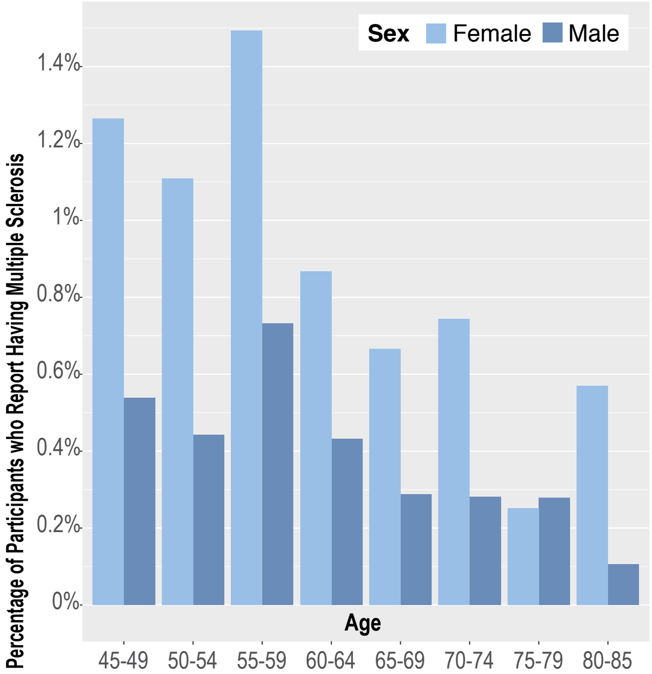

Figure 12 – Percentage of participants who report being told by a doctor that they have multiple sclerosis stratified by age and sex

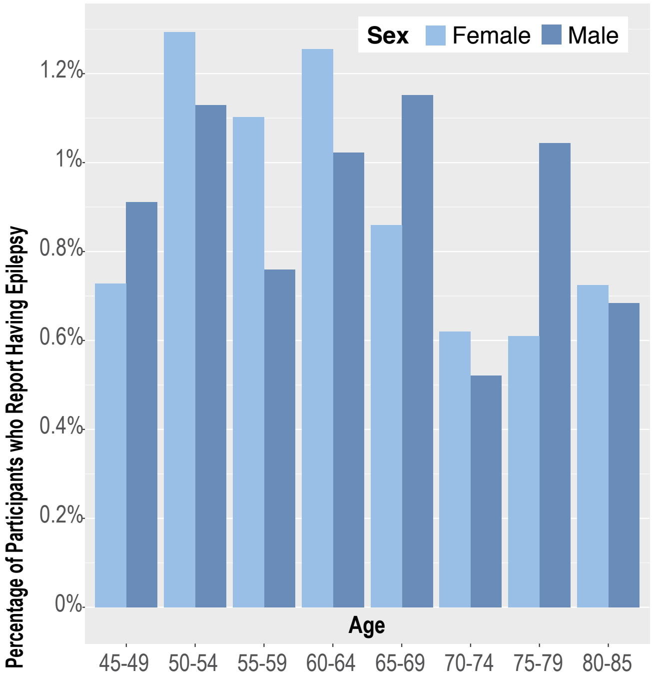

Figure 13 – Percentage of participants who report being told by a doctor that they have epilepsy stratified by age and sex

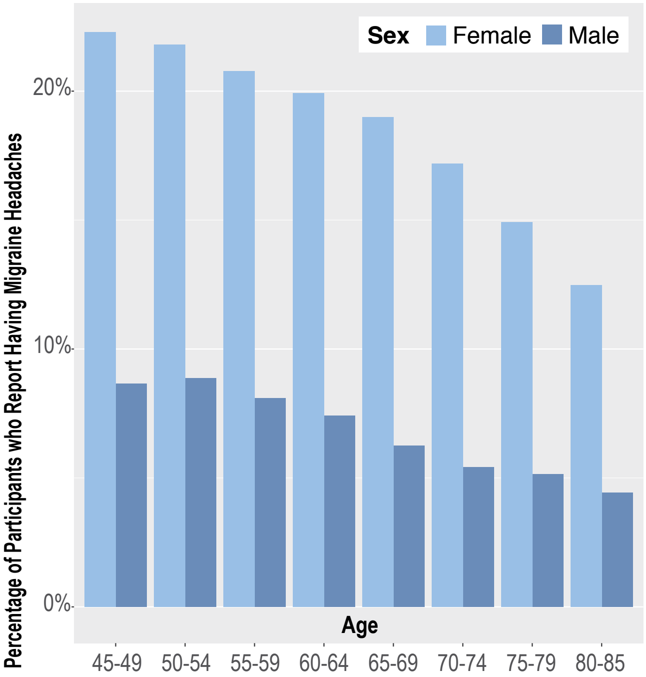

Figure 14 – Percentage of participants who report being told by a doctor that they have migraine headaches stratified by age and sex

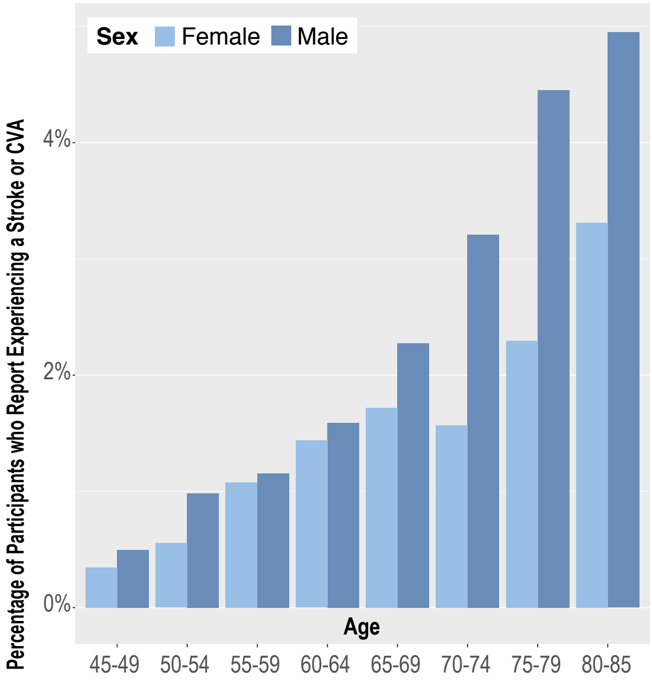

Figure 15 – Percentage of participants who report being told by a doctor that they have had a stroke or CVA stratified by age and sex

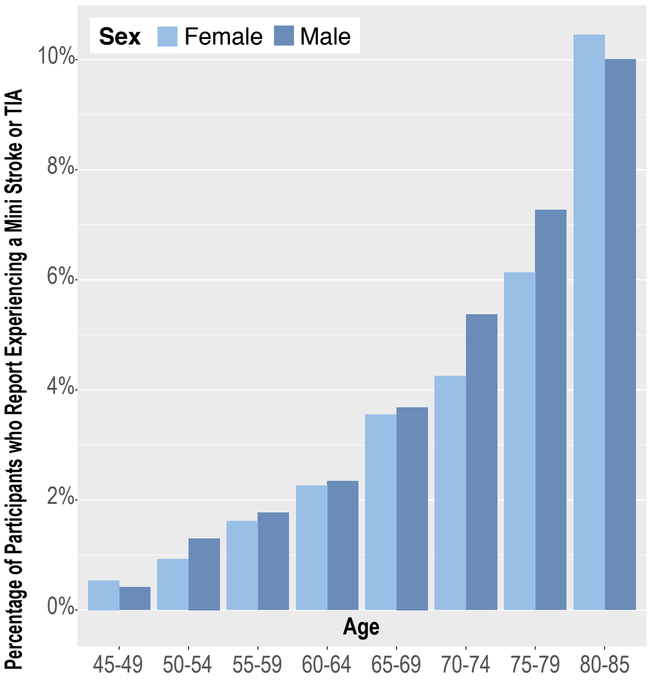

Figure 16 – Percentage of participants who report being told by a doctor that they have had a mini-stroke or TIA stratified by age and sex

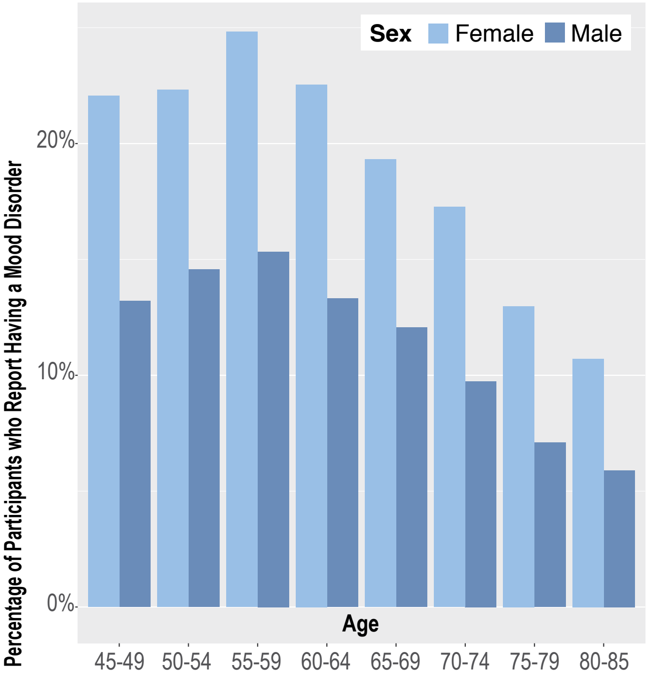

Figure 17 – Percentage of participants who report being told by a doctor that they have a mood disorder stratified by age and sex

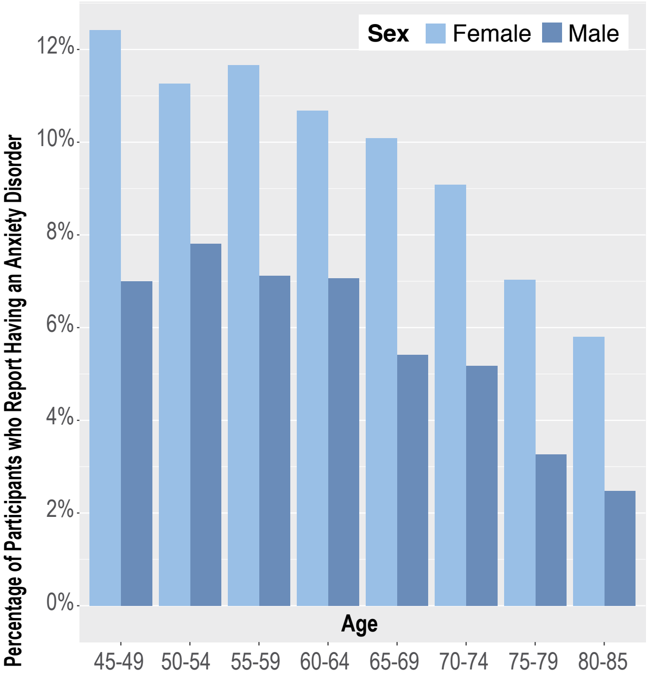

Figure 18 – Percentage of participants who report being told by a doctor that they have an anxiety disorder stratified by age and sex

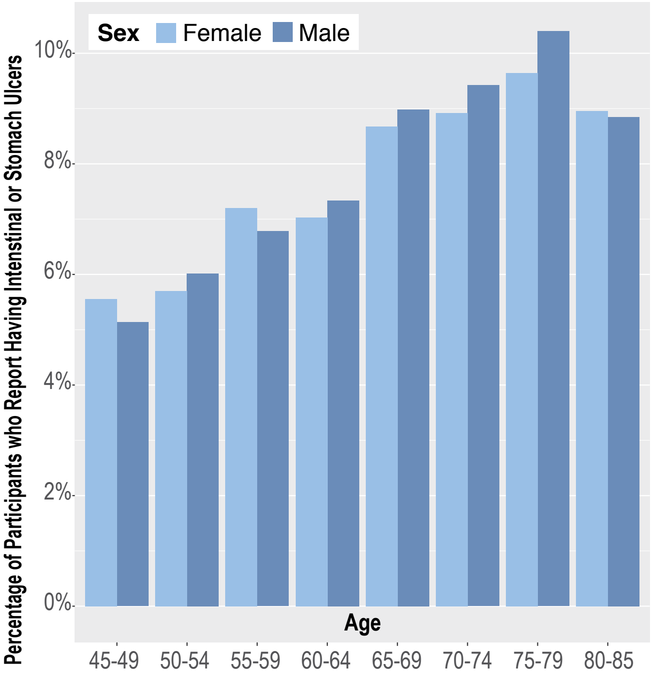

Figure 19 – Percentage of participants who report being told by a doctor that they have intestinal or stomach ulcers stratified by age and sex

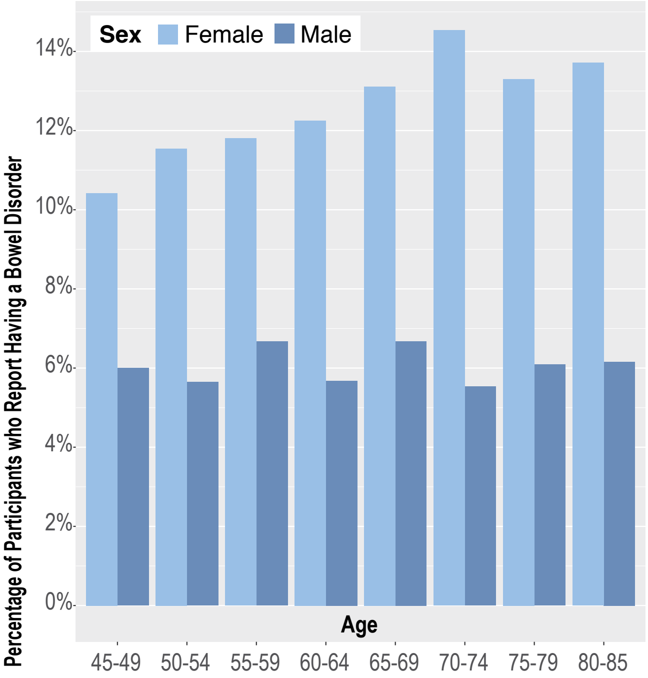

Figure 20 – Percentage of participants who report being told by a doctor that they have a bowel disorder stratified by age and sex

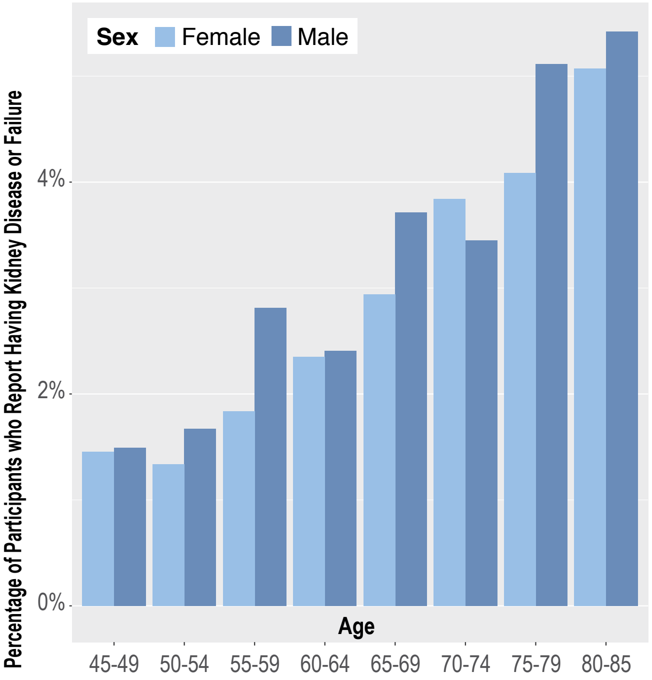

Figure 21 – Percentage of participants who report being told by a doctor that they have kidney disease stratified by age and sex

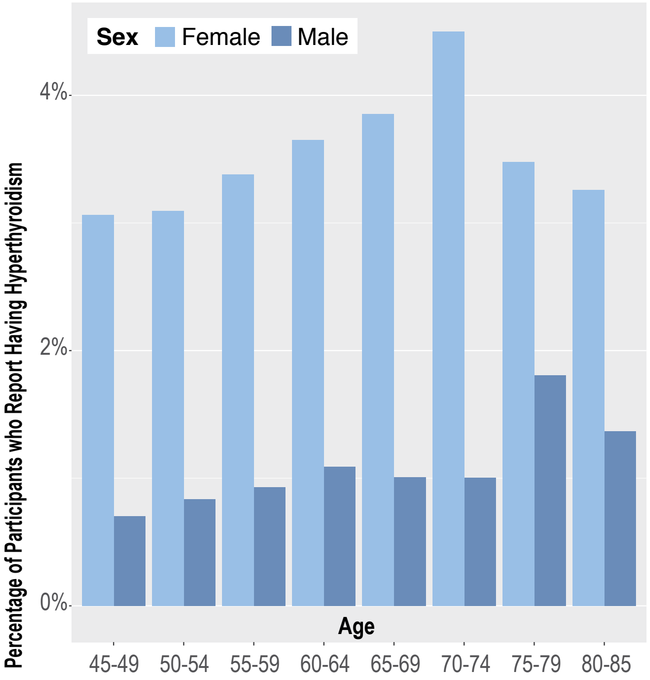

Figure 22 – Percentage of participants who report being told by a doctor that they have hyperthyroidism stratified by age and sex

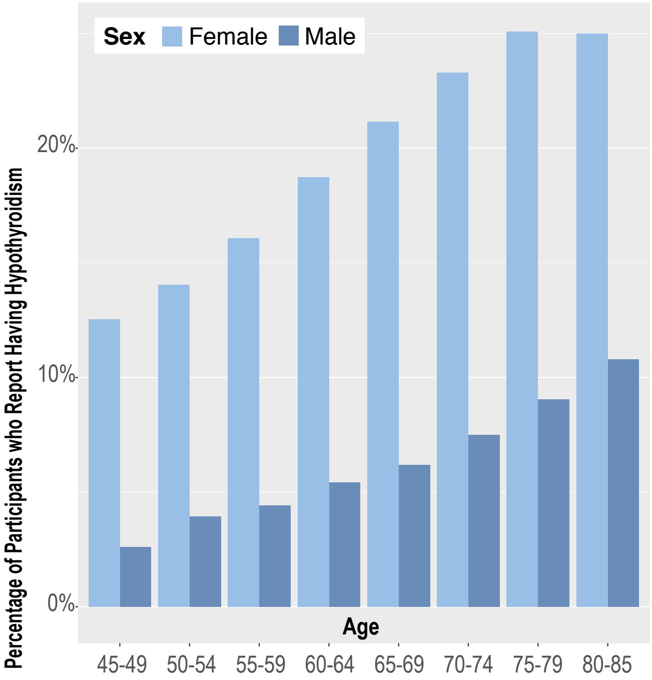

Figure 23 – Percentage of participants who report being told by a doctor that they have hypothyroidism stratified by age and sex

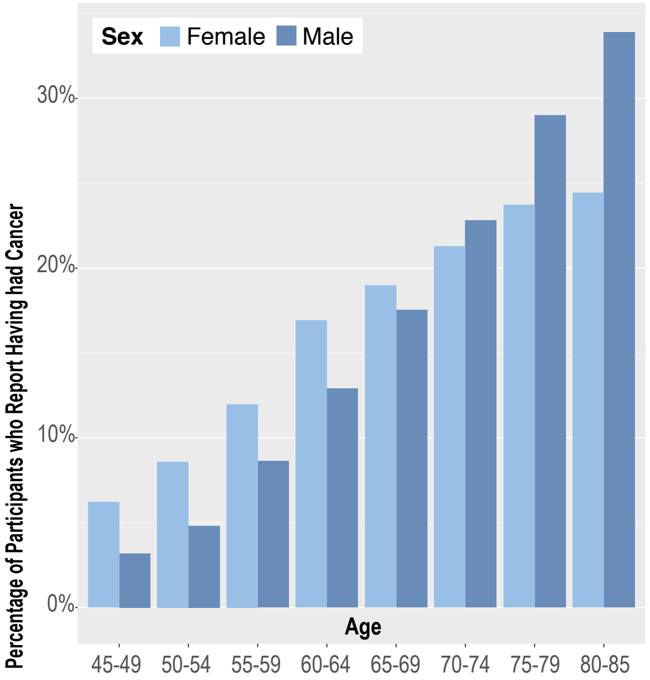

Figure 24 – Percentage of participants who report being told by a doctor that they have cancer stratified by age and sex

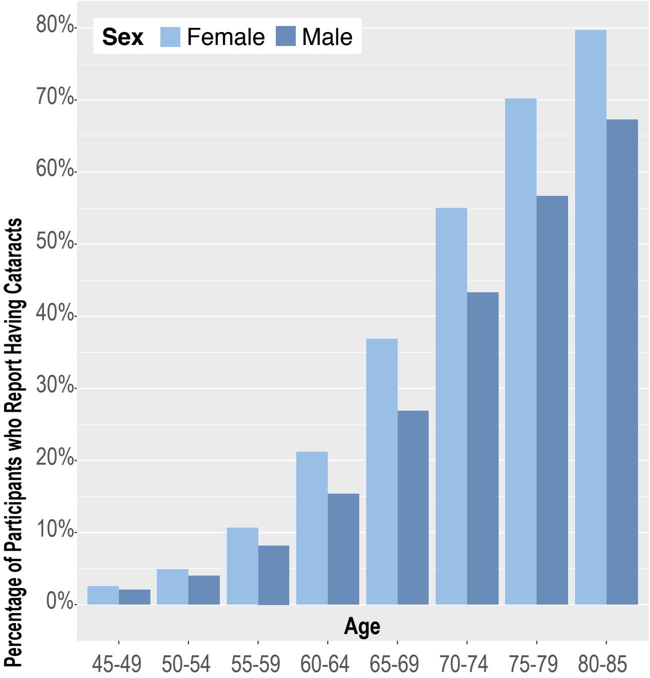

Figure 25 – Percentage of participants who report being told by a doctor that they have cataracts stratified by age and sex

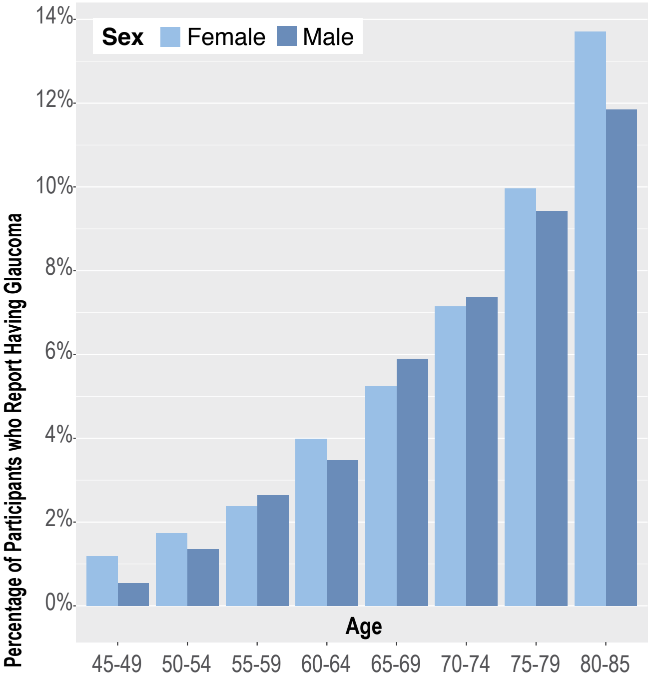

Figure 26 – Percentage of participants who report being told by a doctor that they have glaucoma stratified by age and sex

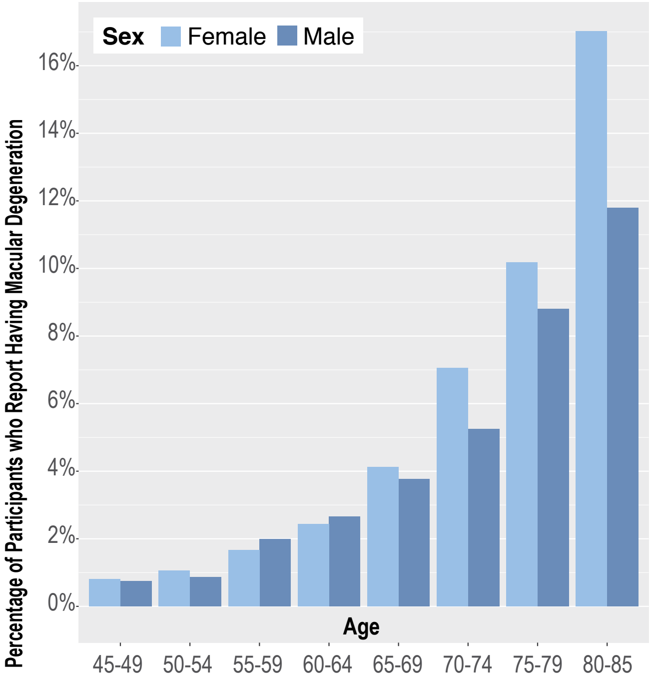

Figure 27 – Percentage of participants who report being told by a doctor that they have macular degeneration stratified by age and sex

8

Physical Function, Disability, and Falls

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Physical Function, Disability, and Falls

Key Insights

This chapter presents the prevalence of limitations in basic activities of daily living (BADL), instrumental activities of daily living (IADL), and questionnaire based functional status. The mean value as well as quartiles of test based physical performance are also provided. Descriptive statistics exploring the, frequency of falls, the use of assistive devices, self-reported vision and hearing status and formal and informal care receiving are reported. All results are based on analyses using the baseline data collected for the Canadian Longitudinal Study on Aging (CLSA). The results presented in this chapter show that:

- The prevalence of BADL and IADL limitations were lower in younger versus older adults. Only 5.2% of participants aged 45 to 54 years reported having one or more BADL or IADL limitations while 22.4% of participants aged 75 and older reported limitations.
- BADL and IADL limitations were more common in females than in males. 12.7% of females reported having at least one BADL or IADL limitation compared to 5.1% of males. The prevalence of BADL limitations (5.8%) and IADL (5.6%) limitations were similar.
- The most common BADL limitations were not being able to walk 2 to 3 city blocks and make it to the bathroom in time. The most common IADL limitation was not being able to do housework or go shopping.
- Of the participants with BADL or IADL disability, 47.4% received either formal or informal care. The proportion of those living with limitations receiving support was similar across age groups. However, the proportion of participants receiving formal care increased from 17.9% in the 45 to 54 year-olds to 24.4% in those aged 75 and older

while proportion of participants receiving informal care decreased from 40.0% in those aged 45 to 54 to 34.1% in those aged 75 and older.

- Despite a lower proportion of males reporting having BADL or IADL limitations, a higher proportion of males with limitations receive formal care (27.0%) and informal care (39.3%) compared to females (23.4% and 36.6% respectively). Similarly, males were overall more likely to use mobility aids (48.1%) or any type of assistive devices (59.8%) than females (41.9% and 55.0% respectively).
- In contrast to the BADL/IADL questionnaire, which asked if participants require assistance completing tasks, the functional status questionnaire asked if participants experience difficulty with a task. A larger proportion of participants reported having at least one functional limitation based on the physical function questionnaire (51.4%) than on the BADL/IADL questionnaire (9.0%).
- Three different categories of functional limitations were assessed, upper body limitations, lower body limitations, and dexterity related limitations. Across all participants, lower body limitations were the most common (41.5%), followed by upper body limitations (25.1%), and dexterity related limitations (7.0%).
- As with BADL/IADL disability, females were more likely to report having at least one physical function limitation (52.5%) compared to males (44.5%). The proportion of individuals with a limitation also increased with age from 38.2% of those aged 45 to 54 years to 51.4% of those aged 75 and older. These trends were consistent for upper body limitations, lower body limitations, and dexterity.
- Males performed better than females for the gait speed, balance, chair rise, and grip strength performance tests. Performance was similar for males and females for the timed up and go test. Performance on all tests decreased across age categories.
- Overall, 4.9% of participants experienced a fall in the previous 12 months. Females experienced a higher prevalence of falls than males, but prevalence was similar across age groups.
- The percentage of participants using at least one mobility related assistive device (cane, walking stick, wheel chair, motorized scooter, or walker) was 10.2% overall with canes and walking sticks being most frequently used (8.7%). The use of mobility related assistive devices increased with age from 5.8% of those aged 45 to 54 to 23.2% of those aged 75 and older.
- The prevalence of poor or fair self-reported vision was 8.1% and 10.9% for hearing. For both vision and hearing, the percentage of people that reported poor or fair status increased with age from 7.9% of 45 to 54 year-olds saying they had poor/fair vision and 7.8% saying they had poor/fair hearing compared to 11.6% and 17.7% of 75+ year-olds. While females were more likely to report poor/fair vision than males for each age category, males were more likely to report poor hearing.

Introduction

There is no single definition of physical function or disability that is appropriate for every context. However, there are two frameworks, which are commonly used to conceptualize these concepts in older adults, Nagi's disablement process model, and the World Health Organization's International Classification for Functioning (ICF), Disability, and Health (ICF). Nagi's disablement process model begins with a pathological problem caused by disease or injury, which causes anatomical, physiological, intellectual, or emotional impairment. This impairment leads to a limitation in functional abilities or performance which then results in disability, defined by the inability to perform social roles and activities[1]. The ICF similarly places a heavy emphasis on the interaction of the individual with his or her environment. According to the ICF, the term *functioning* refers to all body functions, body structures, activities and participation while *disability* includes impairments, activity limitations, and participation restrictions[2].

Regardless of which framework is used to conceptualize physical function and disability, both concepts are important to maintaining independence through the aging process, which is a key concern for older adults, as well as health and social services[3]. Age-related disabilities have numerous implications for public health including increased demand for health care[4], reduced quality of life[5], increased cost of care[6] and higher mortality[7].

For the purposes of this chapter, we have made the following distinctions between physical function and disability. Disability refers to tasks that limit the ability of the person to perform social roles and activities. In the CLSA, this has been operationalized using basic activities of daily living (BADL) and instrumental activities of daily living (IADL)[8]. BADL items focus on the ability to perform personal care, including bathing, dressing, toileting, and feeding[9] while IADL focuses on more complex tasks such as shopping, managing money, doing housework, and preparing meals[10]. Physical function limitations are related to specific tasks that do not directly relate to the ability of the individual to participate in social roles and activities. In the CLSA, two measures of physical function limitations have been used. The first is a questionnaire-based assessment of the ability of participants to complete tasks without difficulty; the second are performance-based measures including gait speed, timed up and go, balance, the chair rise test, and grip strength.

This chapter describes the measures of disability and physical function that were used during baseline data collection for the CLSA and provides the main findings. In addition to physical function and disability, other variables from the CLSA that are important to maintaining independence have been included in this chapter. These variables include falls, and the use of mobility related assistive devices, self-rated vision and hearing, and receiving formal and informal care in those with disability. The prevalence or mean values for these variables are provided by age and sex. The CLSA Comprehensive (Version 2.1) and CLSA Tracking (Version 3.1) datasets were used for the analyses in this chapter. The data were weighted using the trimmed CLSA combined weighting factors for descriptive analyses to calculate prevalence estimates and are presented with the unweighted frequencies used for these calculations. There were only small percentages of missing data; these were removed from data summaries for each variable so that the maximum number of participants were included.

The population studied during baseline data collection of the CLSA is limited to people living in the community and does not cover institutions.

According to Census Canada, approximately 7.9% of seniors aged 65 years and older lived in collective dwellings, such as residences for senior citizens or health care facilities. This percentage increased to 43.5% when considering those aged 90 years and older[11]. Consequently, the true population burden of limited functional status, disability, and falls is likely greater than what was found in the CLSA, particularly in older age groups.

Defining and measuring physical function and BADL/IADL disability

BADL/IADL DISABILITY

For the purposes of this chapter, disability was measured using limitations in basic activities of daily living (BADL) and instrumental activities of daily living (IADL). BADL and IADL limitations were assessed using a questionnaire adapted from the Older Americans Resources and Services (OARS) Multidimensional Assessment Questionnaire[12]. The questionnaire consists of seven items assessing BADLs and seven items assessing IADLs (**Box 1**). For each question, if the participant responded that they were unable to do the task independently, follow up questions were asked to determine if they were able to do the task with some help, or completely unable to do the task without help. For the making it to the bathroom in time item, the follow up question asks participants how often they wet or soil themselves with the response options of “never or less than once a week”, “once or twice a week”, or “three times a week or more”. These items have been found to be highly correlated with physical therapist measures of self-care capacity (Pearson r = 0.89).[13]

Box 1 BADL and IADL questions

Basic activities of daily living

1. Can you dress and undress yourself without help (including picking out clothes and putting on socks and shoes)?
2. Can you eat without help (i.e., you are able to feed yourself completely)?
3. Can you take care of your own appearance without help, for example, combing your hair, shaving (if male)?
4. Can you walk without help?
5. Can you get in and out of bed without any help or aids?
6. Can you take a bath or shower without help?
7. Do you ever have trouble getting to the bathroom in time?

Instrumental activities of daily living

1. Can you use a telephone without help, including looking up numbers and dialing?
2. Can you get to places out of walking distance without help (i.e. you drive your own car, or travel alone on buses, or taxis)?
3. Can you go shopping for groceries or clothes without help (taking care of all shopping needs yourself)?
4. Can you prepare your own meals without help (i.e. you plan and cook full meals yourself)?
5. Can you do your housework without help (i.e., you can clean floors, etc.)?
6. Can you take your own medicine without help (in the right doses, at the right time)?
7. Can you handle your own money without help (i.e. you write cheques, pay bills, etc.)?

Physical function measures

QUESTIONNAIRE BASED PHYSICAL FUNCTION MEASURES

Physical function can be measured using self-reported or interviewer-administered performance testing. Though performance testing is often considered “objective” versus the “subjective” self-reported measures, both techniques predict BADL and IADL disability[14–18] as well as requiring a nursing home or home care, and mortality[19,20].

Self-reported physical function was measured in a subset of approximately 20,000 CLSA participants. A 14 item questionnaire was adapted consisting of items from the Framingham Disability Study[21], Established Populations for Epidemiologic Studies of the Elderly Study[22], the Disabilities of the Arm, Shoulder, and Hand questionnaire[23], and from questionnaires developed by Nagi[1] and Rosow and Breslau[24] (**Box 2**). These scales have been shown to be reliable and correlated with performance-based measures[25–29]. For each question, participants were asked if they had any difficulty with the task (yes or no) as well as being able to respond that they are unable to do the task or do not do the task on doctor’s orders. If a participant responded that they had any difficulty completing the task, they were asked if the degree of difficulty was “a little difficult”, “somewhat difficult”, or “very difficult”.

Box 2 Physical function questions

1. Do you have any difficulty reaching or extending your arms above your shoulders?
2. Do you have any difficulty stooping, crouching, or kneeling down?
3. Do you have any difficulty pushing or pulling large objects like a living room chair?
4. Do you have any difficulty lifting 10 pounds (or 4.5 kg) from the floor, like a heavy bag of groceries?
5. Do you have any difficulty handling small objects, liking picking up a coin from a table?
6. Do you have difficulty standing for a long period, around 15 minutes?
7. Do you have any difficulty sitting for a long period, say 1 hour?
8. Do you have any difficulty standing up after sitting in a chair?
9. Do you have any difficulty walking alone up and down a flight of stairs?
10. Do you have any difficulty walking 2 to 3 neighbourhood blocks?
11. Do you have any difficulty making a bed?
12. Do you have any difficulty washing your back?
13. Do you have any difficulty using a knife to cut food?
14. Do you have any difficulty with recreational or work activities in which you take some force or impact through your arm, shoulder, or hand (e.g., golf, hammering, tennis, typing, etc.)?

Performance-based physical function measures

Physical function was measured through performance testing for a subset of approximately 30,000 CLSA participants. The performance tests included gait speed, timed up and go, standing balance, chair rise, and handgrip strength tests[30]. The gait speed test was conducted over a four-meter course with participants instructed to walk at their normal walking speed. The total time taken to walk the four-meter distance was divided by four to derive meters per second. The timed up and go test did not specify a walking speed. Participants were instructed to get up from a chair without arms, walk past a line three meters away, turn around and sit back down in the chair. The standing balance test required participants to balance for as long as they could on one leg, starting with the right, then the left. The leg with the best time was used for the analyses. For the chair rise test, participants were instructed to have their arms across their chest and to stand up and sit down as quickly as they could five times, or as many times up to five as they could complete. The timer was started when the interviewer told the participant to begin and was stopped when the participant had fully stood after the last chair rise. Lastly, grip strength was measured in the dominant hand using a Tracker Freedom® Wireless Grip Dynamometer. Participants completed 3 repetitions. The repetition with the highest value was used in the analyses.

FALLS

Falls were assessed by asking participants if they had at least one injury in the past 12 months. If participants reported that they had an injury, they were then asked if a fall had contributed to their injury. These questions were taken from the Canadian Community Health Survey (CCHS)[31]. An additional module was included in a phone call administered approximately 18 months after the participants had completed their baseline interviews. In this module, all participants, rather than the subset reporting an injury, were asked if they had a fall in the previous 12 months. For the purposes of this chapter, the question asking about falls in those reporting injuries was used to be consistent with the CCHS and future waves of data collection in the CLSA. If the questions asked of all participants were used, the prevalence of falls would be higher in comparison to using the question about falls in those reporting injury.

Assistive devices for mobility

Participants were asked to report if they had used any of the 12 different types of assistive devices (**Box 3**). Of these 12 devices, the use of a cane or walking stick, wheelchair, or motorized scooter, were selected because of their relevance to mobility. Previous sensitivity analyses revealed that the use of leg braces or supportive devices was not strongly associated with disability; therefore these categories of devices were not included in the list of mobility-related devices.

Box 3 Assistive device use

1. Cane or walking stick*
2. Wheelchair*
3. Motorized scooter*
4. Walker*
5. Leg braces or supportive devices
6. Hand or arm brace
7. Grab bars
8. Bathroom aids
9. Bath or bed lifts or other lifting devices
10. Grasping tools or reach extenders
11. Special eating utensils
12. Personal alarms

**Classified as a mobility device*

Self-rated vision and hearing

Participants were asked to rate both their vision using glasses, or corrective lenses if they use them, and hearing, using a hearing aid if they use one, as either excellent, very good, good, fair, or poor. Previous studies have found that self-reported vision status is associated with better visual acuity, contrast sensitivity, stereo acuity, and visual fields[32]. Self-reported hearing has been associated with objective measures of hearing such as the whispered voice test[33].

CARE RECEIVING AND ASSISTIVE DEVICE USAGE IN THOSE WITH BADL/IADL LIMITATIONS

CLSA participants were asked if they were receiving care for a variety of different tasks. These tasks include personal care such as assistance with eating, dressing, bathing, or toileting, medical care such as help taking medicine or help with nursing care, managing care such as making appointments, help with activities such as housework, home maintenance, or outdoor work, transportation including trips to the doctor or for shopping, and meal preparation or delivery. Formal care was defined as services including health care, homemaker, or other support services received at home that were provided by professionals or paid workers. Informal care was defined as assistance with any of the tasks from family, friends, or neighbours and excluded assistance from paid workers or volunteer organizations. In addition to potentially receiving formal or informal assistance, people experience BADL/IADL limitations may use assistive devices to assist with accomplishing personal care tasks. The full list of mobility aids in **Box 3** as well as the mobility specific devices. The prevalence of receiving formal care, informal care, either informal or formal care, using mobility aids, or using any, aids were determined in those with at least one BADL/IADL limitation.

Findings on disability and physical function

DISABILITY

Overall, 9.0% of participants reported difficulties completing at least one BADL or IADL without assistance (**Table 1**). The prevalence of having at least one BADL limitation (5.8%) was similar to the prevalence of having at least one IADL limitation (5.6%). This trend was consistent across all age groups as well as in males and females (Figure 1). The biggest increase in the prevalence of disability was between the 65 and 74-year-old age group and those over 75. In the 65 to 74 year-old group, 5.9% of people required assistance with at least one BADL or IADL while 22.4% of those aged 75+ required assistance. Although the reported prevalence of BADL/IADL disability varies due to differences in methodology and classification between studies, the Canadian Community Health Survey estimated that over 6% of all seniors reported needing help to carry out BADLs, while over 15% reported difficulty with IADLs; a number that increases rapidly with advancing age[34].

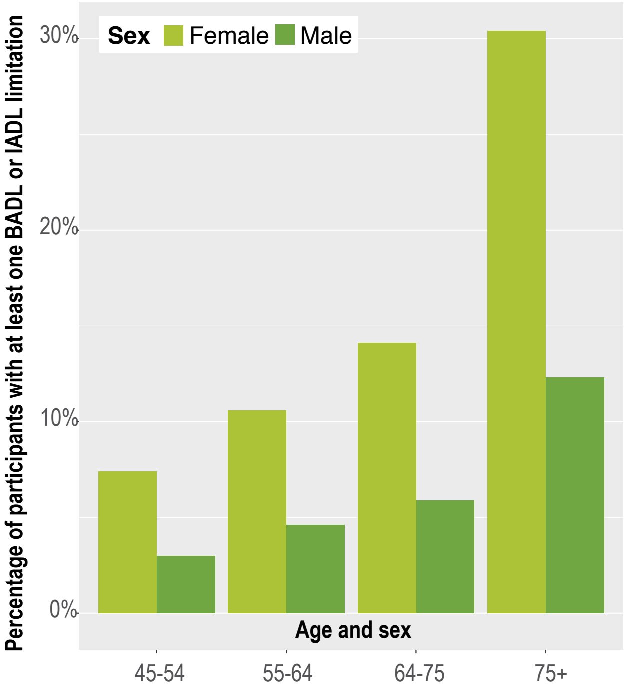

Figure 1 – Difficulty with any activities of daily living (BADL/IADL) by age and sex

BASIC ACTIVITIES OF DAILY LIVING (BADLS)

The prevalence of BADL limitations increased with age from 3.2% of those aged 45 to 54 years to 13.1% of those aged 75 years and older reporting difficulty completing at least one task (**Table 2**). Across all age groups, the prevalence of BADL limitations were higher in females with 8.0% of all females reporting difficulty completing at least one BADL task compared to only 3.0% of males. Of the BADL, the most prevalent limitations were walking two to three city blocks with 1.5% of participants being unable to do the task without help, and having trouble making it to the bathroom in time with 3.7% of participants being unable to make it to the bathroom at least once or twice a week (**Table 2**).

INSTRUMENTAL ACTIVITIES OF DAILY LIVING (IADLS)

The prevalence of IADL limitations increased with age from 3.4% of those aged 45 to 54 years to 15.3% of those aged 75 years and older reporting difficulty completing at least one task (**Table 3**). Across all age groups, the prevalence of IADL limitations was higher in females with 8.0% of all females reporting difficulty completing at least one IADL task compared to only 3.4% of males. Of the IADL, the most prevalent limitations were being unable to do housework with 4.9% of participants requiring assistance and going shopping for groceries or clothes with 1.6% of participants requiring assistance.

Physical function measures

QUESTIONNAIRE BASED PHYSICAL FUNCTION MEASURES

Items from the physical function questionnaire were divided into three domains: 1) upper body limitations, 2) lower body limitations, and 3) dexterity limitations. Across all participants, 48.6% experienced some level of difficulty with at least one physical function item. The prevalence of experiencing difficulty increased across age groups from 38.2% of individuals aged 45 to 54 years to 67.0% of people aged 75 and older (**Table 4**). Lower body limitations were most common with 41.5% of participants reporting having difficulty completing a task compared to only 25.1% for upper body limitations and 7.0% for dexterity limitations. This trend was consistent with males and females as well as across all age groups. Many participants also reported experiencing multiple limitations. Of all participants, 29.8% reported difficulty with two or more tasks and 20.0% reported difficulty with three or more tasks.

UPPER BODY LIMITATIONS

The prevalence of upper body limitations increased with age from 20.1% of those aged 45 to 54 years to 37.5% of those aged 75 years and older (**Table 4**). Females experienced a higher prevalence of upper body limitations (28.6%) compared to males (21.4%) overall as well as for each age group (**Figure 2**). The tasks most frequently found difficult differed between males and females. For males, 10.1% of participants experienced difficulty taking force in arms and 9.7% experienced difficulty in raising their arms above their shoulders (**Table 5**). However, this was not consistent across all age groups. In those aged 75 and older, lifting arms above the shoulder became the task most commonly found difficult (12.2%) followed by washing their back (12.0%). In females, taking force in arms remained the most frequently endorsed task participants experienced difficulty with (14.0%), followed by pushing or pulling large objects (13.2%). As with males, this was not consistent across all age groups. In females aged 45 to 54 and 55 to 64, taking force in arms followed by pushing or pulling large objects remained the most difficult tasks while the order was reversed for those aged 65 to 74 years and those aged 75 and older. These results suggest that different upper body functional limitations are relevant to males and females as well as to different age groups.

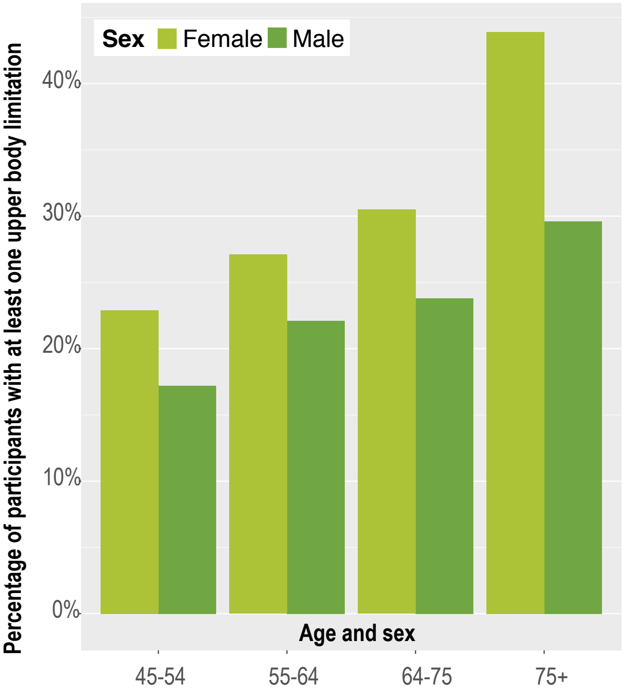

Figure 2 – Difficulty with upper body physical function tasks by age and sex

LOWER BODY LIMITATIONS

The prevalence of lower body limitations increased with age from 31.1% of those aged 45 to 54 years to 59.6% of those aged 75 years and older (**Table 4**). Females experienced a higher prevalence of lower body limitations (45.5%) compared to males (37.2%) overall as well as for each age group (**Figure 3**). Unlike the upper body limitations, the tasks most frequently found difficult were the same between males and females though the prevalence of experiencing difficulty varied. In males of all ages, 25.2% experienced difficulty with stooping, crouching, or kneeling while 31.4% of females experienced difficulty with this task (**Table 5**). Similarly, a relatively smaller percentage of males experienced difficulty with standing up after sitting in a chair (16.0%) compared to females 23.2%. These two tasks remained the most important across all age groups

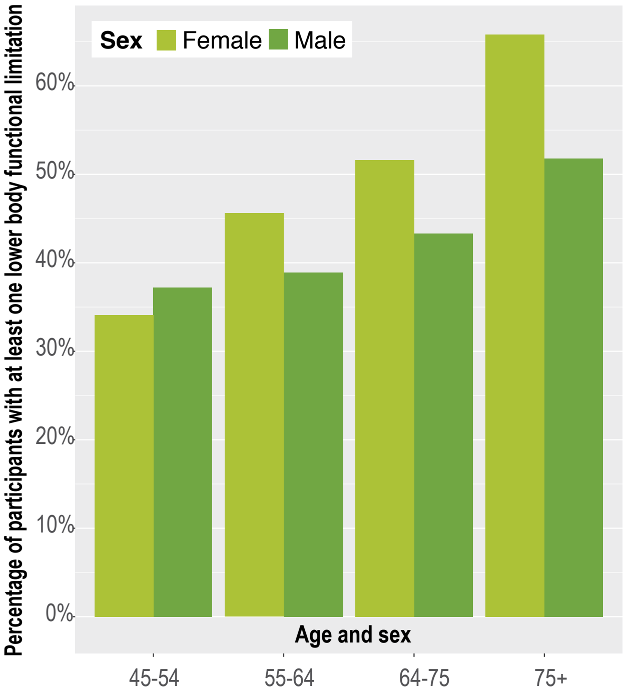

Figure 3 – Difficulty with lower body physical function tasks by age and sex

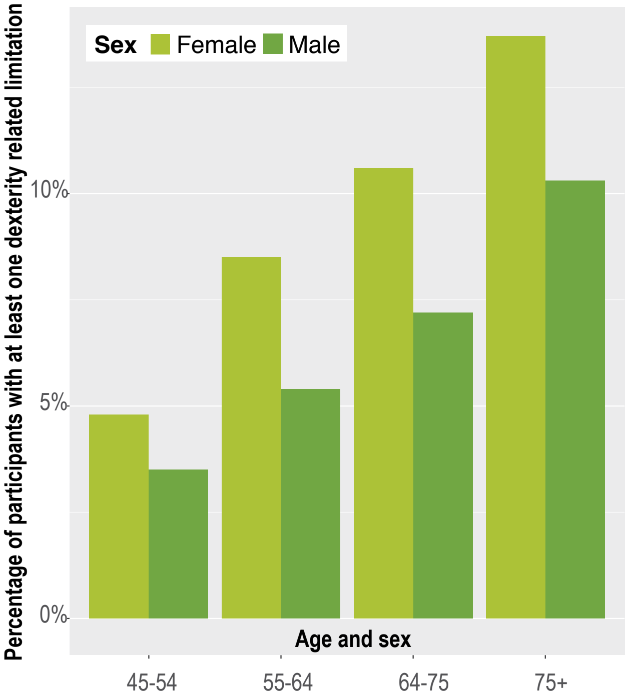

Figure 4 – Difficulty with dexterity related physical function tasks by age and sex

DEXTERITY RELATED LIMITATIONS

The prevalence of dexterity related limitations increased with age from 4.1% in those aged 45 to 54 years to 12.2% of those aged 75 years and older (**Table 4**). Females experienced more problems with dexterity compared to males with 8.3% of all females experiencing at least one dexterity limitation compared to 5.6% of males (**Figure 4**). This trend was present across all age groups. Only two physical function limitations were classified as dexterity limitations. Having difficulty handling small objects was more common (6.1% overall) compared to using a knife to cut food (2.3%) which was the same for males (5.2% versus 1.3%) and females (6.9% versus 3.2%) (**Table 5**).

Performance testing based physical function limitations

Due to a lack of standardized values for performance tests published in the literature, the prevalence of participants experiencing physical limitations based on performance tests cannot be determined. As an alternative to identifying individuals as having a limitation, the mean, standard deviations, and quartiles for each age and sex strata were determined for the gait speed, timed up and go (TUG), balance, chair rise, and grip strength tests. A series of contraindication questions were asked to participants prior to the performance tests. Reasons for contraindication include being unable to stand unassisted or unable to walk unassisted for the gait speed and TUG tests, unable to stand or rise from a chair unassisted and using a cane or walker regularly for the chair rise test, unable to stand unassisted or uses a cane or walker regularly for standing balance, and having had surgery on both hands or wrists within the last 3 months or having pain or paralyses in both hands or wrists due to arthritis, tendinitis, or carpal tunnel syndrome, having open sores or bruises on both hands, having casts on both hands or arms, or having prosthetic arms, hands or fingers on both sides. There were 95 participants contraindicated from the gait speed test, 124 from the timed up and go, 694 from the balance test, 720 from the chair rise test, and 1,431 from the grip strength test.

GAIT SPEED

The mean gait speed measured in meters per second (m/s) was higher in younger participants compared to older participants (**Table 6**). The mean gait speed in males was 0.99m/s and 0.97m/s in females. In all age strata, the mean gait speed was faster in males than it was in females with greater relative differences as age increased.

TIMED UP AND GO

The mean timed up and go time measured in seconds was similar in males (9.61 seconds) compared to females (9.56 seconds) (**Table 6**). In the two youngest age categories, 45 to 54 years and 55 to 64 years, females performed better than males with a mean time of 8.61 and 9.17 seconds compared to 8.90 and 9.26 seconds. In the two oldest age categories, 65 to 74 years and 75 years and older, males performed better than females with a mean time of 9.73 and 11.05 seconds compared to 9.85 seconds and 11.40 seconds.

BALANCE

The mean balance time in males was 40.10 seconds compared to 38.16 seconds for females (**Table 6**) with males having longer balance times for each age group. Compared to the other physical function tests, performance on the balance test declined the most across age groups. In male participants, the average time spent balancing decreased from 53.18 seconds in those aged 45 to 54 years to 18.32 seconds in those aged 75 and older. The trend was similar in females with the average time spent balancing decreasing from 51.68 seconds in those aged 45 to 54 years compared to 15.31 seconds in those aged 75 years and older.

CHAIR RISE

For the chair rise test, a faster speed indicates better performance. The mean amount of time it took to stand up and sit down five times from a chair was higher for females, 13.49 seconds compared to males 13.23 seconds (**Table 6**). In the youngest, two age groups (45 to 54 years and 55 to 64 years) the difference in completion time between males and females was small. In the older age groups, time to completion increased in females more than it increased in males.

GRIP STRENGTH

Relative to the other performance tasks, the differences between males and females were the greatest for the grip strength test. The mean grip strength in males was 41.7 kilograms compared to 25.1 for females **(Table 6**). The absolute amount of grip strength lost was greater in males than in females decreasing from 46.9kg in males aged 45 to 54 years to 34.2kg in males aged 75 years and older compared to a decrease from 28.4kg in females aged 45 to 54 to 20.3kg in females aged 75 years and older. However, this greater absolute decline represents the higher absolute grip strength in males. The relative reduction in grip strength in males in the oldest age group compared to the youngest was 27.0% compared to 28.4% for females.

FALLS

Overall, 4.9% of participants reported that an injury had been caused by a fall (**Table 7**). The prevalence was higher in females than in males for all age groups (*Figure 5*). The prevalence of falls that resulted in injury was relatively stable across age groups for both males and females. In males, the prevalence was between 3.7% and 4.4% and in females, it was between 5.4% and 6.2%.

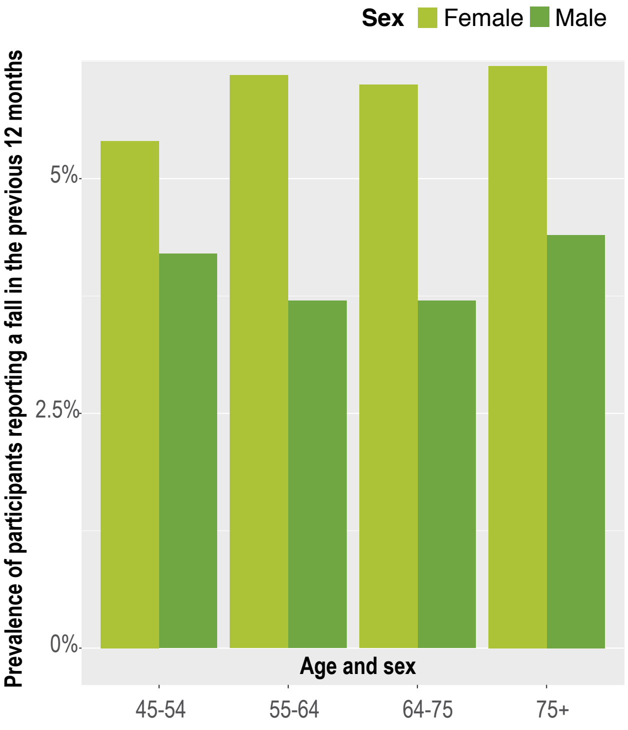

Figure 5 – Prevalence of injury due to fall in previous twelve months by age and sex

Assistive devices for mobility

Participants were categorized as using assistive devices for mobility if they reported using a cane or walking stick, wheelchair, motorized scooter, or walker. Overall, 10.2% of participants used at least one of these devices, with canes or walking sticks being the most common (8.7%), followed by walkers (3.1%), wheelchairs (1.7%), and motorized scooters (0.7%) (**Table 8**). The percentage of participants using any of these devices increased from 5.8% in those aged 45 to 54 up to 23.2% of those aged 75 and older with the same upwards trend observed for each individual device.

Males and females aged 45 to 54 years had approximately the same percentage of people using assistive devices (5.8% for males versus 5.9% for females), across increasing age groups females started to report higher usage of assistive devices for mobility compared to males with 26.3% of females aged 75 and older using at least one mobility aid compared to 19.3% of males (*Figure 6*). For both males and females, a large increase in the percentage of people using assistive mobility devices was observed when comparing those aged 65 to 74 years and those aged 75 years.

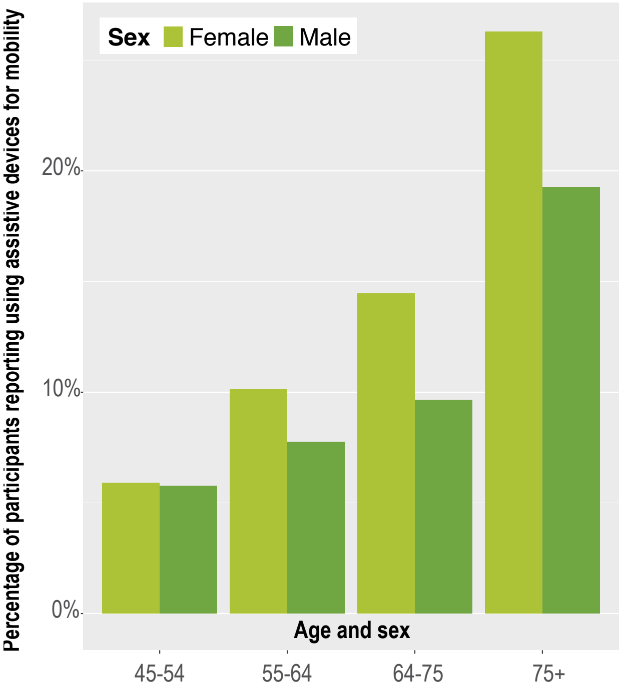

Figure 6 – Use of assistive devices for mobility by age and sex

Self-rated vision and hearing

Overall, 1.5% of participants reported having poor or non-existent vision, 6.6% reported having fair vision, 32.0% reported good vision, 37.4% reported very good vision, and 22.5% reported having excellent vision (**Table 9**). The prevalence of people reporting having either poor/non-existent vision or fair vision combined increased across age groups with 7.6% of those aged 45 to 54 years reporting being in these categories compared to 11.6% of those aged 75 and older**.** Across all age groups, the percentage of females reporting poor/non-existent or fair vision was higher than in males with increasingly large differences with age (*Figure 7*).

More participants reported having poor or fair hearing relative to poor or fair vision. Overall, 1.5% of participants reported having poor hearing, 9.4% reported having fair hearing, 31.8% reported having good hearing, 32.7% reported having very good hearing, and 24.7% reported having excellent hearing. The prevalence of people reporting having either poor or fair hearing combined increased across age groups from 7.8% of those aged 45 to 54 compared to 17.7% of those aged 75 and older. The trend was consistent for males and females (*Figure 8*). Unlike hearing, a higher percentage of males compared to females reported having poor or fair hearing with 13.4% of males compared to 7.7% of females falling into this category.

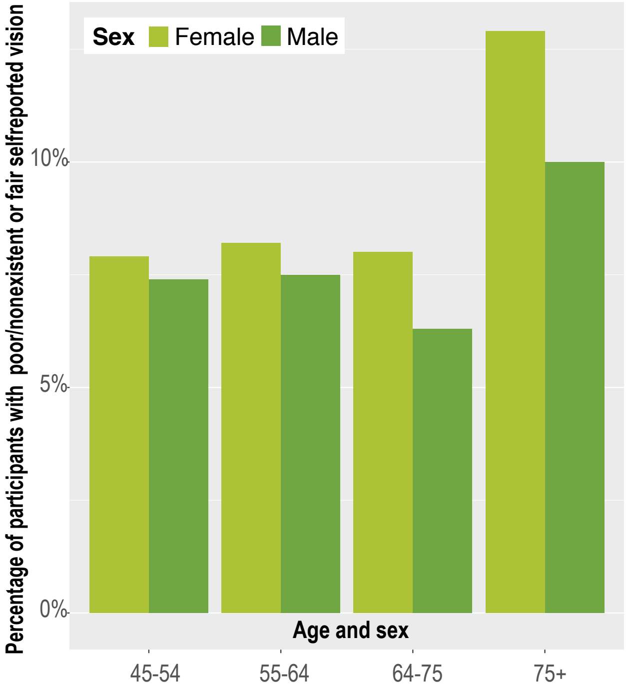

Figure 7 – Prevalence of poor/non-existent or fair self-reported vision by age and sex

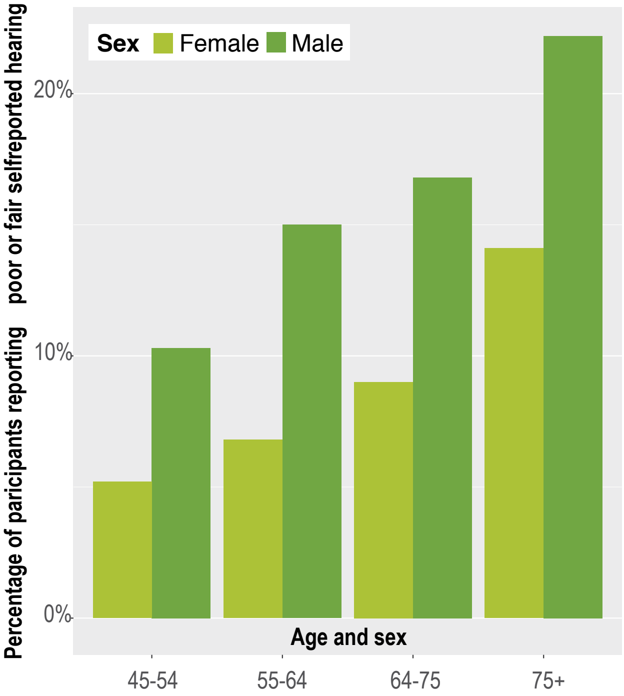

Figure 8 – Prevalence of poor or fair self-reported hearing by age and sex

Care receiving and assistive device usage

Participants with BADL/IADL limitations were more likely to receive informal care compared to formal care. Only 24.4% of participants overall were receiving professional or paid care compared to 37.3% who were receiving informal care from family, friends, or neighbours (**Table 10**). Overall, 47.4% of participants were receiving formal or informal care indicating that approximately 14.3% of participants were receiving both informal and formal care.

Though the percentage of people receiving formal care increased across age groups from 17.9% of those aged 45 to 54 years to 32.1% of those aged 75 years and older, the percentage of participants receiving informal care decreased from 40.0% of those aged 45 to 54 years to 34.1% of those aged 75 years and older. This unexpected decrease may be attributable to factors such as decreased social support availability due to illness or death amongst partners and other informal care providers.

When comparing males to females, a higher percentage of males received both formal care (27.0%), informal care (39.3%), and combined formal and informal care compared to females (23.4% and 36.6% respectively). This trend was consistent for each age category except for those 75 years and older for formal care and combined formal and informal care and 55 to 64 years for informal care.

Similarly, to receiving informal and formal care, males were more likely to use mobility aids (48.1%) or any type of aids (59.8%) compared to females (41.8% and 55.0%). This trend was consistent for all age categories for mobility devices, however for any type of assistive device, a higher percentage of females (66.3%) were using assistive devices compared to males (63.9%). In females, the use of mobility specific assistive devices and any type of assistive devices increased across the age groups. However, in males, those aged 64 to 75 reported less use of both categories of devices compared to those aged 55 to 64 years old.

Discussion

Physical function and disability are important markers of health in aging adults. Factors related to function and disability such as mobility measured by falls, the use of assistive devices, self-rated hearing and vision, and receiving formal and informal care are also important to understand the ability of older adults to participate in life and the methods used to facilitate participation despite different levels of impairment. This chapter has described the variation in disability, physical function measured using both questionnaire-based assessments as well as performance-based tasks, mobility, assistive device use, self-rated hearing, and vision, and care receiving in the community dwelling Canadian population aged 45 to 85 stratified by age categories and sex.

The results presented here are all from the cross-sectional data from baseline in the CLSA. The sampling weights provided by the CLSA were used for all prevalence estimates. The sampling weights allow the prevalence estimates to be representative of all community dwelling Canadian adults in this age range. The use of cross-sectional data has limitations. Though there is the expected increase in the prevalence of disability and functional limitation across age groups, some of the effect may be caused by differences between age cohorts rather than due to the process of aging. The CLSA is a longitudinal study with an anticipated 20 years of follow up. Future waves of data collection will allow for a better understanding of not only the prevalence of disability and functional limitations, but also how people transition through these health states.

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Appendix

TABLE 1 CANADIAN POPULATION ESTIMATES OF BADL AND IADL LIMITATIONS BY AGE AND SEX

MALES

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Basic activities of daily living limitations					
No limitations	98.2%	97.3%	96.6%	93.0%	97.0%
At least one limitation	1.8%	2.8%	3.4%	7.0%	3.0%
At least two limitations	0.3%	0.5%	0.7%	1.1%	0.5%
At least three limitations	0.2%	0.2%	0.2%	0.3%	0.2%
Instrumental activities of daily living limitations					
No limitations	98.0%	96.9%	96.3%	91.7%	96.6%
At least one limitation	2.0%	3.2%	3.7%	8.3%	3.4%
At least two limitations	0.8%	0.8%	1.2%	2.5%	1.1%
At least three limitations	0.3%	0.4%	0.5%	1.1%	0.4%
Basic activities of daily living OR instrumental activities of daily living limitations					
No limitations	97.0%	95.4%	94.1%	87.7%	94.9%
At least one limitation	3.0%	4.6%	5.9%	12.3%	5.1%
At least two limitations	1.0%	1.5%	1.6%	3.7%	1.6%
At least three limitations	0.4%	0.6%	1.0%	2.2%	0.8%

TABLE 1 CANADIAN POPULATION ESTIMATES OF BADL AND IADL LIMITATIONS BY AGE AND SEX (CONTINUED)

FEMALES	**45 - 54 years**	**55 - 64 years**	**65 - 74 years**	**75+ years**	**All**
Basic activities of daily living limitations					
No limitations	95.5%	93.2%	90.4%	8214.0%	92.0%
At least one limitation	4.6%	6.8%	9.7%	17.9%	8.0%
At least two limitations	0.7%	112.0%	1.4%	3.0%	1.3%
At least three limitations	0.2%	0.4%	0.7%	1.1%	0.5%
Instrumental activities of daily living limitations					
No limitations	95.2%	93.7%	92.2%	79.2%	92.0%
At least one limitation	4.8%	6.3%	7.8%	20.8%	8.0%
At least two limitations	1.3%	2.0%	1.7%	5.1%	2.1%
At least three limitations	0.6%	0.9%	0.7%	2.7%	1.0%
Basic activities of daily living OR instrumental activities of daily living limitations					
No limitations	92.6%	89.4%	85.9%	69.6%	87.3%
At least one limitation	7.4%	10.6%	14.1%	30.4%	12.7%
At least two limitations	2.1%	3.0%	3.7%	9.9%	3.7%
At least three limitations	1.0%	1.6%	1.4%	4.5%	0.2%

TABLE 1 CANADIAN POPULATION ESTIMATES OF BADL AND IADL LIMITATIONS BY AGE AND SEX (CONTINUED)

ALL

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Basic activities of daily living limitations					
No limitations	96.8%	95.2%	96.6%	87.0%	94.4%
At least one limitation	3.2%	4.8%	3.4%	13.1%	5.6%
At least two limitations	0.5%	0.8%	0.7%	2.1%	0.9%
At least three limitations	0.2%	0.3%	0.2%	0.7%	0.3%
Instrumental activities of daily living limitations					
No limitations	96.6%	95.2%	96.3%	84.7%	94.3%
At least one limitation	3.4%	4.8%	3.7%	15.3%	5.8%
At least two limitations	1.0%	1.4%	1.2%	4.0%	1.6%
At least three limitations	0.4%	0.7%	0.5%	2.0%	0.7%
Basic activities of daily living OR instrumental activities of daily living limitations					
No limitations	94.8%	92.3%	94.1%	77.6%	91.0%
At least one limitation	5.2%	7.7%	5.9%	22.4%	9.0%
At least two limitations	1.6%	2.2%	1.6%	7.1%	2.7%
At least three limitations	0.7%	1.1%	1.0%	3.5%	1.3%

TABLE 2 CANADIAN POPULATION ESTIMATES OF SPECIFIC BADL LIMITATIONS BY AGE AND SEX

MALES

		45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Dress and undress	Able to do without help	99.3%	99.1%	99.2%	99.2%	99.2%
	Able to do with help	0.5%	0.8%	0.9%	0.8%	0.7%
	Unable to do with help	0.2%	0.1%	0.0%	0.0%	0.1%
Feed yourself completely	Able to do without help	99.8%	100.0%	100.0%	100.0%	99.9%
	Able to do with help	0.2%	0.1%	0.0%	0.1%	0.1%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Take care of appearances	Able to do without help	10.0%	100.0%	100.0%	100.0%	100.0%
	Able to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	Able to do without help	99.2%	99.1%	99.0%	97.7%	99.0%
	Able to do with help	0.6%	0.8%	0.9%	2.1%	0.9%
	Unable to do with help	0.3%	0.1%	0.1%	0.2%	0.2%
Get in and out of bed	Able to do without help	99.5%	99.2%	99.2%	99.0%	99.7%
	Able to do with help	0.5%	0.8%	0.7%	1.0%	0.3%
	Unable to do with help	0.1%	0.0%	0.1%	0.0%	0.0%
Take a bath or shower	Able to do without help	99.6%	99.5%	99.3%	98.7%	99.4%
	Able to do with help	0.4%	0.5%	0.6%	1.3%	0.6%
	Unable to do with help	0.1%	0.1%	0.0%	0.1%	0.1%
Trouble getting to the bathroom in time	Never	97.0%	95.1%	92.5%	87.0%	94.4%
	Never or < once a week	2.4%	3.8%	5.6%	9.0%	4.2%
	Once or twice a week	0.3%	0.7%	1.0%	2.4%	0.8%
	Three + times a week	0.3%	0.4%	0.9%	1.6%	0.6%

TABLE 2 CANADIAN POPULATION ESTIMATES OF SPECIFIC BADL LIMITATIONS BY AGE AND SEX (CONTINUED)

FEMALES		**45 - 54 years**	**55 - 64 years**	**65 - 74 years**	**75+ years**	**All**
Dress and undress	Able to do without help	99.3%	99.3%	99.0%	98.7%	99.2%
	Able to do with help	0.7%	0.7%	0.9%	1.3%	0.8%
	Unable to do with help	0.1%	0.0%	0.1%	0.0%	0.1%
Feed yourself completely	Able to do without help	100.0%	99.9%	99.9%	99.9%	99.9%
	Able to do with help	0.0%	0.0%	0.1%	0.1%	0.1%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Take care of appearances	Able to do without help	100.0%	100.0%	100.0%	100.0%	100.0%
	Able to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	Able to do without help	99.1%	98.3%	97.9%	95.2%	98.1%
	Able to do with help	0.8%	1.6%	1.9%	4.6%	1.7%
	Unable to do with help	0.1%	0.1%	0.2%	0.1%	0.1%
Get in and out of bed	Able to do without help	99.5%	99.2%	99.2%	99.0%	99.3%
	Able to do with help	0.5%	0.8%	0.7%	1.0%	0.7%
	Unable to do with help	0.1%	0.0%	0.1%	0.0%	0.1%
Take a bath or shower	Able to do without help	99.1%	98.9%	98.4%	96.9%	98.6%
	Able to do with help	0.8%	1.0%	1.5%	3.0%	1.3%
	Unable to do with help	0.1%	0.1%	0.1%	0.1%	0.1%
Trouble getting to the bathroom in time	Never	90.3%	85.5%	79.6%	71.4%	84.3%
	Never or < once a week	6.4%	9.9%	12.9%	15.4%	9.9%
	Once or twice a week	1.5%	2.4%	3.8%	6.6%	2.9%
	Three + times a week	1.9%	2.2%	3.7%	6.6%	3.0%

TABLE 2 CANADIAN POPULATION ESTIMATES OF SPECIFIC BADL LIMITATIONS BY AGE AND SEX (CONTINUED)

ALL		45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Dress and undress	Able to do without help	99.3%	99.2%	99.1%	98.9%	99.2%
	Able to do with help	0.6%	0.7%	0.9%	1.1%	0.7%
	Unable to do with help	0.1%	0.1%	0.1%	0.0%	0.1%
Feed yourself completely	Able to do without help	99.9%	99.9%	99.9%	99.9%	99.9%
	Able to do with help	0.1%	0.0%	0.1%	0.1%	0.1%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Take care of appearances	Able to do without help	100.0%	100.0%	100.0%	100.0%	100.0%
	Able to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	Able to do without help	99.2%	98.7%	98.4%	96.3%	98.5%
	Able to do with help	0.7%	1.2%	1.4%	3.5%	1.3%
	Unable to do with help	0.2%	0.1%	0.2%	0.2%	0.2%
Get in and out of bed	Able to do without help	99.6%	99.4%	99.5%	99.2%	99.5%
	Able to do with help	0.4%	0.6%	0.5%	0.8%	0.5%
	Unable to do with help	0.0%	0.0%	0.1%	0.0%	0.0%
Take a bath or shower	Able to do without help	99.3%	99.2%	98.9%	97.7%	99.0%
	Able to do with help	0.6%	0.8%	1.1%	2.2%	0.9%
	Unable to do with help	0.1%	0.1%	0.1%	0.1%	0.1%
Trouble getting to the bathroom in time	Never	93.6%	90.2%	85.8%	78.3%	89.2%
	Never or < once a week	4.4%	6.9%	9.4%	12.6%	7.1%
	Once or twice a week	0.9%	1.6%	2.5%	4.7%	1.9%
	Three + times a week	1.1%	1.4%	2.3%	4.4%	1.8%

TABLE 3 CANADIAN POPULATION ESTIMATES OF SPECIFIC IADL LIMITATIONS BY AGE AND SEX

MALES

		45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
		%	%	%	%	%
Telephone without help	Able to do without help	99.9%	99.7%	99.6%	99.6%	99.7%
	Able to do with help	0.2%	0.3%	0.4%	0.4%	0.3%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Get to places out of walking distance	Able to do without help	99.7%	99.4%	99.4%	98.9%	99.5%
	Able to do with help	0.3%	0.6%	0.6%	1.1%	0.5%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Shop for groceries or clothes	Able to do without help	99.4%	99.1%	99.1%	97.5%	99.0%
	Able to do with help	0.6%	0.8%	0.8%	2.3%	0.9%
	Unable to do with help	0.0%	0.1%	0.1%	0.2%	0.1%
Prepare meals	Able to do without help	99.7%	99.7%	99.1%	98.4%	99.4%
	Able to do with help	0.3%	0.3%	0.7%	1.4%	0.5%
	Unable to do with help	0.1%	0.1%	0.1%	0.3%	0.1%
Do housework	Able to do without help	98.6%	97.6%	97.4%	93.5%	97.5%
	Able to do with help	1.1%	2.1%	2.3%	6.0%	2.2%
	Unable to do with help	0.3%	0.3%	0.2%	0.5%	0.3%
Take medicine	Able to do without help	99.7%	99.8%	99.4%	99.5%	99.6%
	Able to do with help	0.3%	0.2%	0.7%	0.5%	0.4%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Handle money	Able to do without help	99.6%	99.8%	99.5%	99.6%	99.7%
	Able to do with help	0.3%	0.2%	0.5%	0.3%	0.3%
	Unable to do with help	0.1%	0.0%	0.1%	0.0%	0.1%

TABLE 3 CANADIAN POPULATION ESTIMATES OF SPECIFIC IADL LIMITATIONS BY AGE AND SEX (CONTINUED)

FEMALES

		45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
		%	%	%	%	%
Telephone without help	Able to do without help	99.8%	99.6%	99.8%	99.4%	99.7%
	Able to do with help	0.2%	0.4%	0.2%	0.5%	0.3%
	Unable to do with help	0.0%	0.0%	0.0%	0.1%	0.0%
Get to places out of walking distance	Able to do without help	99.5%	99.0%	98.9%	95.7%	98.7%
	Able to do with help	0.5%	1.0%	1.1%	4.2%	1.3%
	Unable to do with help	0.0%	0.0%	0.0%	0.1%	0.0%
Shop for groceries or clothes	Able to do without help	98.5%	98.1%	98.5%	94.6%	97.9%
	Able to do with help	1.3%	1.9%	1.4%	5.0%	2.0%
	Unable to do with help	0.1%	0.1%	0.2%	0.3%	0.1%
Prepare meals	Able to do without help	99.5%	99.2%	99.4%	98.3%	99.2%
	Able to do with help	0.4%	0.7%	0.6%	1.6%	0.7%
	Unable to do with help	0.1%	0.1%	0.1%	0.1%	0.1%
Do housework	Able to do without help	95.7%	94.7%	92.8%	81.5%	92.9%
	Able to do with help	3.8%	5.1%	6.7%	17.5%	6.6%
	Unable to do with help	0.5%	0.3%	0.6%	1.1%	0.5%
Take medicine	Able to do without help	99.8%	99.7%	99.8%	99.3%	99.7%
	Able to do with help	0.2%	0.3%	0.3%	0.7%	0.3%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Trouble getting to the bathroom in time	Able to do without help	99.9%	99.7%	99.9%	99.4%	99.8%
	Able to do with help	0.1%	0.3%	0.2%	0.4%	0.2%
	Unable to do with help	0.0%	0.0%	0.0%	0.2%	0.0%

TABLE 3 CANADIAN POPULATION ESTIMATES OF SPECIFIC IADL LIMITATIONS BY AGE AND SEX (CONTINUED)

ALL						
		45 - 54 years	**55 - 64 years**	**65 - 74 years**	**75+ years**	**All**
		%	**%**	**%**	**%**	**%**
Telephone without help	Able to do without help	99.8%	99.7%	99.7%	99.5%	99.7%
	Able to do with help	0.2%	0.3%	0.3%	0.5%	0.3%
	Unable to do with help	0.0%	0.0%	0.0%	0.1%	0.0%
Get to places out of walking distance	Able to do without help	99.6%	99.2%	99.1%	97.1%	99.1%
	Able to do with help	0.4%	0.8%	0.9%	2.8%	0.9%
	Unable to do with help	0.0%	0.0%	0.0%	0.1%	0.0%
Shop for groceries or clothes	Able to do without help	99.0%	98.5%	98.8%	95.9%	98.4%
	Able to do with help	1.0%	1.4%	1.1%	3.8%	1.5%
	Unable to do with help	0.1%	0.1%	0.1%	0.3%	0.1%
Prepare meals	Able to do without help	99.6%	99.4%	99.3%	98.3%	99.3%
	Able to do with help	0.3%	0.5%	0.6%	1.5%	0.6%
	Unable to do with help	0.1%	0.1%	0.1%	0.2%	0.1%
Do housework	Able to do without help	97.2%	96.1%	95.0%	86.8%	95.2%
	Able to do with help	2.5%	3.6%	4.6%	12.4%	4.5%
	Unable to do with help	0.4%	0.3%	0.4%	0.8%	0.4%
Take medicine	Able to do without help	99.8%	99.8%	99.6%	99.4%	99.7%
	Able to do with help	0.2%	0.2%	0.5%	0.6%	0.3%
	Unable to do with help	0.0%	0.0%	0.0%	0.0%	0.0%
Trouble getting to the bathroom in time	Able to do without help	99.8%	99.8%	99.7%	99.5%	99.7%
	Able to do with help	0.2%	0.2%	0.3%	0.4%	0.3%
	Unable to do with help	0.0%	0.0%	0.0%	0.1%	0.0%

TABLE 4 CANADIAN POPULATION ESTIMATES OF FUNCTIONAL LIMITATIONS BY AGE AND SEX

MALES

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Upper body limitations					
No limitations	82.8%	77.9%	76.2%	70.4%	78.6%
At least one limitation	17.2%	22.1%	23.8%	29.6%	21.4%
Lower body limitations					
No limitations	72.0%	61.1%	56.7%	48.2%	62.8%
At least one limitation	28.0%	38.9%	43.3%	51.8%	37.2%
Dexterity limitations					
No limitations	96.6%	94.6%	92.9%	89.7%	94.4%
At least one limitation	3.5%	5.4%	7.2%	10.3%	5.6%
Any limitations					
No limitations	64.8%	53.7%	49.4%	40.4%	55.5%
At least one limitation	35.2%	46.3%	50.6%	59.6%	44.5%
At least two limitations	18.4%	26.4%	29.9%	38.4%	25.5%
At least three limitations	11.2%	16.7%	17.9%	26.1%	15.9%

FEMALES

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Upper body limitations					
No limitations	77.1%	72.9%	69.5%	56.1%	71.4%
At least one limitation	22.9%	27.1%	30.5%	43.9%	28.6%
Lower body limitations					
No limitations	65.9%	54.4%	48.4%	34.2%	54.5%
At least one limitation	34.1%	45.6%	51.6%	65.8%	45.5%
Dexterity limitations					
No limitations	95.2%	91.5%	89.4%	86.3%	91.7%
At least one limitation	4.8%	8.5%	10.6%	13.7%	8.3%
Any limitations					
No limitations	58.8%	46.7%	42.3%	27.0%	47.5%
At least one limitation	41.3%	53.3%	57.7%	73.0%	52.5%
At least two limitations	24.5%	33.3%	39.0%	52.6%	33.9%
At least three limitations	16.6%	22.3%	28.2%	40.2%	23.9%

TABLE 4 CANADIAN POPULATION ESTIMATES OF FUNCTIONAL LIMITATIONS BY AGE AND SEX (CONTINUED)

ALL

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Upper body limitations					
No limitations	79.9%	75.3%	72.7%	62.5%	74.9%
At least one limitation	20.1%	24.7%	27.3%	37.5%	25.1%
Lower body limitations					
No limitations	68.9%	57.7%	52.4%	40.4%	58.6%
At least one limitation	31.1%	42.3%	47.7%	59.6%	41.5%
Dexterity limitations					
No limitations	95.9%	93.0%	91.1%	87.8%	93.0%
At least one limitation	4.1%	7.0%	9.0%	12.2%	7.0%
Any limitations					
No limitations	61.8%	50.2%	45.7%	33.0%	48.6%
At least one limitation	38.2%	49.8%	54.3%	67.0%	51.4%
At least two limitations	21.5%	29.9%	34.6%	46.3%	29.8%
At least three limitations	13.9%	19.5%	23.2%	34.0%	20.0%

TABLE 5 CANADIAN POPULATION ESTIMATES OF SPECIFIC FUNCTIONAL LIMITATIONS BY AGE AND SEX

MALES

		45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Upper body limitations						
Pushing or pulling large objects	No difficulty	94.5%	93.8%	92.8%	91.1%	93.6%
	Any level of difficulty	5.5%	6.2%	7.2%	8.9%	6.4%
Lifting 10 pounds from floor	No difficulty	96.9%	96.7%	97.2%	94.8%	96.6%
	Any level of difficulty	3.1%	3.3%	2.8%	5.2%	3.4%
Washing your back	No difficulty	93.9%	92.7%	91.1%	88.1%	92.3%
	Any level of difficulty	6.1%	7.3%	8.9%	12.0%	7.7%
Taking force in arms	No difficulty	91.4%	88.3%	90.4%	88.5%	89.9%
	Any level of difficulty	8.6%	11.7%	9.6%	11.5%	10.1%
Arms above shoulders	No difficulty	92.1%	89.1%	90.3%	87.8%	90.3%
	Any level of difficulty	7.9%	11.0%	9.7%	12.2%	9.7%
Making a bed	No difficulty	97.8%	97.6%	97.5%	95.4%	97.4%
	Any level of difficulty	2.2%	2.4%	2.5%	4.7%	2.6%
Lower body limitations						
Sitting for >1 hour	No difficulty	91.8%	89.1%	91.2%	92.9%	88.6%
	Any level of difficulty	8.2%	10.9%	8.8%	7.1%	11.4%
Standing up after sitting in chair	No difficulty	87.7%	84.0%	81.7%	75.8%	84.0%
	Any level of difficulty	12.3%	16.0%	18.3%	24.2%	16.0%
Going up and down stairs	No difficulty	95.1%	92.3%	91.6%	84.4%	92.3%
	Any level of difficulty	4.9%	7.7%	8.5%	15.7%	7.7%
Standing for >15 minutes	No difficulty	92.8%	87.7%	86.6%	82.0%	88.8%
	Any level of difficulty	7.2%	12.3%	13.4%	18.0%	11.3%
Walking 2 to 3 blocks	No difficulty	95.8%	92.8%	91.9%	84.4%	92.8%
	Any level of difficulty	4.2%	7.2%	8.1%	15.7%	7.2%
Stooping, crouching, kneeling	No difficulty	80.9%	73.7%	70.6%	64.9%	74.8%
	Any level of difficulty	19.1%	26.3%	29.4%	35.1%	25.2%
Dexterity limitations						
Handling small objects	No difficulty	96.9%	95.1%	93.3%	90.2%	94.8%
	Any level of difficulty	3.1%	4.9%	6.7%	9.8%	5.2%
Using knife to cut food	No difficulty	98.8%	98.9%	98.8%	97.6%	98.7%
	Any level of difficulty	1.2%	1.1%	1.2%	2.4%	1.3%

TABLE 5 CANADIAN POPULATION ESTIMATES OF SPECIFIC FUNCTIONAL LIMITATIONS BY AGE AND SEX (CONTINUED)

FEMALES

		45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Upper body limitations						
Pushing or pulling large objects	No difficulty	89.4%	88.0%	85.7%	78.7%	86.8%
	Any level of difficulty	10.6%	12.0%	14.4%	21.3%	13.2%
Lifting 10 pounds from floor	No difficulty	91.1%	90.5%	87.8%	87.8%	89.0%
	Any level of difficulty	8.9%	9.5%	12.2%	12.2%	11.0%
Washing your back	No difficulty	93.6%	92.3%	91.3%	86.4%	91.7%
	Any level of difficulty	6.5%	7.7%	8.7%	13.6%	8.3%
Taking force in arms	No difficulty	87.3%	86.1%	86.0%	82.4%	86.0%
	Any level of difficulty	12.7%	13.9%	14.0%	17.7%	14.0%
Arms above shoulders	No difficulty	90.3%	89.6%	88.3%	84.5%	88.9%
	Any level of difficulty	9.7%	10.4%	11.7%	15.5%	11.1%
Making a bed	No difficulty	96.0%	94.0%	93.3%	87.9%	93.7%
	Any level of difficulty	4.0%	6.0%	6.7%	12.1%	6.3%
Lower body limitations						
Sitting for >1 hour	No difficulty	88.8%	88.8%	89.4%	89.7%	91.0%
	Any level of difficulty	11.3%	11.3%	10.6%	10.3%	9.1%
Standing up after sitting in chair	No difficulty	82.5%	76.4%	73.1%	67.9%	76.8%
	Any level of difficulty	17.5%	23.6%	26.9%	32.1%	23.2%
Going up and down stairs	No difficulty	92.8%	88.9%	84.6%	76.6%	87.8%
	Any level of difficulty	7.2%	11.1%	15.4%	23.4%	12.3%
Standing for >15 minutes	No difficulty	91.5%	86.4%	82.3%	72.2%	85.4%
	Any level of difficulty	8.6%	13.6%	17.7%	27.8%	14.6%
Walking 2 to 3 blocks	No difficulty	93.3%	91.0%	87.5%	78.5%	89.4%
	Any level of difficulty	6.7%	9.0%	12.5%	21.6%	10.6%
Stooping, crouching, kneeling	No difficulty	77.5%	68.6%	63.1%	53.4%	68.6%
	Any level of difficulty	22.5%	31.5%	36.9%	46.6%	31.4%
Dexterity limitations						
Handling small objects	No difficulty	96.2%	93.1%	90.8%	88.4%	93.1%
	Any level of difficulty	3.8%	6.9%	9.2%	11.6%	6.9%
Using knife to cut food	No difficulty	97.8%	96.4%	96.3%	95.7%	96.8%
	Any level of difficulty	2.2%	3.6%	3.7%	4.3%	3.2%

TABLE 5 CANADIAN POPULATION ESTIMATES OF SPECIFIC FUNCTIONAL LIMITATIONS BY AGE AND SEX (CONTINUED)

ALL

		45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Upper body limitations						
Pushing or pulling large objects	No difficulty	91.9%	90.9%	89.1%	84.2%	90.1%
	Any level of difficulty	8.1%	9.1%	10.9%	15.8%	9.9%
Lifting 10 pounds from floor	No difficulty	94.0%	93.6%	92.3%	87.6%	92.7%
	Any level of difficulty	6.0%	6.5%	7.7%	12.4%	7.3%
Washing your back	No difficulty	93.7%	92.5%	91.2%	87.1%	92.0%
	Any level of difficulty	6.3%	7.5%	8.8%	12.9%	8.0%
Taking force in arms	No difficulty	89.4%	87.2%	88.1%	85.1%	87.9%
	Any level of difficulty	10.7%	12.8%	11.9%	14.9%	12.1%
Arms above shoulders	No difficulty	91.2%	89.3%	89.3%	86.0%	89.6%
	Any level of difficulty	8.8%	10.7%	10.8%	14.0%	10.4%
Making a bed	No difficulty	96.9%	95.8%	95.3%	91.2%	95.5%
	Any level of difficulty	3.1%	4.2%	4.7%	8.8%	4.5%
Lower body limitations						
Sitting for >1 hour	No difficulty	90.3%	88.2%	90.3%	91.1%	89.7%
	Any level of difficulty	9.7%	11.8%	9.7%	8.9%	10.3%
Standing up after sitting in chair	No difficulty	85.1%	80.2%	77.3%	71.4%	82.3%
	Any level of difficulty	14.9%	19.8%	22.7%	28.6%	19.7%
Going up and down stairs	No difficulty	93.9%	90.6%	88.0%	80.0%	90.0%
	Any level of difficulty	6.1%	9.4%	12.0%	20.0%	10.1%
Standing for >15 minutes	No difficulty	92.1%	87.0%	84.4%	76.5%	87.0%
	Any level of difficulty	7.9%	13.0%	15.6%	23.5%	13.0%
Walking 2 to 3 blocks	No difficulty	94.6%	91.9%	89.6%	81.1%	91.1%
	Any level of difficulty	5.4%	8.1%	10.4%	18.9%	9.0%
Stooping, crouching, kneeling	No difficulty	79.2%	71.1%	66.7%	58.5%	71.6%
	Any level of difficulty	20.8%	28.9%	33.3%	41.5%	28.4%
Dexterity limitations						
Handling small objects	No difficulty	96.5%	94.1%	92.0%	89.2%	93.9%
	Any level of difficulty	3.5%	5.9%	8.0%	10.8%	6.1%
Using knife to cut food	No difficulty	98.3%	97.6%	97.5%	96.5%	97.7%
	Any level of difficulty	1.7%	2.4%	2.5%	3.5%	2.3%

TABLE 6 PERFORMANCE TESTING SUMMARY BY AGE AND SEX, COMPREHENSIVE COHORT

		ALL		MALES		FEMALES	
		Mean	SD	Mean	SD	Mean	SD
Gait speed	45 - 54 years	1.04	0.18	1.04	0.17	1.04	0.19
	55 - 64 years	1.01	0.20	1.02	0.19	1.00	0.20
	65 - 75 years	0.96	0.19	0.97	0.19	0.94	0.19
	75+ years	0.86	0.19	0.88	0.19	0.83	0.19
	All	0.98	0.20	0.99	0.20	0.97	0.21
Timed up and go	45 - 54 years	8.75	1.71	8.90	1.78	8.61	1.62
	55 - 64 years	9.21	2.35	9.26	2.38	9.16	2.32
	65 - 75 years	9.79	2.30	9.73	2.30	9.85	2.31
	75+ years	11.22	3.44	11.05	3.27	11.40	3.60
	All	9.59	2.57	9.61	2.53	9.56	2.61
Balance	45 - 54 years	52.40	16.40	53.18	15.73	51.68	16.96
	55 - 64 years	44.41	21.04	45.52	20.79	43.37	21.22
	65 - 75 years	32.03	23.07	34.04	23.15	30.00	22.81
	75+ years	16.87	18.42	18.32	19.24	15.31	17.36
	All	39.12	23.43	40.10	23.28	38.16	23.54
Chair rise	45 - 54 years	12.33	3.34	12.33	3.29	12.32	3.39
	55 - 64 years	13.01	3.50	12.94	3.49	13.06	3.50
	65 - 75 years	13.87	3.79	13.62	3.55	14.12	4.00
	75+ years	14.94	4.47	14.55	3.94	15.35	4.93
	All	13.36	3.81	13.23	3.62	13.49	3.99
Grip strength	45 - 54 years	37.39	11.89	46.85	9.10	28.39	5.57
	55 - 64 years	34.37	11.27	43.06	8.87	25.88	5.29
	65 - 75 years	31.77	10.53	39.51	8.28	23.57	4.99
	75+ years	27.51	9.51	34.20	7.79	20.32	4.78
	All	33.36	11.47	41.58	9.61	25.09	5.88

TABLE 7 PREVALENCE OF INJURY DUE TO FALL IN PREVIOUS TWELVE MONTHS BY AGE AND SEX

MALES

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
	%	%	%	%	%
No falls	95.9%	96.3%	96.3%	95.6%	96.0%
One or more falls	4.2%	3.7%	3.7%	4.4%	4.0%
Two or more falls	0.6%	0.6%	0.3%	0.7%	0.8%
Three or more falls	0.4%	0.2%	0.1%	0.2%	0.3%

FEMALES

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
	%	%	%	%	%
No falls	94.6%	93.9%	94.1%	93.8%	94.2%
One or more falls	5.4%	6.1%	6.0%	6.2%	5.8%
Two or more falls	0.6%	1.0%	0.7%	1.0%	0.5%
Three or more falls	0.2%	0.5%	0.2%	0.4%	0.3%

ALL

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
	%	%	%	%	%
No falls	95.2%	95.1%	95.1%	94.6%	95.1%
One or more falls	4.8%	5.0%	4.9%	5.4%	4.9%
Two or more falls	0.6%	0.8%	0.5%	0.9%	0.7%
Three or more falls	0.3%	0.3%	0.1%	0.3%	0.3%

TABLE 8 USE OF ASSISTIVE DEVICES FOR MOBILITY BY AGE AND SEX

MALES

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Any mobility aid					
No mobility aid use	94.23%	92.04%	90.34%	80.73%	91.3%
Mobility aid use	5.77%	7.96%	9.66%	19.27%	8.7%
Cane or walking stick					
Not used	95.2%	93.0%	91.5%	83.4%	92.5%
Used	4.9%	7.0%	8.5%	16.6%	7.5%
Wheel chair					
Not used	98.9%	98.8%	98.6%	98.0%	98.7%
Used	1.1%	1.2%	1.4%	2.0%	1.3%
Motorized scooter					
Not used	99.8%	99.3%	99.3%	98.5%	99.2%
Used	0.2%	0.7%	0.7%	1.5%	0.8%
Walker					
Not used	99.0%	98.2%	97.1%	94.5%	97.9%
Used	1.0%	1.8%	2.9%	5.5%	2.1%

FEMALES

	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Any mobility aid					
No mobility aid use	94.10%	89.88%	85.54%	73.72%	88.4%
Mobility aid use	5.90%	10.12%	14.46%	26.28%	11.6%
Cane or walking stick					
Not used	95.0%	91.4%	87.7%	77.9%	90.2%
Used	5.0%	8.6%	13.3%	22.1%	9.8%
Wheel chair					
Not used	98.4%	98.2%	97.4%	96.7%	97.9%
Used	1.6%	1.8%	2.6%	3.3%	2.1%
Motorized scooter					
Not used	99.4%	99.3%	98.9%	98.5%	99.4%
Used	0.6%	0.7%	1.1%	1.5%	0.6%
Walker					
Not used	98.4%	97.0%	94.5%	88.7%	95.9%
Used	1.6%	3.0%	5.5%	11.3%	4.1%

TABLE 8 USE OF ASSISTIVE DEVICES FOR MOBILITY BY AGE AND SEX (CONTINUED)

ALL	**45 - 54 years**	**55 - 64 years**	**65 - 74 years**	**75+ years**	**All**
Any mobility aid					
No mobility aid use	94.16%	90.94%	87.85%	76.81%	89.82%
Mobility aid use	5.84%	9.06%	12.15%	23.19%	10.18%
Cane or walking stick					
Not used	95.1%	92.2%	89.5%	80.4%	91.3%
Used	4.9%	7.8%	10.5%	19.7%	8.7%
Wheel chair					
Not used	98.7%	98.5%	98.0%	97.3%	98.3%
Used	1.3%	1.5%	2.0%	2.7%	1.7%
Motorized scooter					
Not used	99.6%	99.3%	99.1%	98.5%	99.3%
Used	0.4%	0.7%	0.9%	1.5%	0.7%
Walker					
Not used	98.7%	97.6%	95.7%	91.3%	96.9%
Used	1.3%	2.4%	4.3%	8.8%	3.1%

TABLE 9 SELF-RATED HEARING AND VISION BY AGE AND SEX

MALES					
	45 - 54 years	**55 - 64 years**	**65 - 74 years**	**75+ years**	**All**
Self-rated vision					
Excellent	24.3%	23.6%	24.1%	19.6%	21.6%
Very good	36.9%	37.2%	38.7%	35.3%	37.6%
Good	31.5%	31.7%	30.9%	35.1%	32.1%
Fair	6.4%	5.8%	5.0%	8.4%	7.0%
Poor/blind	0.9%	1.7%	1.3%	1.6%	1.7%
Cataracts					
Not diagnosed with cataracts	96.7%	88.3%	69.0%	41.1%	82.6%
Diagnosed with cataracts	3.3%	11.7%	31.0%	58.9%	17.4%
Glaucoma					
Not diagnosed with glaucoma	99.0%	97.0%	94.0%	90.2%	95.8%
Diagnosed with glaucoma	1.0%	3.1%	6.0%	9.8%	4.2%
Macular degeneration					
Not diagnosed with macular degeneration	99.2%	97.8%	96.3%	90.2%	97.2%
Diagnosed with macular degeneration	0.8%	2.2%	3.8%	9.8%	2.8%
Self-rated hearing					
Excellent	23.8%	19.2%	18.2%	12.0%	20.0%
Very good	34.7%	30.4%	29.6%	26.3%	31.4%
Good	31.2%	35.3%	35.4%	39.6%	34.2%
Fair	8.8%	12.8%	14.8%	18.3%	12.3%
Poor	1.5%	2.2%	2.0%	3.9%	2.1%

TABLE 9 SELF-RATED HEARING AND VISION BY AGE AND SEX (CONTINUED)

FEMALES					
	45 - 54 years	**55 - 64 years**	**65 - 74 years**	**75+ years**	**All**
Self-rated vision					
Excellent	23.4%	23.0%	20.6%	15.2%	21.6%
Very good	37.6%	38.2%	38.6%	35.0%	37.6%
Good	31.0%	30.6%	32.9%	37.0%	32.1%
Fair	6.4%	6.4%	7.1%	9.6%	7.0%
Poor/blind	1.5%	1.8%	0.8%	3.2%	1.7%
Cataracts					
Not diagnosed with cataracts	96.0%	85.5%	57.5%	26.5%	76.1%
Diagnosed with cataracts	4.0%	14.5%	42.5%	73.5%	23.9%
Glaucoma					
Not diagnosed with glaucoma	98.4%	96.9%	93.8%	88.7%	96.4%
Diagnosed with glaucoma	1.6%	3.1%	6.2%	11.3%	3.6%
Macular degeneration					
Not diagnosed with macular degeneration	98.9%	97.7%	95.1%	87.4%	96.3%
Diagnosed with macular degeneration	1.0%	2.3%	4.9%	12.6%	3.7%
Self-rated hearing					
Excellent	31.1%	30.4%	25.9%	16.7%	29.1%
Very good	34.3%	34.6%	33.8%	30.7%	33.8%
Good	26.4%	28.2%	31.3%	38.5%	29.5%
Fair	4.6%	6.1%	7.7%	12.2%	6.7%
Poor	0.7%	0.8%	1.4%	1.9%	1.0%

TABLE 9 SELF-RATED HEARING AND VISION BY AGE AND SEX (CONTINUED)

ALL					
	45 - 54 years	**55 - 64 years**	**65 - 74 years**	**75+ years**	**All**
Self-rated vision					
Excellent	23.8%	23.3%	22.3%	17.1%	22.5%
Very good	37.3%	37.8%	38.7%	35.1%	37.4%
Good	31.3%	31.2%	31.9%	36.2%	32.0%
Fair	6.4%	6.1%	6.1%	9.1%	6.6%
Poor/blind	1.2%	1.7%	1.1%	2.5%	1.5%
Cataracts					
Not diagnosed with cataracts	96.4%	86.9%	63.0%	33.0%	79.3%
Diagnosed with cataracts	3.6%	13.1%	37.0%	67.1%	20.7%
Glaucoma					
Not diagnosed with glaucoma	98.7%	96.9%	93.9%	89.4%	96.1%
Diagnosed with glaucoma	1.3%	3.1%	6.1%	10.6%	3.9%
Macular degeneration					
Not diagnosed with macular degeneration	99.1%	97.8%	95.6%	88.6%	96.7%
Diagnosed with macular degeneration	0.9%	2.2%	4.4%	11.4%	3.3%
Self-rated hearing					
Excellent	29.0%	25.0%	22.2%	14.6%	24.7%
Very good	34.5%	32.5%	31.8%	28.7%	32.7%
Good	28.8%	31.7%	33.3%	39.0%	31.8%
Fair	6.7%	9.4%	11.1%	14.9%	9.4%
Poor	1.1%	1.5%	1.6%	2.8%	1.5%

TABLE 10 PERCENTAGE OF PEOPLE RECEIVING INFORMAL CARE, FORMAL CARE, INFORMAL OR FORMAL CARE, USING MOBILITY AIDS, OR USING ANY AIDS AMONG THOSE WITH AND WITHOUT BADL/IADL LIMITATIONS, BY AGE AND SEX

MALES						
	BADL/IADL disability status	**45 - 54 years**	**55 - 64 years**	**65 - 74 years**	**75+ years**	**All**
Receiving formal care						
No	No limitation	98.2%	98.0%	97.4%	94.3%	97.6%
Yes		1.8%	2.0%	2.6%	5.8%	2.4%
No	Limitation	75.9%	73.7%	74.3%	68.9%	73.0%
Yes		24.1%	26.3%	25.7%	31.1%	27.0%
Receiving informal care						
No	No limitation	92.6%	91.7%	93.0%	92.4%	92.4%
Yes		7.4%	8.3%	7.0%	7.6%	7.6%
No	Limitation	56.3%	57.4%	64.8%	54.6%	60.7%
Yes		43.7%	42.6%	35.2%	35.4%	39.3%
Receiving formal or informal care						
No	No limitation	91.5%	90.8%	91.8%	88.8%	91.1%
Yes		8.5%	9.2%	8.2%	11.2%	8.9%
No	Limitation	47.1%	49.6%	53.3%	50.5%	50.1%
Yes		52.9%	50.4%	46.8%	49.6%	49.9%
Using mobility aids						
No	No limitation	95.6%	94.4%	92.9%	85.7%	93.7%
Yes		4.4%	5.6%	7.1%	14.3%	6.3%
No	Limitation	57.2%	49.2%	54.1%	48.5%	51.9%
Yes		42.8%	50.8%	45.9%	51.5%	48.1%
Using any aids						
No	No limitation	89.5%	87.6%	86.3%	76.7%	87.0%
Yes		10.5%	12.4%	13.8%	23.4%	13.0%
No	Limitation	45.5%	38.3%	42.5%	36.1%	40.3%
Yes		54.5%	61.7%	57.5%	63.9%	59.8%

TABLE 10 PERCENTAGE OF PEOPLE RECEIVING INFORMAL CARE, FORMAL CARE, INFORMAL OR FORMAL CARE, USING MOBILITY AIDS, OR USING ANY AIDS AMONG THOSE WITH AND WITHOUT BADL/IADL LIMITATIONS, BY AGE AND SEX (CONTINUED)

FEMALES

	BADL/IADL disability status	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Receiving formal care						
No	No limitation	98.0%	98.1%	96.9%	93.7%	97.4%
Yes		2.0%	135.0%	3.2%	6.3%	2.6%
No	Limitation	84.6%	81.6%	75.9%	67.6%	76.6%
Yes		15.4%	18.4%	24.1%	32.4%	23.4%
Receiving informal care						
No	No limitation	88.9%	90.3%	89.6%	88.0%	89.4%
Yes		11.1%	9.8%	10.4%	12.0%	10.6%
No	Limitation	61.4%	57.3%	68.5%	66.3%	63.4%
Yes		38.6%	42.7%	31.5%	33.7%	36.6%
Receiving formal or informal care						
No	No limitation	88.1%	89.5%	88.4%	84.4%	88.2%
Yes		11.9%	10.5%	11.6%	15.6%	11.8%
No	Limitation	56.2%	51.2%	59.2%	49.8%	53.6%
Yes		43.8%	48.8%	40.8%	50.2%	46.5%
Using mobility aids						
No	No limitation	96.4%	93.8%	90.6%	85.1%	93.3%
Yes		3.7%	6.2%	9.4%	14.9%	6.7%
No	Limitation	69.3%	59.2%	57.3%	50.6%	58.3%
Yes		30.7%	40.8%	42.7%	49.4%	41.8%
Using any aids						
No	No limitation	90.3%	87.1%	82.0%	68.7%	85.5%
Yes		9.7%	12.9%	18.0%	31.3%	14.5%
No	Limitation	58.6%	49.2%	43.3%	33.7%	45.0%
Yes		41.4%	50.9%	56.7%	66.3%	55.0%

TABLE 10 PERCENTAGE OF PEOPLE RECEIVING INFORMAL CARE, FORMAL CARE, INFORMAL OR FORMAL CARE, USING MOBILITY AIDS, OR USING ANY AIDS AMONG THOSE WITH AND WITHOUT BADL/IADL LIMITATIONS, BY AGE AND SEX (CONTINUED)

ALL

	BADL/IADL disability status	45 - 54 years	55 - 64 years	65 - 74 years	75+ years	All
Receiving formal care						
No	No limitation	98.1%	98.0%	97.2%	94.0%	97.5%
Yes		1.9%	2.0%	2.9%	6.0%	2.5%
No	Limitation	82.1%	79.3%	75.5%	68.0%	75.6%
Yes		17.9%	20.8%	24.5%	32.1%	24.4%
Receiving informal care						
No	No limitation	90.8%	91.0%	91.3%	90.2%	90.9%
Yes		9.2%	9.0%	8.7%	9.8%	9.1%
No	Limitation	60.0%	57.3%	67.5%	65.9%	62.7%
Yes		40.0%	42.7%	32.5%	34.1%	37.3%
Receiving formal or informal care						
No	No limitation	89.9%	90.1%	90.1%	86.6%	89.7%
Yes		10.1%	9.9%	9.9%	13.4%	10.3%
No	Limitation	53.6%	50.7%	57.6%	50.0%	52.6%
Yes		46.4%	49.3%	42.4%	50.0%	47.4%
Using mobility aids						
No	No limitation	96.0%	94.1%	91.8%	85.4%	93.5%
Yes		4.1%	5.9%	8.3%	14.6%	6.5%
No	Limitation	65.8%	56.3%	56.4%	50.1%	56.5%
Yes		34.2%	43.7%	43.6%	49.9%	43.5%
Using any aids						
No	No limitation	89.9%	87.4%	84.1%	72.7%	86.2%
Yes		10.1%	12.6%	15.9%	27.3%	13.8%
No	Limitation	54.9%	46.0%	43.1%	34.3%	43.7%
Yes		45.1%	54.0%	56.9%	65.8%	56.3%

9

Psychological Health and Well-Being

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Psychological Health and Well-Being

Key Insights

The purpose of this chapter is to describe the psychological health measures evaluated within the CLSA and to provide cross-sectional descriptive statistics for the baseline Tracking and Comprehensive cohorts. The results presented in this chapter show that:

The analyses in this chapter reveal that:

- Cognitive test scores were generally lower for older participants than for younger participants, consistent with other observations for similar measures in the literature.
- Some sex differences on various cognitive measures were apparent and are consistent with the findings of similar measures in the extant literature.
- Some measures of cognition, particularly those assessing verbal function, show differences in performance levels between those who completed the test in French and English.
- Cognitive measures administered over the telephone and in person yielded similar mean scores.
- Most participants reported their mental health as excellent, very good, or good. Approximately 5% reported fair or poor general mental health; and this proportion declined with age. The youngest CLSA participants reported greatest concerns with mental health.
- Women tended to report more depressive symptoms and psychological distress than men did.
- Few notable differences between sexes, across age groups, were apparent on dimensions of personality.

This chapter only addresses individual psychological measures from the baseline data. Some psychological health measures in the CLSA have rarely been used in the context of large epidemiological research, and evaluation of their performance in relation to other measures will be important. Moreover, the true strength of the CLSA in the study of psychological health and aging will emerge as these same measures are applied over time and trajectories of change can be articulated.

Introduction

As people age, their ability to maintain autonomy and social contact, and to perform everyday activities, is dependent on their level of psychological functioning. Thus, a psychological perspective is a vital component in a longitudinal study of aging. The development of the CLSA psychological health component involved the evaluation, selection, and implementation of measures to address those psychological domains perceived as highly salient within the context of healthy adult development and aging. Throughout the life course, some domains of psychological functioning decline, while others remain relatively stable. Some psychological processes that guide the behaviour and functioning of adults are influenced by changes in physical and health status, whereas others may be influenced by changes in attitudes, beliefs, and values that occur as a function of life experience. Domains of psychological health, within the CLSA, include cognitive functions (i.e., memory, executive functions, and psychomotor speed), mood and distress, life satisfaction, and personality. These domains will be of interest to many researchers for examination, both on their own across subgroups (e.g., based on age) and in relation to other variables in cross-sectional analysis or over time (i.e., longitudinally).

This chapter describes the psychological health measures and provides cross-sectional descriptive statistics separately for the measures used in the baseline Tracking and Comprehensive cohorts stratified by language of response, age group, and sex, factors that have been shown to influence performance on measures of psychological health. For example, it is well known that linguistic factors[1,2] and differences in the modes of test administration (i.e., telephone and face-to-face) can result in differences in performance on measures of cognition. To date, there is no evidence to suggest that the psychological health measures used in the CLSA (and in particular the cognitive measures) capture the same latent constructs in each language of administration. Any observed differences in performance between those who completed the tests in French and English are likely to be reflective of differences in the suitability of the properties of the measures for use in each language rather than differences in capability between the groups. First, we provide a brief description of the processes for selecting these measures and the procedures for implementation within the CLSA. Unweighted findings were examined separately for measures administered over the telephone (i.e., Tracking cohort Version 3.3 baseline (n=21,241) and Maintaining Contact interviews for Tracking Version 2.1 (n=19,052) and Comprehensive Version 2.1 cohorts (n=28,789)) vs. face-to-face (i.e., Comprehensive cohort Version 3.2 baseline in-home interviews and data collection site visits (n=30,097)). This descriptive information provides the necessary foundation for future work with these data.

Measures

SELECTION, ADMINISTRATION, AND SCORING OF THE MEASURES OF PSYCHOLOGICAL HEALTH

Researchers with expertise in different areas of psychology and aging (e.g., developmental, health, social, and neuropsychology) were invited to take part in working group teleconferences to identify key psychological health domains for integration into the overall CLSA study design. Five subthemes were identified as being highly relevant to the CLSA goals: Cognition, Mood, Life Satisfaction, Distress, and Personality. The focus from the psychological health perspective, within the CLSA, is on intra-individual factors that give rise to individual differences in health-related behaviour and/or health outcomes. Within the longitudinal context of the CLSA, the five psychological health subthemes will yield developmental trajectories and contribute to the understanding of adaptive functions within each participant's environmental context (e.g., physical, social, historical).

The psychological health measures were divided into those that were administered either face-to-face or by telephone (Comprehensive cohort: Rey Auditory Verbal Learning Test immediate and 5-minute delayed recall; Mental Alternation Test; Animal Fluency; Miami Prospective Memory Test; Stroop Neuropsychological Screening Test – Victoria modification; Controlled Oral Word Association Test; Choice Reaction Times; General Mental Health self-rating; Center for Epidemiology Survey – Depression – 10 items; Satisfaction with Life; Post-traumatic Stress Disorder), and those that were administered via the telephone (Tracking and Maintaining Contact interview : Rey Auditory Verbal Learning Test Trial 1 and 5 minute delayed recall; Mental Alternation Test; Animal Fluency; General Mental Health self-rating; Center for Epidemiology Survey – Depression – 10 items; Satisfaction with Life; Post-traumatic Stress Disorder; Psychological Distress Scale – 10 items; Ten item Personality Test) (see Table 1). The manner in which some measures are administered and scored within the CLSA differs from most other studies. For example, all measures in the CLSA Tracking cohort are administered over the telephone and in a specific sequence embedded within a broader set of questions concerning health and social functioning. Similarly, some of the measures administered via face-to-face contact were given in the participant's home, whereas others were administered in a more typical clinical setting within a broader set of activities regarding health and physical functioning. The specific measures administered are described in Table 2. The items and order of administration for all psychological health measures within the broader context of the overall CLSA data collection are available on the CLSA website (www.clsa-elcv.ca) as are documents concerning scoring and coding of responses.

Results

COGNITION

Measures of cognitive function, in the CLSA, fall within the domains of memory, executive functions, and psychomotor speed. These three domains were selected because: each domain has been shown to be related to adaptive functioning across the lifespan; gradual age-related normative decline has been observed for each of these domains; pronounced change in each domain has been associated with age-associated medical conditions; and there is growing evidence that each of these cognitive domains may be associated with particular genetic markers. Emphasis was placed on selection of measures of executive functions because they are involved in many complex behaviours such as mental flexibility, response fluency, and response inhibition, all tasks that enable people to engage in independent, adaptive behaviours.

REY AUDITORY VERBAL LEARNING TEST (RAVLT)

On the measures of memory (RAVLT immediate recall, delayed recall), the mean number of words recalled from the 15-item word list differed only slightly when administered over the telephone (i.e., Tracking, immediate recall overall mean English = 5.9; French = 5.8) vs. in person (Comprehensive, immediate recall overall mean English = 5.9, French = 5.5). As expected for both immediate and delayed recall, fewer words were recalled by older participants and women recalled slightly more words within each age group than men, regardless of language of response. The youngest women recalled a greater number of words (mean immediate recall score, English = 7, French = 6.6) and the fewest words were recalled by the oldest men (mean immediate recall score, English = 4.3, French = 4.0) (Figure 1a). After a 5-minute delay, a similar pattern for response was seen (delayed recall mean score for women aged 45-54 English = 5.4 French = 5.3; delayed recall mean score for men aged 75+ English = 2.5, French = 2.4) (Figure 1b).

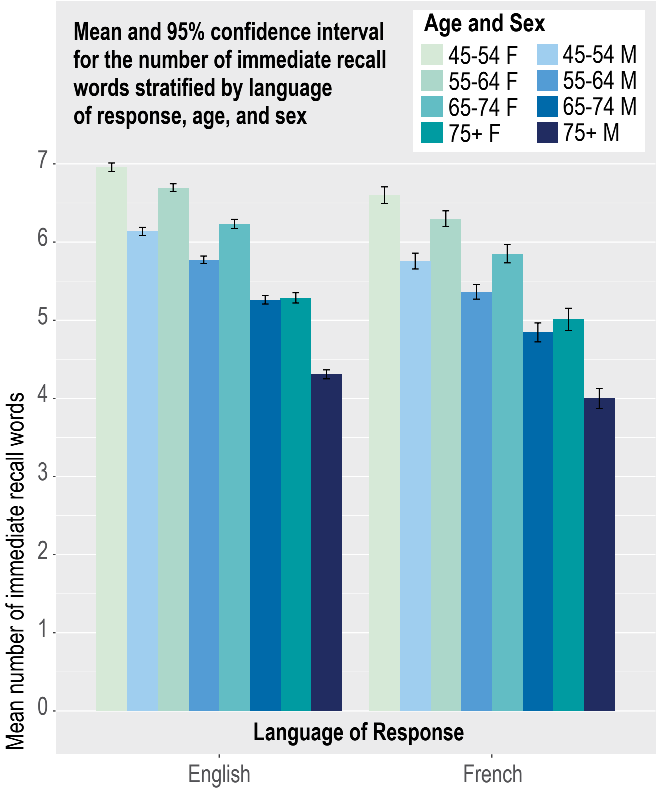

Figure 1a – Immediate word recall by age, sex, and test language

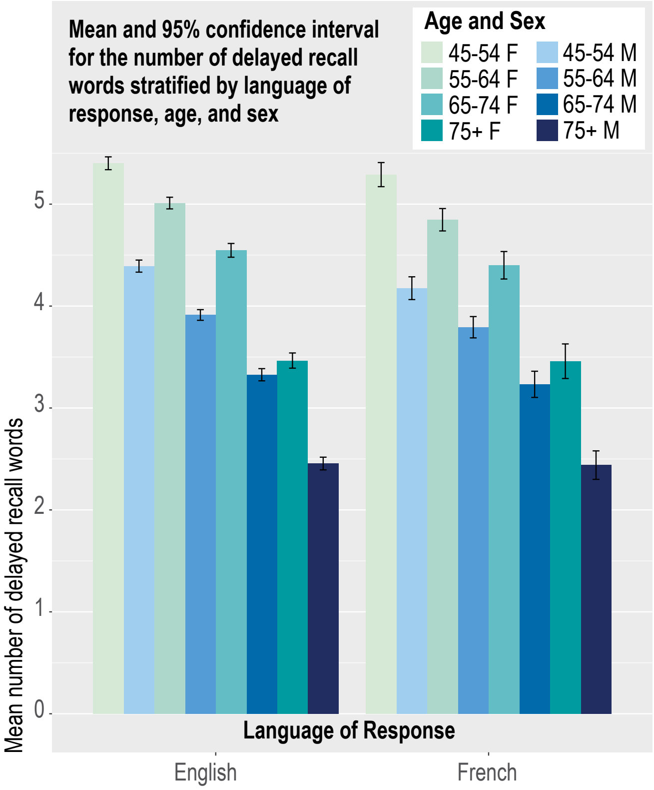

Figure 1b – Delayed word recall by age, sex, and test language

MENTAL ALTERNATION TASK (MAT)

On a mental flexibility test involving alternating tasks (the Mental Alternation Task or MAT), men, and women performed similarly within each age group and language of response, regardless of whether this measure was administered over the telephone or in person. The oldest participants in each sample (Tracking and Comprehensive) completed fewer alternations. The highest number of alternations was completed by the youngest men (mean score aged 45-54 = 29.3) and the oldest women completed the lowest number of alternations (mean score aged 75+ = 21.4).

ANIMAL FLUENCY TEST

The number of animal names (category fluency) generated in 60 seconds was similar for women and men within each age group and language of response, regardless of whether this measure was administered over the telephone or in person. This was true when either strict or lenient scoring was applied. As expected, mean scores were slightly higher when lenient scoring was applied. Older participants generated fewer animal names. While not marked, participants completing the test in English generated slightly more animal names than those completing the test in French did.

FAS VERBAL FLUENCY

The number of words generated in response to stimulus letters (FAS verbal fluency) in 60 seconds was similar between women and men, regardless of language of response (mean score English women = 39.9, men = 40.3; French women = 35.0, men = 35.2). The youngest women generated the highest number of words (aged 45-54 mean score English = 43.1, French = 39.0) and the oldest men generated the lowest number of words (aged 75+ mean score English = 35.6, French = 28.8). As would be expected, given differences in the frequency of words beginning with F, A, and S in English and French, the mean number of words generated differed by language of response.

STROOP TEST

A measure of response inhibition (Stroop) that corrects for age-related slowing was similar for women and men within each age group and language of response. Youngest participants showed the lowest index of interference (aged 45-54 English and French, male and female combined mean index of interference = 1.95), whereas, the oldest participants showed the highest index of interference (aged 75+ English and French, male and female combined mean index of interference = 2.42).

PROSPECTIVE MEMORY TEST (PMT)

In the CLSA, prospective memory (PMT), or remembering to remember, was measured under two conditions: event-based and time-based. A total score was calculated that combined intent to perform scores (range 0-3), accuracy scores (range 0-3) and scores reflecting use of reminders (range 0-3) for the event- and time-based tasks[3], yielding a maximum score of 18. This combined score was similar for women and men within each age group and language of response. As expected, the youngest participants showed the highest performance on this combined measure (aged 45-54 combined English and French, men and women = 17.58), whereas, the oldest participants showed the lowest scores on this combined measure (aged 75+ combined English and French, men and women = 15.99).

The two-choice reaction time tasks provided participants with 60 presentations, with different response intervals, of one of two targets in different locations on a touch-screen computer monitor. An overall mean reaction time score was calculated across the 60 presentations. Few differences were noted between men and women regardless of language of response. The youngest (aged 45-54) participants showed the fastest mean reaction times (English and French, male and female combined mean reaction time = 761.17 mSec) whereas the oldest participants showed the highest reaction times (aged 75+ English and French, male and female combined mean reaction time = 979.94mSec).

MOOD, LIFE SATISFACTION, AND DISTRESS

Participant responses concerning mental health and well-being differed depending on the specific measure examined. On a single question assessing general mental health, most participants, regardless of age, sex, or language of response, reported few mental health problems, with over 90% of the participants in the Tracking and Comprehensive cohorts rating their mental health as excellent, very good or good (English 94.2%; French 95.8%) rather than fair or poor (English 5.8%, French 4.1%). The report of fair or poor general mental health declined with age (6.7% for aged 45-54 years; 4.1% for aged 75+ years) regardless of sample (i.e., Tracking, Comprehensive), sex, or language of response. The only exception was for the women completing the French version of the test in the comprehensive cohort, where those 45-54 years old had similar reports to those 75-85 years old (i.e., about 6%).

SATISFACTION WITH LIFE SCALE (SWLS)

Similarly, most CLSA participants reported feeling satisfied with life. When the frequency of responses was tallied, 4.9% of CLSA participants reported dissatisfaction or extreme dissatisfaction.

The youngest adults (i.e., aged 45-54 years) reported dissatisfaction with their lives two times more frequently than the oldest adults aged 75+ years (6.0% vs. 2.9%), although this finding varied depending on the CLSA sample. For example, 3.5 % of youngest (i.e., aged 45-54 years) men in the Comprehensive cohort completing the questionnaire in French reported dissatisfaction or extreme dissatisfaction in comparison to 0.5% of the oldest men from the same cohort. In the Tracking cohort, 7.2 % of the youngest (45-54) men completing the questionnaire in English reported dissatisfaction or extreme dissatisfaction in comparison to 2.4 % of the oldest men (i.e., aged 75+) from this same cohort.

POST-TRAUMATIC STRESS DISORDER (PTSD)

Responses to four questions concerning symptoms of Post-Traumatic Stress Disorder (PTSD) suggested that, regardless of sex, participants completing the English questionnaire were less likely to screen positive for PTSD with increasing age. Approximately 8.5% of women in the Tracking and Comprehensive English-version cohorts and aged 45-54 years screened positive for PTSD, whereas only approximately 2.8% of women aged 75+ years from these cohorts screened positive. This pattern was not as evident for either male or female participants completing the questionnaire in French. In some cases, there was little difference between the youngest and oldest age groups for participants completing the French questionnaire (e.g., Tracking cohort aged 45-54 years = 8.2%, aged 75+ years = 7.3%).

PSYCHOLOGICAL DISTRESS (K10)

On the measure of non-specific psychological distress symptoms occurring over the previous 30 days (K10), women, regardless of language of response, exhibited slightly higher scores than men. The same general trend noted above for other mental health measures was apparent, with the youngest participants reporting somewhat higher levels of distress (mean score for English and French women and men aged 45-54 years = 14.9) than the oldest participants (mean score for English and French women and men aged 75+ years = 13.8).

DEPRESSION (CES-D)

On a measure of depressive symptoms (CES-D), women reported higher overall mean scores than men, regardless of language of response (i.e., English or French) or sample (i.e., Tracking or Comprehensive). Approximately 18-24% of women, regardless of sample or language of response, screened positive for depressive symptomatology, whereas approximately 9-17% of men screened positive. Of note, the largest groups screening positive were the oldest women responding in French (i.e., aged 75+ years) in the Tracking cohort (i.e., 24.1%) and the youngest (i.e., aged 45-54 years) men in the English-version Tracking cohort (i.e., 16.6%). The group with the lowest proportion of participants who screened positive was men aged 65-74 years in the Comprehensive cohort who completed the English version of the test (i.e., 9.6%). The proportion of the participants who screen positive for depressive symptoms is presented according to age, sex, cohort, and language in Figure 2.

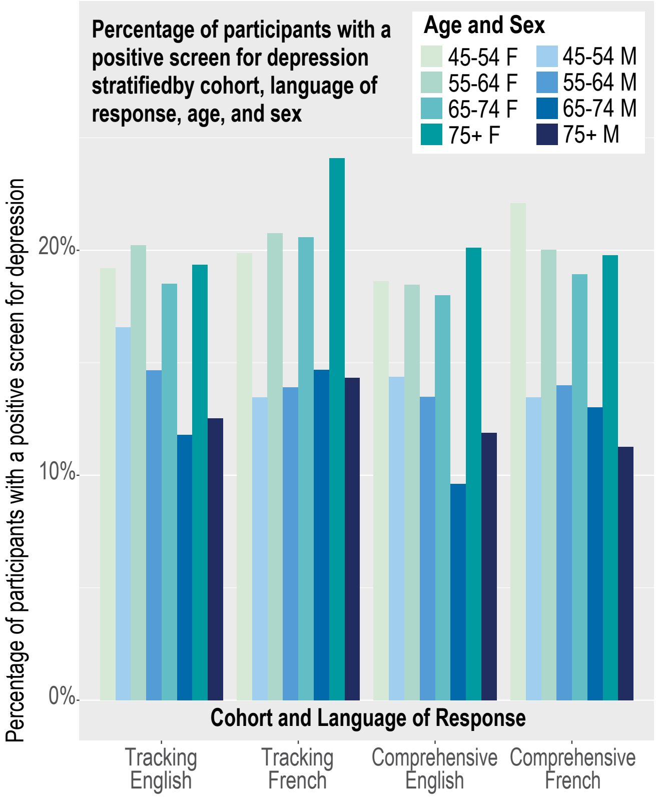

Figure 2 – Depressive symptoms (CES-D) by age, sex, cohort, and questionnaire language

PERSONALITY

On a measure of personality (TIPI), few notable differences between men and women, regardless of language of response or age, were apparent for any of the dimensions of personality (i.e., Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness).

Discussion

In this chapter, the cross-sectional psychological health data from all participants in the CLSA baseline Tracking and Comprehensive cohorts were described. While some interesting trends were noted, many important factors that may affect psychological health were not considered. For example, CLSA participants are generally well educated, and marked differences in cognition may be apparent for those differing in level of education. These and many other factors must be carefully examined before conclusions are drawn from the CLSA data regarding the psychological health of Canadians.

Though the information presented in this chapter suggests that indicators of psychological health appeared similar between participants testing in English and French, decisions to collapse across language of response needs to be considered carefully. It is possible that different constructs are being measured in each language. Similarly, in future research, subsample selection will be an important consideration depending on the purpose of the study (e.g., to characterize performance of those without major medical conditions). More research is needed to examine the equivalency of measures among various subsamples.

While many of the measures selected for use in the CLSA have shown promise in other epidemiological or clinical studies, it will be important to demonstrate the similarities and differences that emerge between these studies and the CLSA. For example, since the manner in which cognitive measures in the CLSA were administered and scored differ from their use in other research; normative standards based on neurologically healthy CLSA participants aged 45 through 85 years are being developed. This project utilizes the CLSA research platform and is funded by the Alzheimer Society of Canada and the Pacific Alzheimer Research Foundation (grant number 17-29). These normative standards will take age, sex, language of response (i.e., English or French), education, and mode of administration (i.e., telephone, face-to-face) into consideration. More information about the general selection process and the specific administration procedures for measures within the cognitive domain can be found on the CLSA website.

The CLSA is one of the largest research platforms of its kind worldwide and it may yield some associations not apparent in smaller studies or those conducted in different parts of the world. Some measures selected for use in the CLSA have rarely been used in the context of large epidemiological research and it will be important to evaluate their performance in relation to other measures or “gold” standards. For example, the measure of personality has typically been used with younger adults; being able to examine personality characteristics for subsamples of adults in middle-to-late life will contribute new knowledge about the utility of this measure.

Numerous studies are ongoing to examine: the influence that psychological health factors have when adjusting to life transitions, such as driving cessation (e.g., Bedard, Cosco); how personal characteristics (e.g., sex, physical activity level, racial disparities, hearing and vision, bilingualism) are related to cognitive status (e.g., Chen, Fenesi, Penning, Mick, St. John); and the association between disability and mental health concerns (e.g., Fisher). More information and summaries of current approved projects can be found on the CLSA website. This chapter only addresses baseline data. The true strength of the CLSA in the study of psychological health and aging will emerge as these same measures are applied over time and trajectories of change can be articulated.

TABLE 1 PSYCHOLOGICAL HEALTH MEASURES IN THE CLSA

Measure	**Face to Face Administration**		**Telephone Administration**	
	Comprehensive Data Collection Site Visit (n=30,097)	Comprehensive In-home Interview (n=30,097)	Tracking Interview (n=21,241)	Maintaining Contact Interview (n=47,841)
Cognition				
Memory Rey Auditory Verbal Learning Test[4]	•	✔	✔	•
Executive Function				
Mental Alteration Test[5]	✔	✔	✔	•
Miami Prospective Memory Test[6]	✔	•	•	•
Stroop Neuropsychological Screening Test[7]	✔	•	•	•
Controlled Oral Word Association Test (FAS)[8]	✔	•	•	•
Animal Fluency[9]	•	✔	✔	•
Psychomotor Speed				
Choice Reaction Times[10]	✔	•	•	•
Mood and Psychopathology				
General mental health self-rating		✔	✔	
Center for Epidemiology Survey – Depression (CES-D 10)[11]	✔	•	✔	•
Satisfaction with Life[12,13]	•	✔	✔	•
Posttraumatic Stress disorder[14]	•	✔	✔	•
Psychological Distress (K10)[15]	•	•	•	✔
Personality				
Ten item personality test (TIPI)[16]	•	•	•	✔

✔: measured (Tracking, Maintaining Contact = telephone, or Comprehensive = face-to-face, administration)
•: Not measured
Maintaining Contact = 18 months after Tracking or In-home interview

TABLE 2 DESCRIPTION OF PSYCHOLOGICAL HEALTH MEASURES

Measure	Characteristics
Memory	
Rey Auditory Verbal Learning Test[4]	Word list learning and recall is one of the most widely used memory test. One of the most widely used measure of list learning in clinical neuropsychology17,18.
Executive Function	
Mental Alteration Test[5]	Oral switching task based on the Trail Making Test, a test extremely sensitive to progressive cognitive decline Very easy to use requiring only 90 seconds to complete. Relatively new compared to the Trail Making Tests.
Prospective Memory Test[6]	Implications for daily functioning. Contains both time-based and event-based prospective memory tasks Both time-based and event-based tasks decline with age[8,19,20]
Stroop Neuropsychological Screening Test[21]	A measure of inhibition, attention, mental speed, and mental control, all of which have implications for everyday functioning. Increasing age has been associated with a larger Stroop effect.
Controlled Oral Word Association Test (FAS)[8]	Verbal fluency measures are responsive to age related changes in verbal functioning.
Animal Fluency[9]	Animal naming is very sensitive to normal cognitive decline and can dissociate normal aging from early-stage dementia[21].
Psychomotor Speed Choice Reaction Times[10]	A two choice reaction time task sensitive of age-related changes with 60 presentations of one of two targets in different locations on a touch-screen computer monitor with various response intervals

Measure	Characteristics
Mood and Psychopathology	
Center for Epidemiology Survey – Depression (CES-D 10)[11]	Designed to cover the major components of the Beck's cognitive model of depression with an emphasis on affective components[22]. A measure of depressive symptomatology (i.e., not based on clinical criteria for clinical and should not be used as a diagnostic tool). Best-known survey instruments for identifying symptoms of depression designed for use in community-based epidemiological study. Questions appropriate for the entire age range targeted for CLSA.
Satisfaction with Life[12,13]	One of the most widely used scales in subjective well-being studies. Quick and easy to administer. Can be used with adult of various ages. The scale assesses satisfaction with the respondent's life as a whole.
Posttraumatic Stress disorder[14]	Asks participants 4 items about re-experiencing, numbing, avoidance and hyperarousal in the last month from any lifetime traumatic event
Psychological Distress (K10)[15,23,24]	Measures non-specific psychological distress and focuses on identifying people with severe mental illness. One of the most widely used screens for psychological distress in epidemiological surveys; used successfully in national population health surveys.
Personality	
Ten item personality inventory (TIPI)[16]	Extremely brief measure of the Big-Five personality dimensions: Extraversion, openness to experience, agreeableness, conscientiousness, and emotional stability.

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10

Lifestyle and Behaviour

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Lifestyle and Behaviour

Key Insights

Lifestyle factors play a significant role in healthy aging through their link to virtually every major disease or condition affecting an individual. The purpose of this chapter is to provide descriptive data for the measures of dietary intake, nutrition risk, physical activity, sleep habits, tobacco use and alcohol consumption being used in the tracking and comprehensive cohorts and, if appropriate, relate this to other information concerning similar measures collected in similar populations.

- The most frequent nutritional risk factors in the CLSA cohort were ‘skipping meals’, ‘eating alone’, and ‘weight loss’ while very few reported poor appetite, lack of money to buy foods or experiencing swallowing problems;
- Overall, only one fourth of older adults reach the recommended amounts of aerobic and resistance type physical activity;
- Sleep appears to be perturbed mostly in 45-65 year-olds, and women are more affected by sleep difficulties and express being less satisfied by their sleep quality than men;
- Physical and mental health could exacerbate chronic conditions by leading to the adoption of inappropriate lifestyle habits (e.g., food habits, sleep habits, exercise, alcohol consumption, and social activities).
- A small proportion of older adults reported being current smokers (about 10%) and heavy drinkers (5% once a week);

Understanding how the aging process is regulated by modifiable factors such as lifestyle and behaviours will allow the development of targeted strategies for promoting healthy aging. On the other hand, health benefits associated with improved lifestyle can be observed at all ages. The CLSA study will provide high quality data that will help understand factors that impact on lifestyle at older age and how this, in turn, affects health and wellness.

Introduction

Although, human development and aging processes are genetically programmed, it is now recognized that the expression of genes may be modified by past and present environmental factors such as nutrition, lifestyle and physical and psychosocial environments. Understanding how the aging process is regulated by modifiable factors such as lifestyle and behaviours will allow the development of targeted strategies for promoting healthy aging.

Lifestyle factors play a significant role in healthy aging through their link to virtually every major disease or condition affecting an individual. As the baby-boom generation approaches and enters into retirement, this demographic phenomenon will intensify the challenges that Canada faces in supporting an aging population. Their shifting lifestyle choices make them one of the most compelling demographic segments to study.

At the outset of CLSA study planning, researchers with experience studying lifestyle and behaviour were invited to take part in working group teleconferences to develop content for inclusion in the CLSA. The objectives of the Lifestyle Working Group are to 1) identify determinants of lifestyles practices, including food consumption, food security and nutritional risk, physical activity, sleep, tobacco use and alcohol consumption, and understand their inter-relationships, 2) determine how lifestyle practices influence the effects of genetic, immunologic and molecular determinants of healthy aging and 3) understand how lifestyle practices interact with social, economic and cultural environments to influence physical, psychological and social functioning, well-being and adaptation.

Measures

The Comprehensive cohort (Version 3.2) Tracking Cohort (Versions 3.3) baseline and Maintaining Contact interviews were used in the analyses presented in this chapter. The sample sizes represent the number of participants who were asked each item, and estimated proportions of the Canadian population are based on the CLSA inflation weights (see Chapter 2 in this report for full details).

Nutrition

SELF-PERCEIVED WEIGHT STATUS

Obesity is an important public health issue in Canada and the prevalence is increasing in aging population[1]. In the CLSA Tracking cohort, 21,164 individuals were asked on their perception of their current body weight status. A person's perception of their own body weight is the result of multiple factors including general health, personal experiences as well as social and cultural ideals, which may not reflect his/her current body weight status as determined by the body mass index. Nonetheless, more than half of all Canadians aged 45-85 (51.6%) perceived themselves as overweight, while a little below half of them perceived themselves as "just about right" (46.0%), underlining again the extent of the obesity crisis in Canada (Table 1). Sex and age differences were observed though with overweight perception being a little more frequently reported in women than men as well as in individuals aged 45-64 years old in both sexes.

TABLE 1 SELF-PERCEIVED WEIGHT STATUS

	Women		Men	
	45-64 n=6345	65-85 n=4419	45-64 n=5999	65-85 n=4401
Overweight	56.5	49.3	50.6	45.4
Underweight	1.0	2.4	2.3	2.4
Just about right	41.7	47.7	47.0	52.1

Numbers of respondents include participants who either responded, “Don’t know/no answer” or “Refused to respond”.

DIET

Healthy eating is a cornerstone of healthy aging through its role in the prevention of chronic diseases such as diabetes, cardiovascular diseases, and cancer. Diet should be rich in vegetables, fruits, and fibers while providing a sufficient amount of proteins from either animal or plant-based sources. Dietary habits have been assessed in 30,097 individuals of the CLSA Comprehensive cohort using the Short Diet Questionnaire (SDQ), which provides the usual consumption frequencies of common food items[2]. When processed, SDQ data will provide estimated intakes for 10 nutrients as well as the number of servings of fruits and vegetables. For the purpose of the present report, daily consumption frequencies of key food items are reported as medians and interquartile ranges (IQR) in **Table 2**.

Overall, these preliminary data indicated that ‘fruits and vegetables’, high-fiber cereal products, low-fat dairy products and meats (mostly beef, pork, and poultry) were consumed daily or almost every day. Specifically, most Canadians consumed fruits and vegetables 2 to 5 times a day, with similar frequencies in both age groups. This is expected, since the recommendations for consumption of fruits and vegetables are the same in middle-aged and older adults. Potatoes were mostly consumed 1 to 3 times a week with median values higher in men than women, and increasing in older groups of both sexes. Consumption of high-fiber cereal products was slightly higher in older groups while low-fat dairy products were consumed twice often than regular-fat dairy products, which is consistent with the current recommendations. Sources of proteins were mostly animal-based and predominantly red and white meats. Consumption frequencies of meats were lower in older groups of both sexes. Such trends are worrisome as protein requirements increase during aging[3]. The most frequently consumed plant-based protein sources was the food item ‘nuts, seeds, and peanut butter.

NUTRITIONAL RISK

Seniors have an increased risk for impaired nutritional status because of altered metabolism and/or insufficient dietary intakes. This is partly due to the aging process per se to which can be added the burden of chronic diseases and disabilities as well as the lack of social support. Impaired nutritional status is an important geriatric syndrome that has been independently associated with acute care hospitalizations and mortality among community-dwelling older adults in Canada[4]. Individuals with characteristics known to be associated with impaired nutritional status (ex. weight loss, poor appetite) are said to be at “nutritional risk”. The presence of such characteristics was enquired in 47,841 individuals of the CLSA cohort (Table 3). The most frequent characteristics among Canadians were ‘skipping meals’, ‘eating alone’, and ‘weight loss’. Specifically, 18.5% reported having lost weight during the last 6 months, including 6.6% reporting having lost more than 10 pounds. The proportion of such significant weight loss was very similar between groups. Despite that poor appetite and the lack of money to buy food were rarely reported (1.5% and 2.5% respectively), 12.2% have indicated to skip meals often or almost every day; a proportion slightly higher in individuals aged 45-64 years old (14.0%) than in older adults (8.2%). Similarly, 9.2% reported to never or rarely have a meal with someone; a proportion particularly high among older women (16.6%). Finally, only 2.1% of Canadians often experienced coughing, choking or pain while swallowing. These data would help defining programs aiming to decrease the nutritional risk among older adults.

DIETARY SUPPLEMENT USE

Dietary supplements are often used for filling self-perceived or actual gaps between nutrient requirements and actual intakes with the objective to improve health or prevent specific conditions such as osteoporosis or anemia. In the CLSA cohort, 47,841 individuals were questioned regarding their dietary supplement use in the past month (Table 3). Dietary supplements reported were miscellaneous and comprised vitamins (ex. multivitamin or single-ingredient products), minerals (ex. calcium, iron), fatty acids (ex. omega-3), probiotics, and natural health products (ex. glucosamine, garlic extracts). The most popular supplements were vitamin D (44.5% of Canadians), multivitamins (32.0%), and calcium (28.0%). The use of vitamin D and calcium supplements was higher in women as well as in the older groups for both sexes, pointing to bone health as one major preoccupation in aging, particularly in women. In contrast, the proportion of multivitamin users did not greatly vary between groups.

Physical Activity

SITTING, WALKING, AND SPORTS

Physical activity participation has numerous benefits for physical as well psychological health of older adults[5] even in those who are challenged by health problems[6]. Physical activity participation in light, moderate and strenuous sports and recreational activities as well as sedentary activities data were collected in 47,841 participants using the Physical Activity Scale for the Elderly. **Table 4** displays the percentage of individuals reporting doing each activity.

It was observed that more than 90% of individuals, regardless of age and sex, often do sitting activities, representing a frequency of 5-7 days per week. On the other hand, less than 3% individuals, never or seldom (1-2 days per week) performed sitting activities.

Close to two thirds of 45-64 years old individuals (F=68.7% and M= 67.4%) walked 3 or more days per week. While this percentage slightly dropped to 62.9% in women 65-85 years of age, it remained stable in men 65-85 years of age (69.8%). The survey also examined participation to light, moderate and strenuous sports, and recreational activities. Physical activity intensity is determined relative to the person's maximal capacity. Light activity represents an exertion lower than 50% of maximal capacity while moderate (65-70% of maximal capacity) and strenuous activity (more than 75% of maximal capacity) represents greater intensities[7]. It appears that the vast majority of individuals do not practice physical activities or sports other than walking. Nevertheless, the greatest percentage of practice was for strenuous activities with an average of 19.2% and 23.8% for women and men 45-65 yrs, respectively, which is higher than for light or moderate activities. In those 65-85, the percentage of practice decreased to 11.5% and 15.8% in women and men, respectively, which is still higher than for light or moderate activities.

Altogether, these observations suggest that Canadian older adults mostly walk as their main physical activity, which is concordant with the accessibility and ease of walking in a large proportion of individuals. Nonetheless, the small proportions of individuals who engage in sports or recreational activities tend to do so at vigorous intensity. It can be hypothesized that this small proportion of individuals has a long history of performing these activities and includes mostly long-term athletes or keen sportspersons.

MEETING THE RECOMMENDED AMOUNTS OF PHYSICAL ACTIVITY

When adding together "sometimes" or "often" practice moderate and strenuous activities, it can be determined that a maximum of one fourth of older Canadian adults are susceptible to reach the Canadian Physical Activity Guidelines for aerobic physical activity, which are 150 min per week of moderate or vigorous physical activity[8]. It is important to note that this is an assumption based on the number of days per week of practice (minimum of 3) since we do not have the precise duration of practice each time. A certain proportion of these individuals may reach the minimum time recommended of 150 minutes per week. On the other hand, Canadian Physical Activity Guidelines also promote performing muscular exercise to increase muscle strength and endurance twice a week with no further precision about duration[8]. It was observed that only 1 out of 4 persons perform such activities at least 3 times a week and thus definitely meet the recommendations.

The majority of individuals (68.4%) indicated that this physical activity practice is representative of their routine over 12 months, suggesting some stability over the year. Seasonal effects (too cold or slippery in winter, too hot in summer) are known to have the greatest effect on yearly variations[9].

Finally, while a majority of older adults aged 45-64 years indicated wanting to participate more in physical activities during the past year (65.6% and 61.0% in women and men) this was not as prevalent in 65-85 years individuals with less than half individuals wanting to do more (45.3% and 42.6% in women and men). This may be representative of a greater impression of barriers in 45-64 year-olds than 65-85 year-olds. This is concordant with the fact that 45-64 year old people are likely still professionally active and/or may have familial responsibilities, since perceived lack of time is the most common barrier[10]. Although we can only speculate about the reasons for such an elevated percentage in this age group, it could also reflect some "social desirability" as if they somehow knew they did not do sufficient physical activity. This bias may also suggest that the reported practice is above actual values.

The majority of CLSA participants (60%) report being satisfied or very satisfied with their sleep patterns

Sleep

Several changes in sleep patterns are observed during the normal aging process, such as shorter duration of sleep, earlier waking and sleep times, as well as more frequent awakenings with more difficulty getting back to sleep, particularly in the second half of the sleep episode[11]. Additionally, sleep efficiency, or total sleep time compared to the length of the sleep episode, decreases significantly with age—86% at 45 years of age to 79% at

70 years of age[12]. As we age, it is common to become more sensitive to the challenges imposed on our sleep/wake cycles, such as shift work or jet lag[13]. Unfortunately, sleep quality is directly linked to quality of life. Poor sleep quality is associated with cognitive, physical and psychological difficulties[14].

SLEEP CYCLES

Sleep consists of several sleep cycles lasting approximately 90 to 120 minutes, and comprised of distinct stages: light sleep, deep sleep, and REM sleep. The division of sleep stages within a sleep cycle varies throughout the night: the first sleep cycles tend to have a greater proportion of deep sleep, whereas the final sleep cycles tend to have more REM and light sleep. Although REM sleep does not tend to change as we age, deep sleep tends to decrease significantly. Deep sleep is particularly restorative and plays a key role in learning and memory consolidation[15]. Ideally, adults and seniors require seven to nine hours of sleep per night[14].

SLEEP DISORDERS

The most common complaints reported as people age are: trouble falling asleep and staying asleep, night waking, early awakening and daytime napping[16]. The ideal sleep duration for older adults falls between 7 and 9 hours every night. On average, Canadians reported 6.8 hours of sleep per night. Among Canadians, 32.3% had no trouble getting back to sleep in the month prior to the survey, and 27.7% experienced difficulty less than once a week. For Canadians having difficulty staying asleep, 64.3% reported little or no impact on their ability to function in the daytime. Additionally, a majority of Canadians (72.2%) reported in the month prior to the survey taking more than 30 minutes to fall asleep less than once per week or never. Middle-aged and female Canadians reported experiencing the most impact of sleep onset latency (37.9%).

Insomnia, which is characterized by dissatisfaction with the duration or quality of sleep or by non-restorative sleep, is the most common sleep disorder among seniors[17]. More Canadians between the ages of 45 and 64 reported experiencing restless sleep than those between the ages of 65 and 85; Canadians aged less than 65 seem more often experience restless sleep, probably due to professional and personal obligations (Figure 1). The prevalence and incidence of insomnia tends to increase with age as the rate of recovery decreases significantly. In other words, insomnia tends to become chronic with age[18].

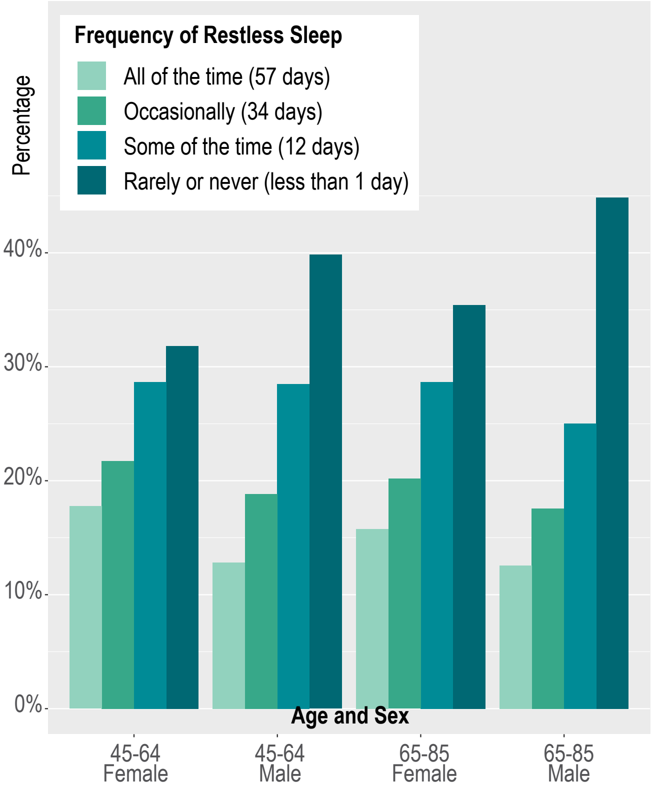

Figure 1 – Frequency of restless sleep by sex and age group

OTHER SLEEP DISORDERS

Other sleep disorders often arise with age, particularly sleep apnea and restless leg syndrome[12]. The prevalence of restless leg syndrome, which is characterized by uncomfortable or unpleasant sensations in the legs in the evening and while at rest leading to an irresistible urge to move, increases significantly with age[19]. Consequently, 32.9% of Canadians reported experiencing discomfort and/or an irresistible urge to move their legs while sitting or lying down. This disorder appears to be more common among women between the ages of 45 and 65. In fact, women are at greater risk of suffering from periodic jerking limb movements or restless leg syndrome[19].

SEX DIFFERENCES

The results of the CLSA show marked differences between men and women. Women report experiencing more restless sleep than men, no matter their age group. Studies show clear differences between sexes both in subjective and objective sleep variables. Compared to men, women generally report lower sleep quality and experience more insomnia symptoms. However, in lab studies of women's sleep patterns at various ages, women demonstrate more slow-wave sleep, tend to fall asleep more quickly and exhibit more efficient sleep[20,21]. Women between the ages of 45 and 65 report the lowest sleep satisfaction. Several hypotheses may explain the subjective and objective differences between men and women. It is possible that women need more sleep to function effectively, or that they tend to assess the subjective quality of their sleep differently. Nevertheless, hormonal changes and variations in circadian rhythms, specifically in the release of melatonin (dubbed the sleep hormone) could also explain these differences[20,21].

HEALTHY SLEEP

Subjective sleep satisfaction is an integral part of healthy sleep, in addition to other factors such as sleeping at a suitable time, getting enough sleep and sleeping efficiently, while remaining alert during waking hours[22]. The majority of Canadians (60.8%) reported never having trouble staying awake during the day in the month prior to the study, and 20.3% reported experiencing difficulty less than once a week. In general, Canadians appeared satisfied with their sleep as 58.7% reported being satisfied or very satisfied of their sleep.

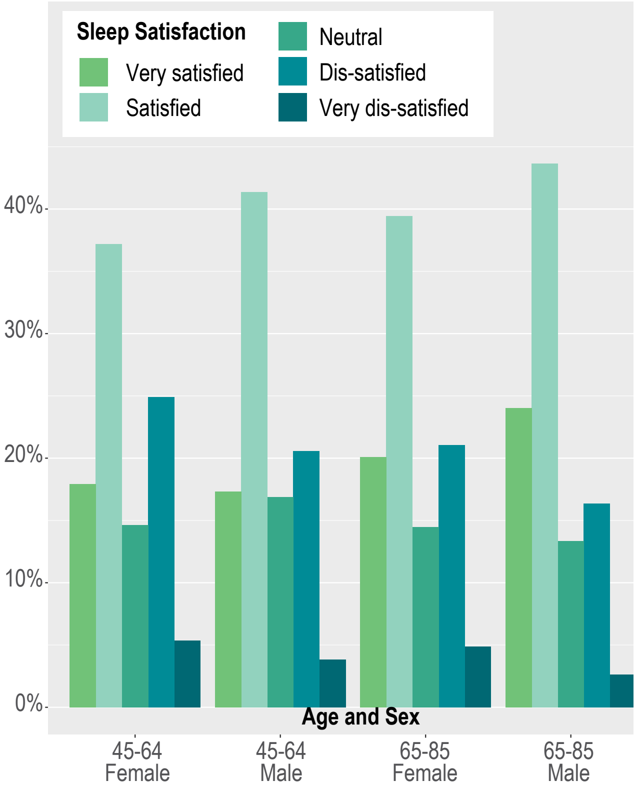

Figure 2 – Sleep satisfaction among Canadians stratified by age and sex

SMOKING

Smoking is a well-recognized risk factor for multiple chronic diseases including cancer and cardiovascular diseases. Accordingly, the proportion of smokers showed a downward trend in the last decades. However, smoking remains a leading cause of premature death in Canada and as such, continues to be an important public health issue. In the CLSA cohort, 51,338 individuals were asked about their lifelong smoking habits (Table 6). Overall, 31.2%

of Canadians never smoked a whole cigarette and 47.2% smoked less than 100 cigarettes in life. Those who never smoked were more commonly women (57.6%); the sex difference being more prominent in those aged 65-85 years old (66.9% Female). Almost one half (48.0%) of all individuals reported to have smoked on a daily basis at some point in life, a proportion that was particularly high in older men (60.7 %). Interestingly, 66.0% of individuals are now a non- or an occasionally smoker once smoked daily, illustrating the downward shift of smoking habits in Canada. As a result, only 8.7% of all individuals reported being current daily smokers and 6.3% of them (0.5% total) are heavy smokers (>25 cigarettes per day). Current smokers are more commonly middle-aged adults (81.1% 45-64 years old) than in the older groups, while no sex trend was revealed.

ALCOHOL USE

Drinking alcohol can lead to both health benefits and harms depending of the frequency and volume consumed. Virtually all Canadians (97.3%) drank alcohol at least once in their life while 88.5% drank alcohol at least once in the past 12 months. Overall, the frequency of consumption was lower in women than in men (Table 6). The pattern was greatly different between sexes though. For instance in older women, frequency of consumption was lower than in women aged 45-64 years old. In contrast, the frequency of consumption did not differ or was even higher in older men compared with men aged 45-64 years old, with 28.1% of older men consuming alcohol almost every day.

Heavy drinking refers to consumption of >4 drinks in one occasion. Sustained heavy drinking can lead to dependence and serious consequences for health (e.g. liver diseases) and the ability to function socially. Among Canadians, 45.0% did not experience heavy drinking during the past 12 months while 5.8% experienced it every week, including 0.6% almost every day. Heavy drinking was more frequent in men as well as in older groups in both sexes.

Discussion

The research literature has demonstrated that for the 2010 Canadian population, 6.0 years of life expectancy lost were attributable to unhealthy behaviours[23]. On the other hand, health benefits associated with improved lifestyle can be observed at all ages. The CLSA study will provide high quality data that will help understand factors that impact on lifestyle at older age and how this, in turn, affects health and wellness. On the other hand, CLSA lifestyle component will provide basics to further our understanding of factors that may promote changes in lifestyle to counteract the effect of aging on various health dimensions, including physical, psychological components and quality of life. For instance, CLSA data currently serve to examine the relationship between oral health, nutrition, and frailty in older adults. It is also used for determining the potential metabolic and functional benefits of a comprehensive evaluation of physical activities in older adults in Canada as well as investigating the role of nutrition on physical capacity and body composition in older adults with osteoarthritis. Furthermore, the CLSA study takes part in the growing research movement in the area for markers of identification for optimal aging and prevention of the chronic and neurodegenerative diseases such the CSCN (Canadian Sleep and Circadian Network) which investigates, for example, the impacts of sleep respiratory disorders on cognitive and cerebral biomarkers in patients with cognitive impairments. Overall, the CLSA lifestyle data pool constitutes a rich and comprehensive data source to improve our understanding of how lifestyle is linked to health and wellness, refine clinical recommendations in terms of nutrition, physical activity, and sleep habits in Canadian older adults.

TABLE 2 DAILY CONSUMPTION FREQUENCIES OF KEY FOOD ITEMS (MEDIAN [IQR]).

	Ages 45-64#		**Ages 65-85#**	
	Women	**Men**	**Women**	**Men**
Fruits and vegetables, excluding potatoes	3.64 [2.64-5.00]	2.71 [1.86-3.71]	3.46 [2.57-4.71]	2.86 [2.00-3.75]
Potatoes(boiled, mashed, or baked)	0.14 [0.07-0.43]	0.29 [0.14-0.43]	0.29 [0.14-0.57]	0.43 [0.14-0.57]
High-fiber cereal products	1.00 [0.50-1.43]	1.00 [0.57-1.43]	1.14 [0.86-1.86]	1.17 [1.00-2.00]
Low-fat dairy products	1.00 [0.43-1.93]	1.00 [0.29-1.43]	1.13 [0.57-2.00]	1.00 [0.43-1.71]
Regular-fat dairy product	0.57 [0.14-1.00]	0.60 [0.30-1.00]	0.50 [0.10-1.00]	0.40 [0.20-1.00]
Meats (red and white)	0.86 [0.63-1.03]	0.86 [0.64-1.10]	0.86 [0.60-1.00]	0.81 [0.60-1.00]
Fatty fishes	0.14 [0.07-0.29]	0.14 [0.07-0.29]	0.14 [0.14-0.29]	0.14 [0.10-0.29]
Egg dishes	0.14 [0.07-0.29]	0.14 [0.07-0.29]	0.14 [0.07-0.29]	0.14 [0.07-0.29]
Legumes, peas, beans and lentils	0.86 [0.43-1.17]	0.78 [0.43-1.14]	0.86 [0.43-1.14]	0.86 [0.43-1.29]
Nuts, seeds, and peanut butter	0.57 [0.29-1.00]	0.43 [0.14-1.00]	0.57 [0.14-1.00]	0.57 [0.14-1.00]

#Numbers of respondents include participants who either responded, “Don’t know/no answer” or “Refused to respond”.

TABLE 3 NUTRITIONAL RISK AND DIETARY SUPPLEMENT USE (EXPRESSED IN %).

	Women#		Men#	
	45-64 n=14 380	65-85 n=10 011	45-64 n=13 479	65-85 n=9 971
Lost weight in the last 6 months	18.9	19.5	17.9	17.6
More than 10 pounds	7.0	6.3	6.5	6.2
Poor appetite	1.7	1.2	2.1	1.1
Lack of money to buy food*	3.0	1.9	2.9	0.7
Skipped meals often or almost every day	13.0	8.4	15.1	7.9
Never or rarely have a meal with someone	7.6	16.6	7.0	9.4
Coughing, choking or pain while swallowing	2.2	3.1	1.6	2.6
Dietary supplement use during the past month				
Vitamin D	51.8	66.6	27.3	42.0
Multivitamins	32.3	37.5	28.3	32.2
Calcium	36.3	51.5	10.6	21.8

#Numbers of respondents include participants who either responded, “Don’t know/no answer” or “Refused to respond”.

**Assessed in a subsample of 19 051 participants*

TABLE 4 PERCENTAGE OF INDIVIDUALS REPORTING “NEVER OR SELDOM” (0-2 DAYS PER WEEK) AND “SOMETIMES OR OFTEN” (3-7 DAYS PER WEEK) PERFORMING A GIVEN ACTIVITY.

Activities	Age	Sex	Never or seldom	Sometimes or often
Sitting	45-64	Women	2.6%	97.3%
		Men	2.9%	96.9%
	65-85	Women	1.8%	98.1%
		Men	2.0%	97.8%
Walking	45-64	Women	31.2%	68.7%
		Men	32.4%	67.4%
	65-85	Women	36.8%	62.9%
		Men	30.0%	69.8%
Light sports or recreational activities	45-64	Women	89.8%	10.2%
		Men	90.4%	9.5%
	65-85	Women	90.2%	9.7%
		Men	89.2%	10.8%
Moderate sports or recreational activities	45-64	Women	94.6%	5.3%
		Men	94.9%	5.1%
	65-85	Women	96.0%	3.9%
		Men	94.2%	5.7%
Strenuous sports or recreational activities	45-64	Women	80.8%	19.2%
		Men	76.1%	23.8%
	65-85	Women	88.4%	11.5%
		Men	84.2%	15.8%
Exercise to increase muscular strength and endurance	45-64	Women	81.7%	18.2%
		Men	80.4%	19.5%
	65-85	Women	83.7%	16.1%
		Men	78.6%	21.4%

TABLE 5 SLEEP HABITS STRATIFIED BY AGE AND SEX

	Women#		Men#	
	45-64 n=9014	65-85 n=6306	45-64 n=8437	65-85 n =6340
Frequency sleep is restless %				
All the time (5-7 days)	17.7	15.7	12.8	12.5
Occasionally (3-4 days)	21.7	20.1	18.8	17.5
Some of the time (1-2 days)	28.6	28.6	28.4	25.0
Rarely or never (less than 1 day)	31.8	35.3	39.7	44.7
Current sleep pattern satisfaction %				
Very satisfied	17.9	20.1	17.3	24.0
Satisfied	37.2	39.4	41.4	43.6
Neutral	14.6	14.5	16.9	13.3
Dissatisfied	24.9	21.0	20.6	16.3
Very dissatisfied	5.3	4.9	3.8	2.6
Frequency of taking over 30 min to fall asleep in past month %				
Never	41.6	39.0	50.1	55.5
≤ 1 a week	26.7	26.0	26.1	24.7
1-2 times a week	12.9	14.5	11.3	8.8
3-5 times a week	9.2	8.9	6.3	5.1
6-7 times a week	9.6	11.1	6.0	5.7
Frequency of difficulty to fall asleep again in past month %				
Never	28.3	32.5	33.5	39.7
≤ 1 a week	26.9	26.9	29.2	26.7
1-2 times a week	17.6	15.3	16.0	13.8
3-5 times a week	13.9	12.8	11.6	8.8
6-7 times a week	13.4	12.3	9.5	10.8
Ever experienced recurrent need/urge to move legs while sitting/lying down %				
Yes	35.9	38.4	28.5	31.0
No	64.0	61.3	71.3	68.7

#Numbers of respondents include participants who either responded, "Don't know/no answer" or "Refused to respond".

TABLE 6 SMOKING HABITS AND ALCOHOL CONSUMPTION STRATIFIED BY AGE AND SEX

	Women#		**Men#**	
	45-64 n=15 406	65-85 n=10749	45-64 n=14 441	65-85 n =10 742
Lifelong smoking habits (%)				
Never smoked a whole cigarette	33.7%	37.5%	29.9%	21.3%
Smoked <100 cigarettes in life	49.0%	53.0%	47.9%	34.5%
Ever smoked on a daily basis	46.2%	42.2%	47.4%	60.7%
Current smoking habits* (%)				
Current smokers (%)	15.8%	9.1%	14.6%	6.1%
Smoke occasionally	3.1%	1.7%	3.6%	1.1%
Non smokers	80.7%	88.9%	81.6%	92.6%
Frequency of alcohol consumption in past 12 months (%)				
Never	12.8	19.4	11.4	14.4
≤ 1 time a month	24.9	28.2	16.0	15.5
2 to 4 times a month	24.0	18.2	22.8	17.1
2 to 5 times a week	29.0	19.4	35.9	25.5
Almost every day	9.3	14.7	13.9	27.5
Frequency of heavy drinking (%)**				
Never	56.0	79.4	46.8	68.6
≤ 1 time a month	32.7	15.0	35.8	21.6
2 to 4 times a month	6.0	2.3	10.2	4.8
2 to 5 times a week	1.8	0.7	3.7	2.0
Almost every day	0.5	0.3	0.9	1.0

#Numbers of respondents include participants who either responded, “Don’t know/no answer” or “Refused to respond”.

**Current smoking habits were assessed based on the past 30 days. Occasionally=at least one cigarette in the last 30 days; Non-smokers= did not smoke at all in the last 30 days.*

***Consumption >4 drinks in a sitting.*

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11

Transportation Mobility

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Transportation Mobility

Key Insights

Having access to safe and reliable transportation is important for all Canadians. Being able to move around one's community enables engagement in everyday activities that promote economic as well as social participation. Many factors can influence the types of transportation that are used and the frequency with which it is accessed. The purpose of this chapter is to describe the transportation mobility of Canadians aged 45 and older using the CLSA sample.

- Driving a motor vehicle is the most common form of transportation used regardless of age, sex, geographic location, health and functional status
- The majority of Canadians report having a valid driver's license, but the proportion decreases with age, particularly among women
- Women over the age of 75 drive their own vehicle less often, but use all other forms of transportation more
- Of those who reported having a license, most used their vehicle more than four times per week; although women reported a lower frequency of driving than men
- The majority of current drivers are male and live in rural areas.
- Those who live in rural areas more often rely on driving as their main form of transportation and use all other forms of transit less
- Specialized accessible transit is seldom identified as a means of transportation, even among persons with poor health and limitations to activities of daily living; women aged 75 and older in poor health are the main users of this form of transportation
- Driving is the primary mode of transportation among those with limitations to activities of daily living, although the proportion is lower for older age groups.

Introduction

Driving is the most common and preferred mode of transportation among adults living in westernized nations, including Canada[1]. For many individuals, particularly those who are older, access to a private automobile and a driver's license has been linked to higher rates of social participation and community engagement[1]. However, with age, there is greater likelihood of experiencing health-related changes and functional limitations that can negatively affect the ability to drive. Individuals aged 65 and older are the fastest growing segment of Canada's driving population; a trend that raises a significant public health issue. Drivers aged 70 and older are more likely to be involved in multi-vehicle collisions relative to younger drivers, and because they are frailer, the severity of their injuries and fatality rates are disproportionately higher[2,3].

Concerns for public safety and efforts to restrict older drivers must be considered in relation to the personal impact of license forfeiture on their mobility and independence. Loss of licensure, whether voluntary or otherwise, has been associated with many negative outcomes, including reduced out-of-home activity levels[4], decreased health status[5,6], higher rates of depression[7], institutionalization (e.g., long term care admissions)[8], and even death[6]. Moreover, Canadian seniors living in rural or suburban areas may be more likely to experience these adverse outcomes given the lack of mobility alternatives beyond driving[8]. Hence, access to viable, accessible, and flexible transportation options is critical to ensure ongoing and meaningful participation in one's community.

A 2012 report published by Statistics Canada on the transportation habits of Canadian seniors' analyzed data of those aged 45 and older using the 2008-9 Canadian Community Health Survey – Healthy Aging (CCHS)[1]. Findings from this report highlighted the popularity of the automobile as the main mode of transit where only a minority reported using other forms of transportation. Given the Statistics Canada report was based on data from nearly 10 years ago, there is a need for a more complete and up-to-date analysis of the types of transportation used by Canadians for two primary reasons. First, it is important to consider that the current generation of older drivers (i.e., baby-boomers) grew up with driving as their main form of transportation and, as such, may have different attitudes and experiences compared to older cohorts. For example, there are more female drivers now than in prior Canadian cohorts[1]. Second, there has been increasing efforts over the past decade to improve senior mobility and transportation systems, which can also influence mobility patterns[9]. Hence, understanding the types of transportation used in middle to late adulthood is critical with regard to identifying both similarities and differences with respect to age, sex, and geographic location. Analyzing use of various transit options in relation to health and functional status is also important to further understand how Canadians of differing abilities move around their community. Such analysis is only possible because of the Canadian Longitudinal Study on Aging (CLSA), which is the largest and most comprehensive dataset to include detailed measures of transportation alongside many other factors that can track individuals across time. The purpose of this chapter is to provide a general overview of the transportation mobility of Canadians aged 45 and older using the CLSA sample.

Measures

AN OVERVIEW OF THE TRANSPORTATION, MOBILITY, MIGRATION MODULE IN THE CLSA

As part of its 'transportation, mobility, migration' module administered as part of the Maintaining Contact Interview for both the Tracking and Comprehensive Cohorts (N=47,841) collected over the telephone, the CLSA includes questions specific to driving status and public transit use. The transportation module was updated after the start of data collection with new questions on public driving frequency (N=40,072), and common modes of transportation (N=42,473). The combined Comprehensive (Version 2.1) and Tracking (Version 3.2) were used for these analyses.

If participants indicate they have a valid license, they are asked if they had ever spoken to their family doctor or other healthcare professional about their driving, and, if so, to share the reasons the topic had been raised. A series of questions also explored their perceived driving abilities as compared to 10 years ago. Individuals with a driver's license were also asked to indicate if there were particular driving situations they try to avoid (situational avoidance), such as bad weather or heavy traffic. These questions (i.e., perceived driving abilities, situational avoidance) have demonstrated good test-retest reliability in studies with multiple samples[10,11]. CLSA participants who indicated they no longer had a license were asked to identify the factors and events that had led them to stop driving.

Approximately 93% of CLSA participants completed the Maintaining Contact Questionnaire with the transportation module. Participants who completed a different questionnaire and non-respondents for each item are excluded from data summaries presented in this chapter. All summaries use weighted data to extrapolate results from the module to the transportation mobility of the Canadian population. The analyses presented in this chapter are exploratory and, as such, a descriptive approach was utilized. First, the CLSA sample was categorized into three main groups: 1) never drove, 2) former drivers, and 3) current drivers. From these groups, participants' use of transportation was compared with respect to age, sex, where they live (urban, rural, province), perceived health, and functional status. Participants were classified as urban or rural-dwelling using postal code data, as defined by Statistics Canada's Population Centre and Rural Area Classification 2016[12]). Perceived health was based on a self-reported, 5-point scale where participants rated their current health status (excellent, very good, good, fair, poor). Functional status was defined as a binary variable (yes/no), which indicated whether participants had a limitation in their basic activities of daily living (BADL) or instrumental activities of daily living (IADL) using the Older Americans Resources and Services (OARS) Multidimensional Assessment Questionnaire[13]. The OARS scale has been found to be highly correlated with measures of self-care capacity as determined by a clinician (Pearson r = 0.89)[13].

Results

MOST CANADIANS AGED 45 AND OLDER HAVE A DRIVER'S LICENSE AND USE A CAR FREQUENTLY

Across age groups, the majority of Canadians report having a valid driver's license (94.7%). Men (96.8%) more often report having a license than women (92.6%). Among those aged 45-54, men and women are almost equal when it comes to having a license (97.3% vs. 96.3%). However, at higher ages, this sex difference is greater, with the largest gap among those aged 75 and older, where 94.1% of men have a driver's license, as compared to 78.0% of women. Across all provinces, the majority of Canadians are current drivers. Alberta had the highest percentage (96.6%) while Quebec and Newfoundland had the lowest (93.2%). A higher percentage of Canadians who live in rural areas reported having a license (97.2%) compared to those in urban areas (94.0%). Using population partitions, those who least often reported having a valid driver's licence were older women living in urban areas (Figure 1).

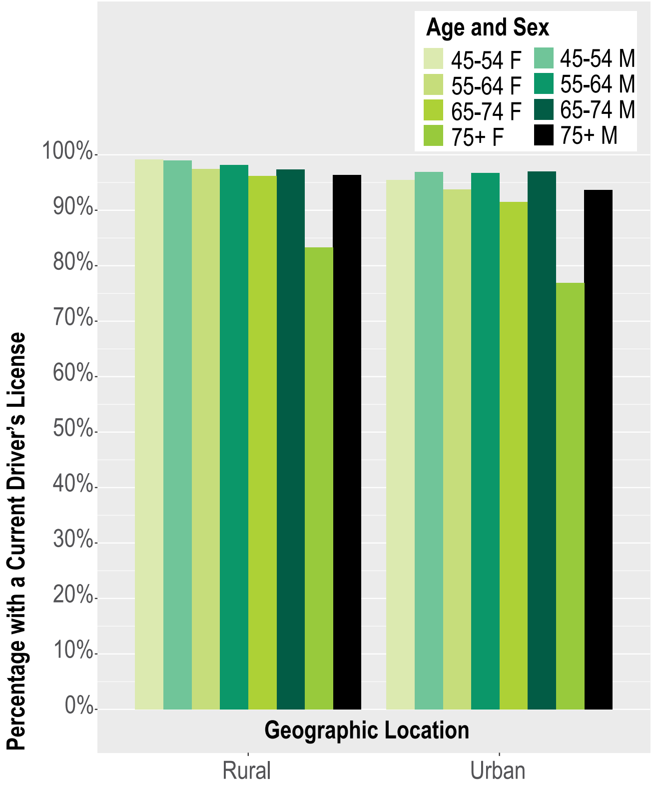

Figure 1 – Canadians with a current driver's license by sex, geographic location, and age group

Approximately 2.0% of Canadians reported they never had a license, of which 78.3% are women. This sex difference was also greater across age groups; with 5.8% of women aged 75 and older reporting they never had a license, as compared to only 0.2% of men in this same age group. Of those in the CLSA sample that reported being former drivers, there is a higher proportion of women (4.3%) than men (2.3%), which was also greater in older age groups. The largest difference was among those aged 75 and older where 5.7% of men as compared to 16.2% of women reported no longer having a license. Not surprisingly, a higher proportion of Canadians who are non-drivers (88.9%) or former drivers (88.8%) live in urban areas. When examined by province, New Brunswick (3.0%) and Newfoundland (3.7%) had the highest percentage of non-drivers and British Columbia has the lowest (1.2%). Quebec has the highest percentage of former drivers (4.0%) while Alberta (2.1%) and Nova Scotia (2.2%) had the lowest.

Among those who indicated having a driver's license and reported their driving frequency (N=40,072), 84.5% of Canadians reported using their vehicle at least four times per week. A lower proportion of women (80.2%) than men (88.8%) reported being frequent drivers (i.e., four or more times per week). This was true across all age groups, with the largest difference found between men (84.2%) and women (68.0%) aged 75 and older who use their vehicle at least 4 times a week. When frequency of driving was compared between urban and rural areas across age groups, more men and women who live in urban areas reported driving 4 or more times a week with the exception of those aged 45-54. In this age group, there is a higher percentage of men (96.0%) and women (87.7%) who live in rural areas who drive more frequently than their urban-dwelling peers (i.e., 88.2% of men and 85.9% of women aged 45-54 who live in urban areas report driving 4 or more times per week). (Figure 2)

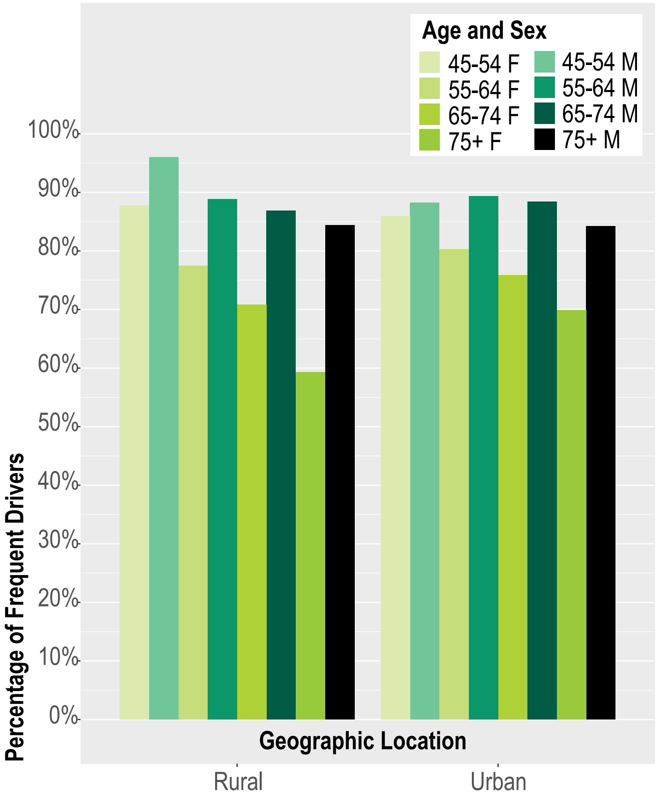

Figure 2 – Percentage of licensed drivers who drive more than four times per week stratified by sex, geographic location, and age group

Among those with a valid license, there is a small percentage of individuals who indicated not driving at all (1.6%), most of whom lived in urban areas (85.1%). Across all age groups and in both urban and rural areas, a higher proportion of women than men reported having a license, but not driving at all. In the youngest age group (aged 45-54) living in rural areas a similar proportion of men and women with a license (0.3% vs. 0.4%) reported not driving at all, while women more often reported that they drive less than 4 times per week (11.9% vs. 3.5%).

ACROSS ALL PROVINCES, DRIVING A VEHICLE IS THE MOST COMMON FORM OF TRANSPORTATION USED BY CANADIANS AGED 45 AND OLDER

Driving a vehicle was the most common mode of transportation reported (82.6%), followed by being a passenger in a vehicle (7.3%), walking/bicycling (4.9%) and public transit (4.2%) (Table 1). Taxi, specialized accessible transit, and wheelchair/scooter are used by less than 1% of Canadians. For the 45-54 age group, the percentage of men and women who report driving a vehicle as their most common mode of transportation is nearly equal (85.7% vs. 85.0%). However, with age, this sex disparity is greater, with the largest difference among those aged 75+ (men: 86.0% vs. women: 62.2%). Of those who reported being a passenger as their main form of transportation, higher percentages are women (78.9%). Among the youngest group (aged 45-54), only 3.3% identified being a passenger as their main form of transportation when compared 15.9% aged 75+. Newfoundland had the highest percentage of those who reported being a passenger (12.6%) and British Columbia had the lowest (5.3%).

When comparing those who live in rural and urban areas, a higher percentage of Canadians from rural areas report driving a vehicle than their urban counterparts. However, with higher age, a lower proportion of Canadians who live in rural areas report driving, and the difference between sexes is greater. For example, at age 75+, 91.9% of men living in rural areas as compared to 61.1% of women identified driving as their primary mode of transportation (Figure 3). Alberta had the highest percentage of those who identified driving as their main form of transportation (86.9%), whereas in British Columbia this percentage was lowest (80.0%).

TABLE 1 MAIN FORM OF TRANSPORTATION BY AGE, SEX, GEOGRAPHIC REGION, AND PROVINCE

	Driving own vehicle	Passenger in a vehicle	Public transit	Taxi	Access-ible transit	Walk or Bicycle	Wheel-chair or Scooter
	Percentage						
Overall	82.6	7.3	4.2	0.4	0.4	4.9	0.2
Sex							
Male	87.0	3.1	4.0	0.2	0.2	5.3	0.2
Female	78.4	11.2	4.4	0.5	0.6	4.5	0.2
Age Group - Men							
45-54	85.7	2.1	5.2	0.2	0.1	6.6	0.1
55-64	88.6	2.1	3.3	0.3	0.2	5.2	0.4
65-74	87.9	4.7	3.1	0.1	0.3	3.8	0.1
75+	86.0	7.9	2.6	0.3	0.5	2.4	0.3
Age Group - Women							
45-54	85.0	4.6	4.1	0.4	0.2	5.7	0.1
55-64	79.2	11.3	5.0	0.3	0.5	3.5	0.2
65-74	74.1	17.9	3.3	0.2	0.8	3.6	0.2
75+	62.2	22.1	5.8	2.1	2.1	4.9	0.7
Region							
Rural	88.2	9.1	0.6	0.1	0.1	1.7	0.1
Urban	81.1	6.7	5.2	0.4	0.5	5.8	0.2
Province							
Newfoundland	83.8	12.6	0.7	0.4	0.1	2.3	0.0
PEI	86.5	8.9	0.2	0.6	0.2	3.1	0.4
Nova Scotia	85.0	9.2	2.3	0.1	0.2	3.0	0.2
New Brunswick	83.2	10.9	1.9	1.0	0.0	2.8	0.2
Quebec	83.9	7.0	4.6	0.4	0.7	3.2	0.2
Ontario	81.2	8.0	4.7	0.5	0.5	5.0	0.2
Manitoba	82.8	6.2	5.2	0.1	0.3	5.2	0.2
Saskatchewan	85.5	7.7	1.3	0.2	0.4	4.5	0.3
Alberta	86.9	6.0	2.9	0.2	0.2	3.6	0.1
British Columbia	80.0	5.3	4.5	0.1	0.2	9.3	0.4

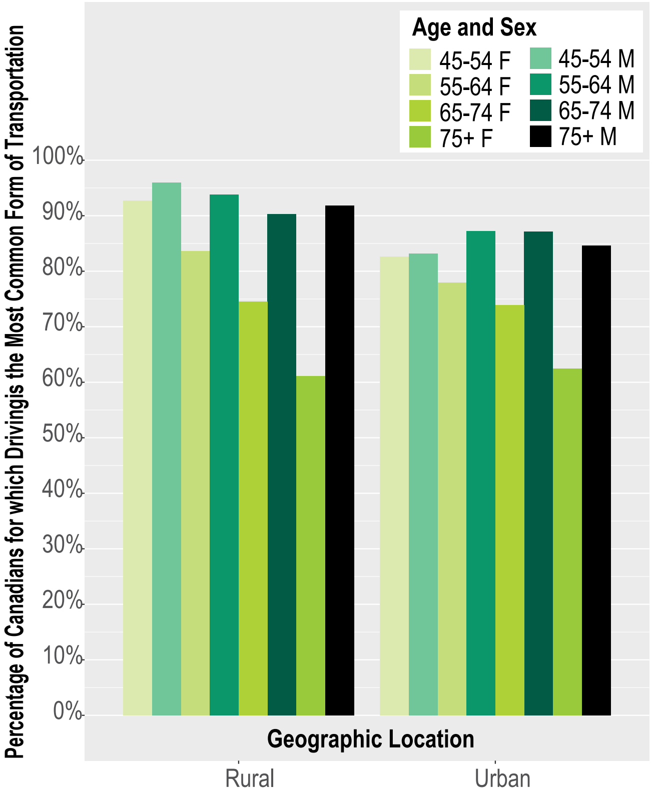

Figure 3 – Percentage of Canadians for whom driving is the most common form of transportation stratified by geographic location, age, and sex

USE AND FREQUENCY OF ACCESSING OTHER FORMS OF TRANSPORTATION BEYOND THE AUTOMOBILE VARY BY AGE AND SEX AMONG CANADIANS AGED 45 AND OLDER

Beyond driving or being a passenger in a private vehicle, a higher percentage of women than men identified relying on other types of transportation, with the exception of walking/bicycling. There are slightly more men (5.3%) than women (4.5%) who reported walking or cycling as their primary mode of transportation. The percentage of those who walk or cycle is less in older age groups. A slightly higher proportion of men report using this mode of transportation across most age groups, except in the oldest group, where more women aged 75+ (4.9%) then men (2.4%) primarily walk or cycle.

The percentage of those who use public transit as their primary mode of transportation is less than 5% across all age groups. Women reported using public transit slightly more often. Of those who reported public transit as their primary mode of transportation, 53.7% were women. Not surprisingly, the vast majority of those who report using public transit live in urban areas (97.2 %). Among Canadians aged 75+, more women (5.8%) reported using public transit as their primary mode of transportation compared to men (2.6%) (Figure 4).

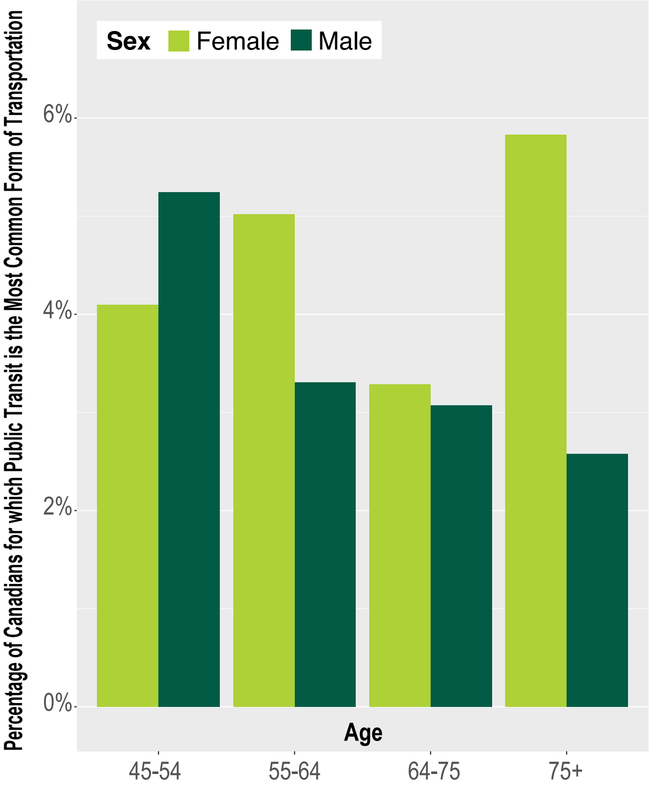

Figure 4 – Percentage of Canadians for whom public transit is the most common form of transportation stratified by age and sex

Across all Canadians, the majority (79.1%) indicated using public transit less than once per week. Among those who reported using public transit at least once per week (20.9%), those in younger age groups had more frequent use. In the youngest age group (45-54 years), a higher proportion of men (6.1%) compared to women (4.8%) used public transit at least four times per week. Conversely, among those aged 65 and over, a higher proportion of women (2.5%) were frequent users of public transit compared to men in this age group (1.8%).

HEALTH, FUNCTIONAL STATUS, & TRANSPORTATION MOBILITY AMONG CANADIANS AGED 45 AND OLDER

Few Canadians with a valid license rated their health as fair or poor (10.0%) compared to former drivers (28.4%) and those who never drove (23.1%). Of those who are former drivers, a higher proportion of men perceive their health as poor (32.8%) (Figure 5).

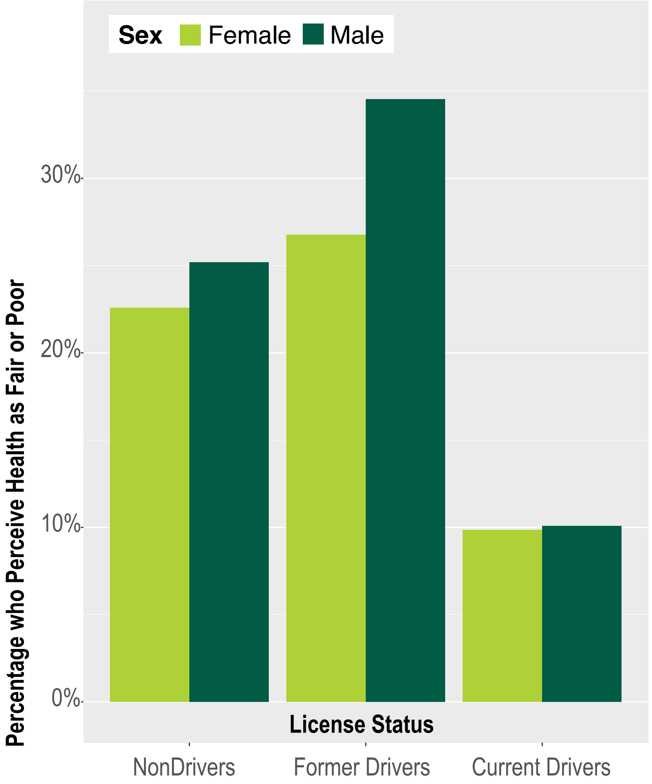

Figure 5 – Percentage of Canadians who perceive their health as fair or poor stratified by license status and sex

Of those who reported driving a vehicle as their main form of transportation, the majority rated their health as good to excellent (90.6%) as compared to poor/fair (9.4%). A small proportion of Canadians who identified walking (8.8%) or cycling (4.6%) as their main form of transportation rated their health as poor/fair. Among those who relied on other forms of transit, a larger percentage rated their health as poor/fair, including taxis (38.7%), passenger in a motor vehicle (21.4%), a wheelchair or scooter (26.0%), or accessible transit (50.6%).

As outlined in Chapter 8, a small proportion of Canadians reported limitations in their ability to perform basic or instrumental activities of daily living (BADL/IADL). Of those who reported BADL/IADL limitations, a lower percentage (80.4%) indicated they were current drivers as compared to those without such limitations (96.2%) and this pattern is consistent across age and sex (Figure 6).

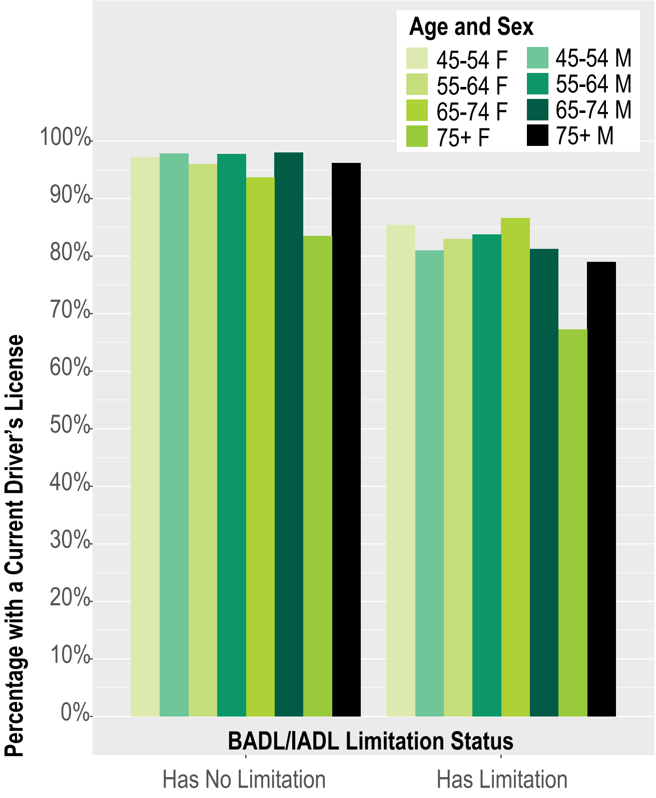

Figure 6 – Percentage of Canadians with a current driver's license stratified by BADL/IADL limitation, age, and sex

The proportion of those who reported having a BADL/IADL limitation who had a license and drove frequently (i.e., at least 4 times per week) was lower (68.8%) than those with no such limitations (85.8%). A higher percentage of men who reported having such problems and drove frequently (75.3%) as compared to women (66.4%). This sex difference increased with age among those with BADL/IADL limitations and who reported driving frequently, with the largest difference noted at age 75+ (men: 78.3% vs. women:59.5%).

TABLE 2 TYPES OF TRANSPORTATION USED BY THOSE WITH BADL/IADL LIMITATIONS BY AGE AND SEX

	Driving own vehicle	Passenger in a vehicle	Public transit	Taxi	Accessible transit	Walk or Bicycle	Wheel-chair or Scooter
				Percentage			
BADL/IADL Limitation	**61.8**	**21.6**	**5.4**	**2.0**	**4.0**	**3.9**	**1.4**
Sex							
Male	66.0	15.5	5.4	1.7	3.2	6.1	2.2
Female	60.3	23.8	5.4	2.0	4.3	3.2	1.1
Age Group - Men							
45-54	64.3	17.5	7.6	1.3	1.3	7.4	0.7
55-64	61.4	10.1	6.9	3.7	4.1	8.5	5.3
65-74	71.5	16.0	2.9	0.4	3.4	5.6	0.2
75+	69.3	20.4	2.9	0.5	4.1	1.5	1.4
Age Group - Women							
45-54	70.5	17.4	4.0	1.2	2.2	4.0	0.7
55-64	59.9	20.3	8.7	1.6	4.6	3.7	1.2
65-74	64.8	23.3	3.7	0.9	4.7	1.6	1.0
75+	49.5	32.3	4.6	4.0	5.3	3.1	1.3

Similar to the patterns observed with health status, a higher percentage of those who had no BADL/IADL limitations identified driving a vehicle as their primary form of transportation (84.8%) compared to those with limitations (61.8%). Canadians with BADL/IADL limitations more often reported being a passenger, using a taxi, accessible transit, or scooter/wheelchair (Table 2). For those who reported no BADL/IADL limitations, a slightly higher percentage identified walking and cycling (5.0%) as their primary form of transportation than those who had such problems (3.9%). When examining mode of transportation with age, sex, and BADL/IADL limitation, women with at least one BADL/IADL limitation more often reported being a passenger and less often reported driving their own vehicle in higher age groups (Figure 7). Men with a BADL/IADL limitation relied on other forms of transportation besides driving less often than women, which was found across all age groups (Figure 7).

Analysis of the frequency of using public transit based on BADL/IADL limitation suggests those who report BADL/IADL limitations use this mode of transportation use this mode of transportation less frequently. This was true across all sex and age groups examined.

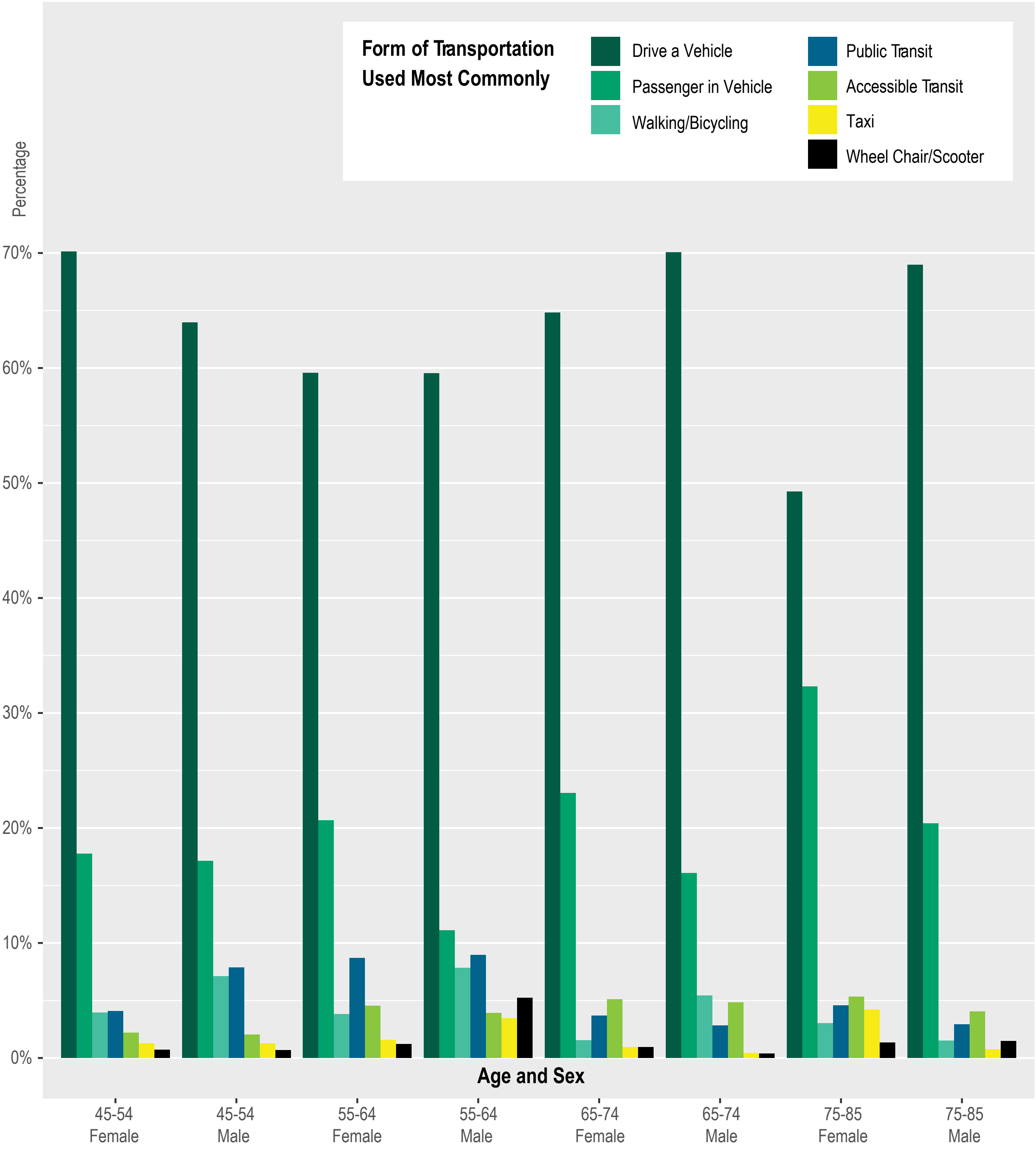

Figure 7 – Forms of transportation used most commonly by Canadians with a BADL/IADL limitation stratified by age and sex

Discussion

This chapter describes the types of transportation that are used by Canadians aged 45 years and older by age, sex, geographic location (urban, rural, province), perceived health, as well as BADL/IADL limitations. Based on our analysis, the vast majority of Canadians report having a driver's license. However, with higher age, the percentage of those who have a license is lower and the gap between men and women who hold a license is greater (see Figure 1). In a 2012 report on the transportation habits of Canadian seniors published by Statistics Canada, Turcotte[1] prognosticated this sex difference would decrease given that almost as many women as men had a license in younger age groups based on analysis from the 2009-2010 CCHS-Healthy Aging data. Our current examination of the CLSA data suggests this sex difference persists, although this result may still be due to a cohort effect where in previous generations women drove less often than younger women do today[1]. Future analysis using the CLSA dataset will be able to track if such sex differences will dissipate, as predicted. As well, women with a license may also report driving less frequently or report being a passenger more, if they have a husband or partner who drives. Given the comprehensive scope of this dataset, it will also be possible to consider how other factors, such as education, occupation, and household status might serve as comparators when examining the types of transportation used by Canadians.

Given the reliance on driving a vehicle as the primary mode of transportation, public transit continues to be used by only a minority of Canadians. This number remained relatively steady across age groups. Not surprisingly, use of public transit was much higher in urban than rural areas, but even in urban areas it is used by a relatively small percentage of individuals. Among older age groups (i.e., aged 65+), women more often reported using public transportation than their male counterparts. However, the rate of using this form of transportation remains very low for both men and women in the older age groups. Not surprisingly, those who identify driving a vehicle as their primary mode of transportation perceive their health and BADL/IADL status to be higher compared to those who use other forms of transit. Among those with BADL/IADL limitations, being a passenger in a vehicle is by far the most common form of transportation, and this increases with higher age. This finding contrasts with the low frequency of using specialized accessible transport in those with BADL/IADL limitations, which raise concerns about the availability of this form of transportation as well as other alternatives beyond the private automobile.

With the CLSA, there is an opportunity to track measures from the CLSA 'transportation, mobility, migration' module alongside changes in other areas of health and everyday function, such as cognition (see Chapter 9 on Psychological Health) or other emerging public health issues, such as cannabis, to understand trajectories based on age. Currently, an investigation is underway to explore the relationship between driving and other transit options on social participation in older adulthood. This project has been funded by the Canadian Institutes for Health Research (CIHR).

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12

Lesbian, Gay, and Bisexual (LGB) Aging

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Lesbian, Gay, and Bisexual (LGB) Aging

Key Insights

The purpose of this analysis was to explore the characteristics, social environments, care relationships, and health characteristics of participants in the baseline CLSA who self-identified as lesbian, gay, or bisexual (LGB).

Analyses show that:

- At baseline, 1,057 participants (i.e., 2%) within the CLSA self-identified as lesbian, gay, or bisexual (LGB).
- Relative to heterosexual participants, LGB participants were younger and reported higher levels of education.
- LGB participants commonly reported residing in an urban environment.
- LGB participants were less likely to report being married relative to heterosexual participants and more likely to report being single, having never married or lived with a partner.
- A greater proportion of LGB participants reported living alone relative to heterosexual participants. For example, 46.1% of gay and bisexual males reported living alone in comparison to only 15.7% of heterosexual males.
- LGB participants were more likely to report feeling lonely at least some of the time.
- Scores from the MOS Social Support Survey (i.e., a composite measure of social support) indicated that gay and bisexual male participants reported the lowest levels of social support and lesbian and bisexual female participants reported the highest.

- LGB participants were active participants in their communities, yet approximately half of LGB participants also reported a desire to participate in more social, recreational, and group activities.
- In comparison to heterosexual participants of the same sex, LGB participants were more likely to be involved in the provision of care. Approximately half (i.e., 49.8%) of lesbian and bisexual females and 46.4% of gay and bisexual males reported providing care in the last 12 months (compared to 48.2% of heterosexual females and 40.4% of heterosexual males).
- The vast majority of LGB participants reported at least one chronic disease (i.e., 89.5% of lesbian and bisexual females and 83.3% of gay and bisexual males).
- LGB participants tended to report high self-rated general and mental health, and tended to report their healthy aging experience as either excellent or very good.

Introduction

Individuals who identify as lesbian, gay, bisexual, trans, queer, and two-spirit (LGBTQ2) in Canada constitute a diverse community. This is true for those who are aging within the LGBTQ2 community, and yet their aging experiences are often less understood or captured in research. The social determinants of health have been identified as key factors in order to understand the experience of aging and to facilitate healthy aging[1]. Sexual orientation, age, and gender are three social determinants of health[2,3] that are particularly relevant when exploring the experiences of aging for members of the LGBTQ2 community.

At that outset of the CLSA, the Social Working Group, one of six expert teams that develop scientific content for the CLSA, recognized the importance of sexual orientation in the aging process. In the baseline wave of data collection, the CLSA included a question on sexual orientation, allowing for analyses that focus on lesbian, gay, and bisexual individuals (See Textbox 1). When planning for the first follow-up of CLSA the Social Working Group recommended that an item on gender (i.e., socially constructed roles, behaviours, expressions and identities of girls, women, boys, men, and gender diverse people)[4] be added to the questionnaire. This item asks participants about their gender identity, or inner sense of oneself of being male or female, which can be different from sex at birth and can change over time. This also enables the representation of participants as transgender, genderqueer, or other gender identities, which will allow the exploration of gender identity in the context of health patterns, trajectories, and needs of aging Canadians. These data will be available with the release of Follow-up 1 data.

Textbox 1

The CLSA asked participants if they are:

● **Heterosexual?**	(sexual relations with people of the opposite sex);
● **Homosexual,**	that is lesbian or gay? (sexual relations with people of your own sex); or
● **Bisexual?**	(sexual relations with people of both sexes)

The unique social and historical contexts of older lesbian, gay, and bisexual Canadians are also an important consideration in understanding their current aging experience. In November 2017, the Prime Minister of Canada delivered an apology for the historical injustices that members of the LGBTQ2 community encountered, including systemic discrimination against sexual minorities who were employed by the Federal Government and Canadian military.† This is just one example of the historical experiences of discrimination faced by members of the this population, who were adults in an era when homosexuality was seen as a mental illness and criminal offence that necessitated treatment or conversion[5], and when same sex marriage was not legal[6].

Textbox 2

Homophobia can be defined as the “fear and/or hatred of homosexuality in others, often exhibited by prejudice, discrimination, intimidation, or acts of violence” [7].

In addition to discriminatory policies and laws, many individuals who are part of the aging LGBTQ2 community report experiences of homophobia (see Textbox 2) and discrimination[8–10]. The detrimental impacts of homophobia and discrimination are well documented, and include negative impacts on mental health and well-being[9]. These social and historical contexts of aging, along with personal histories of discrimination, manifest in unique and sometimes adverse experiences of aging for members of the LGBTQ2 community[11]. Fears related to personal safety and discrimination with the care system have been well documented and are particularly salient in the context of long-term care (e.g. Wilson et al., 2018) and while accessing health and social care services[12]. Conversely, research also highlights that these same personal histories of discrimination may actually prepare LGBTQ2 for aging more so than their non-sexual minority peers, in that they have “fought through life, forged their own paths, and formed their own communities”[13].

The CLSA provides a unique platform from which to examine trajectories of health and well-being in relation to age, sex, gender identification, sexual orientation, and psychosocial determinants. Additionally, over time, these data will allow us to examine differences in the aging experiences of individuals who identify as sexual and gender minorities relative to majority populations as well as differences within the minority subpopulations within the CLSA. At baseline, CLSA participants were asked to self-report their sex (i.e., female or male) and their sexual orientation (i.e., heterosexual, homosexual, and bisexual). This chapter provides an overview of participants in the CLSA who identify as lesbian, gay, or bisexual (LGB) (relative to heterosexual peers of the same sex) and offers a closer look at the health, well-being, and social networks of LGB participants based on the first wave of data collection.

Measures

This analysis is based on self-report data from the pooled baseline sample of the CLSA (Tracking version 3.2 and Comprehensive version 3.1). At baseline, all CLSA participants were asked to report their sex (i.e., male or female), their sexual orientation (i.e. heterosexual, homosexual, or bisexual), and a variety of demographic characteristics (e.g., levels of education, total household income, location of residence, marital status, living arrangements, home ownership, etc.). To reflect the language that was used in the collec-

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† https://pm.gc.ca/eng/video/2017/11/28/prime-minister-delivers-apology-lgbtq2-canadians?utm_source=pm_eng&utm_medium=carousel_Can_ca&utm_campaign=LGBTQ2apology

tion of these data, we report participants' sex as either male or female. We present the proportion of participants who reported no other individuals residing with them as a measure of living alone. Participants completed a module on caregiving that asked them about the types of assistance they may have provided to other people, allowing us to examine the types of care and the nature of the relationship between the care recipient and the care giver. Here, we present the types of care assistance participants reported as well as the nature of the relationship between the care recipient and the care provider (e.g., parent, spouse, neighbour, etc.).

As part of the module on social participation, participants were asked about the types and frequency of community-related activities in which they engage. Participants were also asked whether they would like to participate in more social, recreational, and group activities and given the response options of "yes" or "no". We report frequency of social participation (i.e., greater than once a week), collapsed across all activity types, as well as the proportion of individuals who reported a desire to participate in more activities. In addition, the MOS (Medical Outcome Study) Social Support Survey Scale was analyzed[14]. The scale consists of 19 items capturing the social support elements of emotional/informational support, affection support, tangible support, and positive social interaction. Response options for each item ranges from 1 (none of the time) to 5 (all of the time). For this analysis, we analyzed the total MOS Social Support score where higher values indicate higher levels of total social support.

Participants were asked to self-report whether they had been diagnosed with any long-term medical conditions; if they responded in the affirmative, they were flagged as having at least one chronic condition. We report the proportion of participants who reported at least one chronic disease. Based on participants' self-reported height and weight, their body mass index (BMI) was calculated and categorized as underweight (less than 18.5) normal (18.5 - 24.9), overweight (25.0 - 29.9), obese class I (30.0 to 34.9), obese class II (35.0 to 39.9) and obese class III (40.0 or more)[15]. We report the proportion of individuals classified as obese class I or greater. Participants were asked to rate their health, their mental health, and their own healthy aging as "excellent", "very good", "good", "fair", or "poor"; we report the proportion who responded "excellent" and "very good".

Characteristics

Within the pooled CLSA baseline sample of 51,338 Canadians aged 45-85 years (i.e., Tracking and Comprehensive cohorts combined), 1,057 participants (i.e., 2%) self-identified as lesbian, gay, or bisexual (LGB)[‡]. Within the subpopulation of LGB participants, 62% self-identified as male and gay (n=528) or bisexual (n=131) and 38% self-identified as female and lesbian (n=275) or bisexual (n=123). Table 1 shows a summary of characteristics separated by sex (i.e., male and female) and sexual orientation (heterosexual and homosexual/bisexual).

A comparison of characteristics indicates that sexual minorities within the study are younger than heterosexual peers with 40% of lesbian and bisexual females and 35.7% of gay and bisexual males being in the 45-54 age bracket (compared to 26.3% of heterosexual females and 25.5% of heterosexual males being in the same age bracket). Compared with heterosexual peers, male and female sexual minorities were more educated with 80.2% of lesbian and bisexual females and 79.2% of gay and bisexual males reporting the comple-

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‡ 130 participants did not disclose their sexual orientation.

tion of postsecondary diploma/degree (compared to 72.6% of heterosexual females and 75.3% of heterosexual males).

Compared to heterosexual females, a greater proportion of lesbian and bisexual females reported higher yearly household income brackets. In particular, 30.9% of lesbian and bisexual females (compared to 25.9% of heterosexual females) reported annual household incomes of at least $100,000. This pattern, however, was not observed among gay and bisexual males; 29.3% of gay and bisexual males reported an annual household income of at least $100,000 compared to 35.9% of heterosexual males. A lower proportion of sexual minority males and females reported being retired relative to their heterosexual peers of the same sex (i.e., 29.7% of lesbian and bisexual females and 35.7% of gay and bisexual males reported being completely retired).

Within the CLSA Baseline sample, the greatest proportion of lesbian and bisexual females reside in British Columbia (n=103, 25.9%) while the greatest proportion of gay and bisexual males reside on Ontario (n=163, 24.7%). In terms of place of residence, a greater proportion of sexual minorities than heterosexuals in the sample reported living in an urban environment. In particular, 89.1% of lesbian and bisexual females and 89.2% of gay and bisexual males reported living in an urban environment, compared to 84.9% of heterosexual females and males. Compared to heterosexual participants, a smaller proportion of sexual minorities reported owning their own home (i.e., 75.6% of lesbian and bisexual females and 71.1% of gay and bisexual males). Yet, the data indicate that LGB participants are satisfied with their housing; 96% of lesbian and sexual females and 94% of gay and bisexual males agreed or strongly agreed that they were satisfied with their current housing, values that closely align with heterosexual participants (i.e., 95.4% of heterosexual females and 96.3% of heterosexual males agreed or strongly agreed with the statement).

Relationships & Social Environments

Historically, members of the LGBTQ2 community have established rich social networks that involve relationships with individuals who are not associated with families of origin (i.e., genetic relatedness) or legally recognized institutions (e.g., marriage)[16]. Within the queer literature, these relationships have been coined *families of choice*[17]. Similarly, many LGBTQ2 individuals have historically been active in their communities and involved in advocating for the rights of their community members. The CLSA collects data on social relationships relevant to aging LGB individuals. In particular, participants are asked about their marital status, household composition, levels of social support, and social participation.

With respect to relationship status, fewer LGB participants reported being married relative to heterosexual participants (see Table 2). In particular, among lesbian and bisexual females, 57.3% reported being married/common law and 24.6% reported being single (i.e., never married or lived with a partner). Among gay and bisexual males, 40.5% reported being married/common law 43.1% reported being single. For comparison, 60.3% of heterosexual females and 78.7% of heterosexual males reported being married. Only 8.6% of heterosexual females and 6.9% of heterosexual males reported being single.

In terms of household composition, 31.5% of lesbian and bisexual females reported living alone as did almost half (i.e., 46.1%) of gay and bisexual males. These proportions are in stark contrast with heterosexual participants where 28.8% of heterosexual females and only 15.7% of heterosexual males live alone.

When participants were asked how often they feel lonely, 30% of lesbian and bisexual females and 32.9% of gay and bisexual males reported feeling lonely at least some of the time (compared to 27.5% of heterosexual females and 21.2% of heterosexual males). When considered alongside the data concerning household composition, these estimates suggest that aging sexual minorities who live alone may be at risk for social isolation, particularly as they experience age-associated changes in health that may limit mobility. As noted in Chapter 5 (Wister & Menec) although loneliness and social isolation can be related, within future research it will be important to consider both the objective measures of social isolation along with subjective experiences of loneliness over time in LGB participants.

Within the CLSA, participants were asked questions related to the presence of social support available to them through the 19-item MOS Social Support Survey [14], allowing researchers to measure differences in social support over time and among subpopulations within the sample. For a summary of the MOS Social Support Survey data from the full CLSA sample, please consult Chapter 5 (Wister & Menec). The MOS offers a composite score, capturing emotional/informational support, affection support, tangible support, and positive social interaction domains. Within the entire CLSA sample, MOS Total Scores ranged from zero to 100, with higher scores indicating more social support. When the Total MOS score was stratified by sex and sexual orientations, the estimates indicate that lesbian and bisexual females have slightly higher scores (mean=83.0, standard deviation=16.9) relative to heterosexual females (mean=81.7, standard deviation=17.0). Gay and bisexual males, however, had lower scores (mean=75.8, standard deviation=20.7) indicative of lower levels of social support relative to heterosexual males (mean=82.0, standard deviation=18.1).

The vast majority of LGB participants in the sample indicated they participate in their communities. Figure 1 shows the distribution of participation in community activities among LGB participants in the previous 12 months. These data show that over three quarters of sexual minority females (i.e., 82.9%) and sexual minority males (i.e., 76.8%) reported participating in a community-related activity at least once a week. When asked about participating socially, 50.4% of lesbian and bisexual females and 48.8% of gay and bisexual males indicated that they desired the opportunity to participate in more social, recreational, and group activities (compared to 45.8% of heterosexual females and 41.8% of heterosexual males).

Caregiving and Care Receiving

Given that, this analysis is based on the baseline wave of CLSA data collection and that over two thirds of LGB participants in the sample are between the ages of 45 and 64 years it is not overly surprising that few of them are receiving formal or informal care. Only 14.4% of LGB participants are receiving some form of care (i.e., informal care, formal care, or both), a proportion comparable to heterosexual participants (i.e., 14.3%).

Yet, LGB participants are active in the provision of care. Approximately half (i.e., 49.8%) of lesbian and bisexual females and 46.4% of gay and bisexual males reported providing care in the last 12 months (compared to 48.2% of heterosexual females and 40.4% of heterosexual males). Among the LGB participants who reported providing assistance (other than financial assistance), lesbian and bisexual caregivers were most frequently providing care to their female friend or neighbour (33.3%), their mother (24.1%), and their father (8.2%). Gay and bisexual males frequently reported providing care to their mother (29.6%), a male friend or neighbour (19.1%), or a female friend or neighbour (19.1%).

In terms of type of care provided, LGB participants were most active in providing transportation, providing assistance with activities, and meal preparation. While there are clear sex differences in the provision of care such that a greater proportion of lesbian and bisexual female participants consistently reported providing care than did gay and bisexual males, the magnitude of the sex differences observed among LGB participants is less than the magnitude of the sex difference among heterosexuals (see Figure 2).

Health

Members of marginalized populations often experience social and economic conditions that can negatively impact physical and emotional health[18]. As such, sexual orientation has been identified as an important social determinant of health[2].

Within the CLSA, participants are asked about their physical and mental health including whether they have been diagnosed with health conditions. These data show that 89.5% of lesbian and bisexual females and 83.3% of gay and bisexual males reported at least one chronic disease. In addition, based on participants' self-reported height and weight, 28.9% of lesbian and bisexual female participants and 24.3% of gay and bisexual males were classified as obese class I or greater (i.e., Body Mass Index of 30 or greater).

Despite the presence of health conditions and risk factors, LGB participants tended to report high self-rated general and mental health, and they tended to report their health experience as they age as either excellent or very good. Figure 3 shows LGB participants' self-rated health across age groups. Across all ages, 59.6% of LGB participants rated their general health as very good or excellent and 65.4% reported their mental health as very good or excellent. When asked to rate their own healthy aging, 59.4% of LGB participants rated it as either very good or excellent. Interestingly, while self-rated general health progressively decreases as we move to older age groups, self-rated mental health is highest among LGB participants aged 65-74 years and 75-85 years.

Discussion

In order to support the health and well-being of diverse populations in Canada, it is necessary to establish a profile of aging subpopulations, including individuals who identify as LGBTQ2. Through the examination of the data collected in the first year of the CLSA, several differences between heterosexual and sexual minority individuals were noted. In particular, LGB participants were shown to be younger, more educated, and more likely to be urban dwelling than their heterosexual peers were. Many LGB participants in the sample provided caregiver support. While the majority of the members of this community reported the presence of one or more chronic disease, they also reported high levels of general health.

These baseline data help to build an initial profile of the subpopulation of LGB individuals within the CLSA. With 72% of LGB participants less than 65 years of age, these baseline data are largely capturing the mid-life experience of participants; the health and psychosocial status of these individuals is likely to change as they continue to age. LGBTQ2 is an umbrella term used to characterize diversity in sexual orientation and gender identity. While the CLSA Baseline data allow us to examine the mid-life experiences of aging LGB participants, gender identity was not asked, precluding any analysis of other identities within the LGBTQ2 community (e.g., trans aging). The lexicon associated with the LGBTQ2 community is changing and expanding; the identities within this community can be fluid, highlighting an opportunity to examine changes in sexual/gender identity alongside the aging experience through the CLSA.

The CLSA will allow us to examine changes in health and factors among members of the LGBTQ2 community as they age. The analyses presented here offer a snapshot of the self-reported baseline characteristics of LGB participants. We did not include measures of objective physical health or validated measures of mental health (e.g., psychological distress, depressive symptomology), variables that are particularly relevant to this group. The authors of this chapter received funding through the Canadian Institutes of Health Research (CIHR) and are currently examining physical and mental health inequalities among aging LGB individuals as well as the importance of social support in contributing to the well-being of this population.

Future waves of CLSA data collection offer opportunities to address knowledge gaps related to the social determinants of health among aging Canadians. Within the context of LGBTQ2 aging, it is plausible that the impacts of historical and contemporary discrimination may become magnified as members of this community experience age-associated changes in health, increased risk of frailty and dependence, and more contact with formal care systems. While we anticipate observing health deficits and structural barriers in future cycles of the CLSA, a strengths-based approach would also consider measures of resiliency, connection to community, spirituality, and sense of identity as determinants of healthy aging among individuals who identify as LGBTQ2. Through ongoing data collection and analysis, data stemming from the CLSA have the opportunity to support inclusive health and social care approaches to enhance the aging experience for members of the LGBTQ2 community.

TABLE 1 CHARACTERISTICS OF CLSA CYCLE 1 PARTICIPANTS BY SEX AND SEXUAL ORIENTATION.

	Female (n=26,086)		Male (n=25,122)	
	Heterosexual (n=25,688) %(n)	Lesbian & Bisexual (n=398) %(n)	Heterosexual (n=24,463) %(n)	Gay & Bisexual (n=659) %(n)
45-54 years	26.3% (6,767)	40.0% (159)	25.5% (6,237)	35.7% (235)
54-64 years	32.3% (8,302)	36.9% (147)	31.6% (7,721)	33.2% (219)
65-74 years	23.2% (5,947)	16.1% (64)	23.7% (5,799)	22.9% (151)
75+ years	18.2% (4,672)	7.0% (28)	19.2% (4,706)	8.2% (54)
Education				
Less than secondary school education	7.4%(1,900)	2.3%(9)	6.9% (1,684)	4.1% (27)
Secondary school graduation, no post-secondary education	12.2%(3,124)	9.3%(37)	10.2% (2,487)	8.4% (55)
Some post-secondary education	7.7%(1,964)	8.0%(32)	7.4% (18,03)	8.2% (54)
Post-secondary degree/diploma	72.6%(18,644)	80.2%(319)	75.3% (18,415)	79.2 %(522)
Missing	0.2%(56)	0.2%(1)	0.3% (74)	0.2% (1)
Retirement status				
Completely retired	48.1%(12,358)	29.7%(118)	42.9%(10,491)	35.7%(235)
Partly retired	9.0%(2,315)	9.3% (37)	12.7% (3,117)	12.0% (79)
Not retired	42.3%(10,860)	60.6% (241)	44.2%(10,823)	51.9% (342)
Missing	0.6%(155)	0.5% (2)	0.1%(32)	0.5% (3)
Household Income Per Year				
>=$100,000	25.9% (6,661)	30.9% (123)	35.9% (8,793)	29.3% (193)
$50,000 - $100,000	31.4% (8,068)	33.9% (135)	35.5% (8,677)	33.7% (222)
$20,000 - $50,000	27.3% (7,003)	21.9% (87)	20.1% (4,910)	25.0% (165)
<$20,000	7.1% (1,831)	8.8% (35)	3.9% (956)	8.4% (55)
Missing	8.3% (2,125)	4.5% (18)	4.6% (1,127)	3.6% (24)

TABLE 1 CHARACTERISTICS OF CLSA CYCLE 1 PARTICIPANTS BY SEX AND SEXUAL ORIENTATION. (CONTINUED)

	Female (n=26,086)		Male (n=25,122)	
	Heterosexual (n=25,688) %(n)	Lesbian & Bisexual (n=398) %(n)	Heterosexual (n=24,463) %(n)	Gay & Bisexual (n=659) %(n)
Home ownership				
Own	83.5% (21,442)	75.6% (301)	87.2%(21,325)	71.1%(468)
Rent	15.4% (3,963)	23.1%(92)	12.1% (2,953)	27.7%(182)
Other	1.0% (244)	1.3%(5)	0.6%(149)	1.1%(7)
Missing	0.1% (20)	0.0%(0)	0.1%(16)	0.2%(1)
Geographic location				
Urban	86.0%(22,100)	89.4% (356)	86.0% (21,046)	90.0% (593)
Rural	14.0%(3,588)	10.6% (42)	14.0% (3,417)	10.0% (66)
Province of residence				
Alberta	10.0% (2,568)	6.3% (25)	9.9% (2,425)	5.8% (38)
British Columbia	17.2% (4,412)	25.9% (103)	17.2% (4,211)	19.4% (128)
Manitoba	8.9% (2,295)	12.3% (49)	9.0% (2,201)	5.6% (37)
New Brunswick	2.6% (677)	1.8% (7)	2.6% (639)	3.8% (25)
Newfoundland & Labrador	6.7% (1,729)	6.5% (26)	6.9% (1,678)	4.3% (28)
Nova Scotia	8.9% (2,284)	8.5% (34)	9.2% (2,252)	7.1% (47)
Ontario	21.6% (5,545)	17.1% (68)	21.8% (5,332)	24.7% (163)
Prince Edward Island	2.2% (567)	1.8% (7)	2.2% (545)	2.7% (18)
Quebec	19.1% (4,908)	17.3% (69)	18.5% (4,520)	24.1% (159)
Saskatchewan	2.7% (703)	2.5% (10)	2.7% (660)	2.4% (16)

Note: Excludes 130 participants who did not disclose sexual orientation. Missing derived from participants who responded, "Don't know" or who refused to respond.

TABLE 2 RELATIONSHIP OF PARTICIPANTS IN CLSA CYCLE 1 BY SEX AND SEXUAL ORIENTATION.

	Female (n=26,086)		Male (n=25,122)	
	Heterosexual (n=25,688) %(n)	Lesbian & Bisexual (n=398) %(n)	Heterosexual (n=24,463) %(n)	Gay & Bisexual (n=659) %(n)
Marital status				
Single, never married or never lived with a partner	8.6%(2,216)	24.6% (98)	6.9% (1,683)	43.1%(284)
Married/Living with a partner in a common-law relationship	60.3% (15,478)	57.3% (228)	78.7% (19,259)	40.5% (267)
Widowed	14.9%(3,838)	4.8% (19)	5.2%(1,261)	4.9%(32)
Divorced/ Separated	16.2%(4,149)	13.3% (53)	9.2%(2,254)	11.5%(76)
Missing	0.0% (7)	0.0% (0)	0.0% (6)	0.0% (0)
Living arrangements				
Living alone	28.8%(7,404)	31.5% (125)	15.7%(3,829)	46.1% (303)
Lives with at least 1 other	71.2% (18,270)	68.5% (272)	84.4% (20,623)	54.0% (355)
Frequency feeling lonely				
Some of the time or more	27.5% (7,059)	30.0% (119)	21.2%(5,181)	32.9% (216)
Rarely or never	72.3% (18,558)	70.0% (278)	78.6%(19,204)	66.8% (439)
Missing	0.2% (42)	0.0 (0)	0.2%(49)	0.3% (2)

Note: Excludes 130 participants who did not disclose sexual orientation. Missing derived from participants who responded, “Don’t know” or who refused to respond.

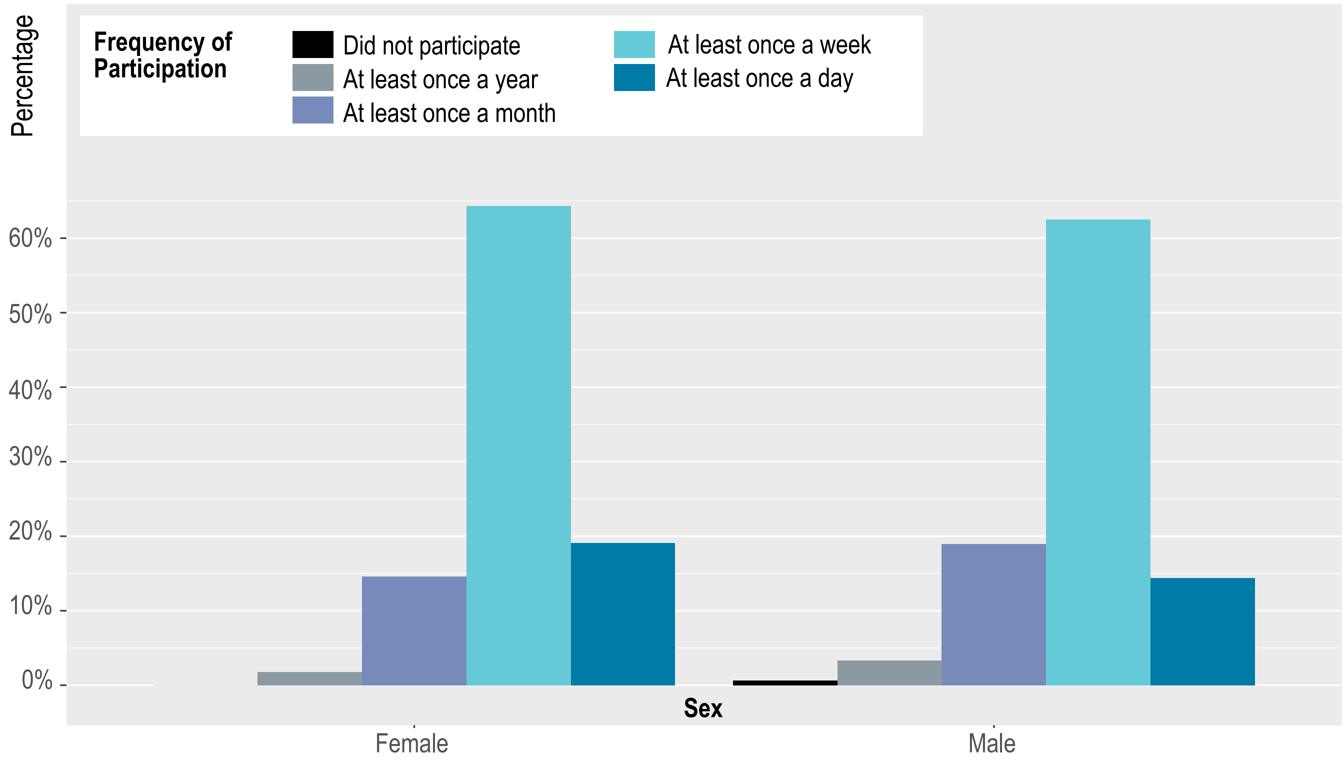

Figure 1 – Frequency of community-related activities among LGB participants by sex

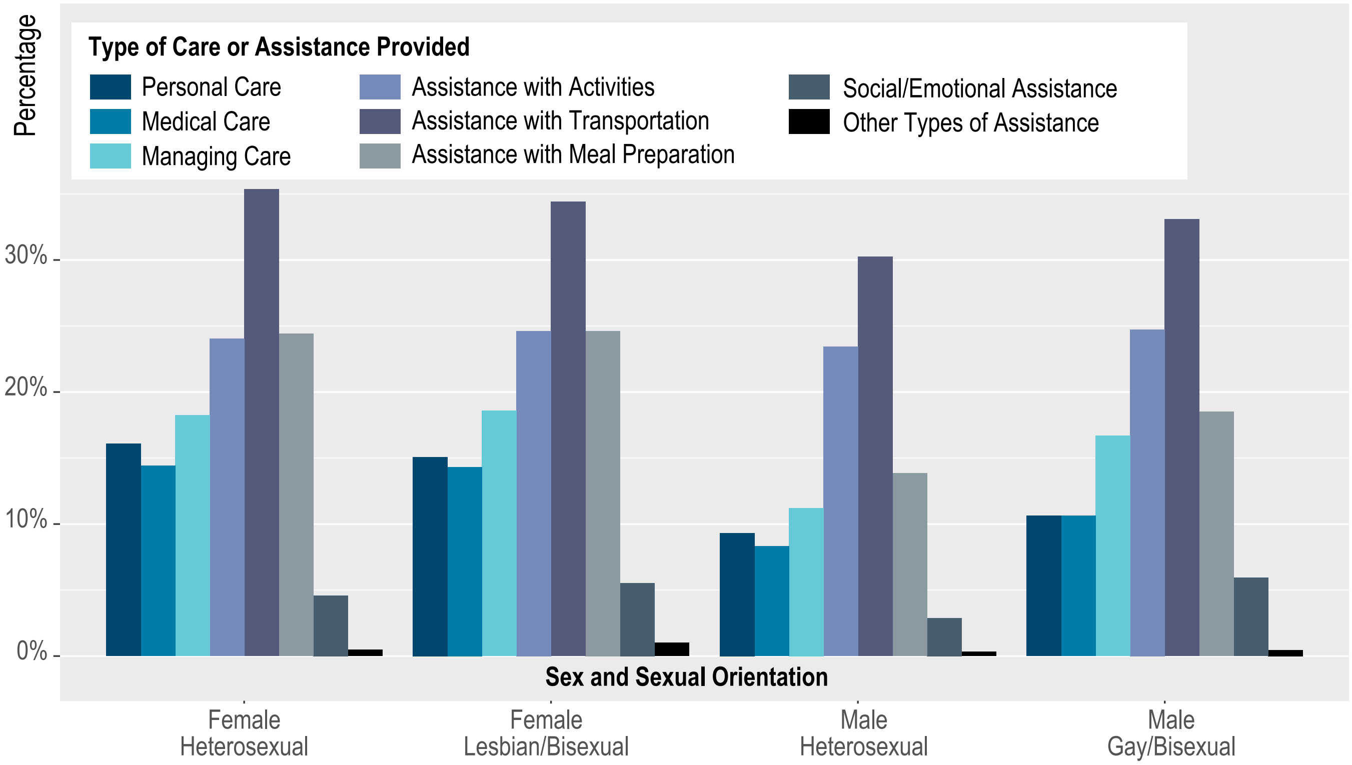

Figure 2 – Percentage of participants who provided care in the last 12 months, by sex and sexual orientation

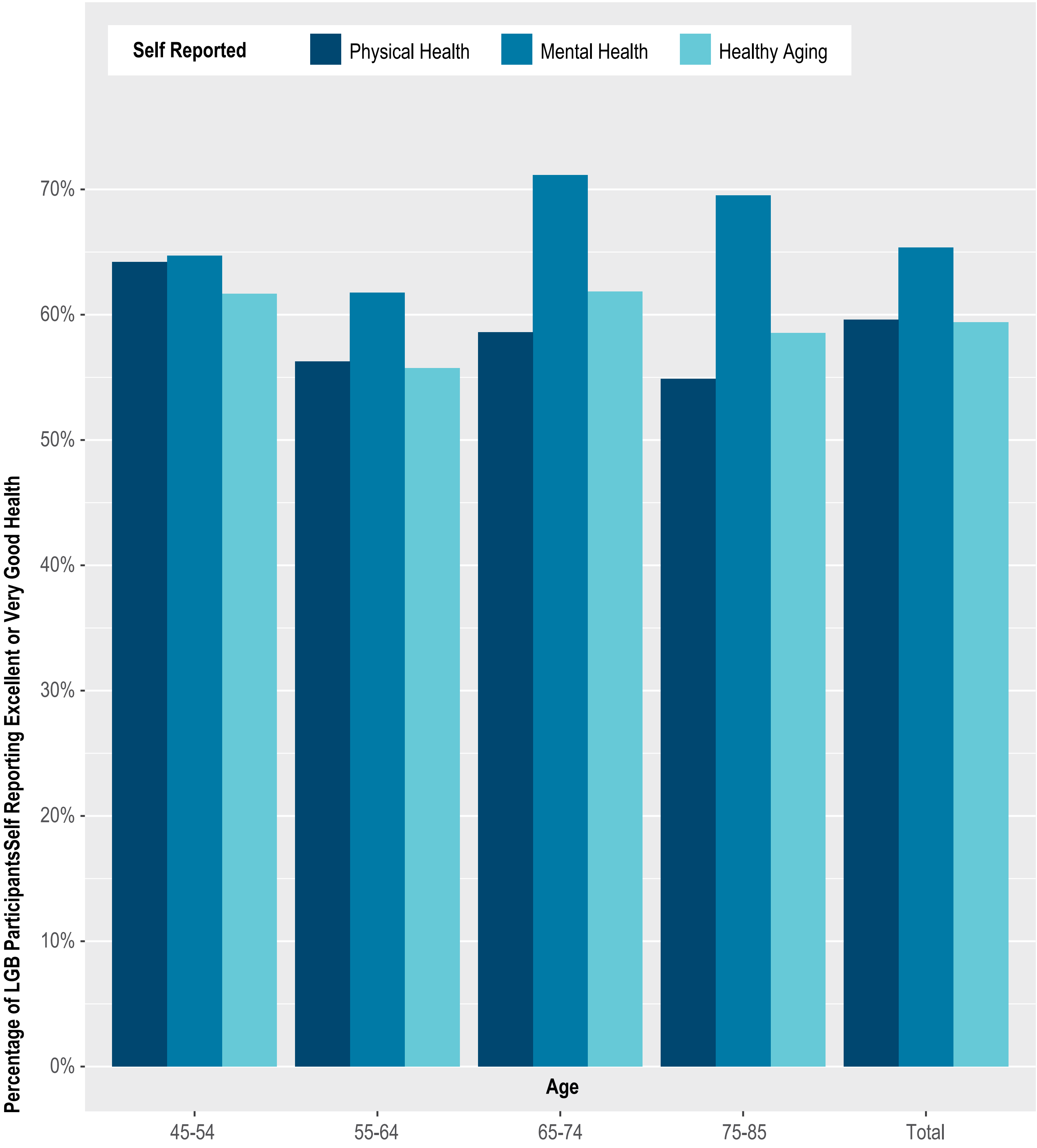

Figure 3 – Percentage LGB participants self-reporting very good or excellent health by age group

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