



Special Report:

The Incidence of Osteoarthritis in Canada and Associated Health Outcomes: Findings from the Canadian Longitudinal Study on Aging

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Executive Summary

Osteoarthritis (OA) is the most common type of arthritis and affects more people in Canada than all other forms of arthritis combined. OA is characterized by joint pain, stiffness, and/or swelling that can lead to disability, and contributes to poorer physical and mental health and overall reduced quality of life. OA frequently affects the knee, hand, and hip joints, among others.

The work herein reports on estimates of incidence (a measure of the occurrence of new diagnoses) of knee, hand, and or hip OA (hereafter referred to as 'OA') over a 3-year time period. The analyses are based on data from the Canadian Longitudinal Study on Aging, a representative longitudinal study of people living in the ten provinces of Canada aged 45-85 years.

How common is osteoarthritis (OA)?

- Based on the initial data collected from the Canadian Longitudinal Study on Aging, from 2011-2015, about 2.6 million Canadians aged 45-85 had OA.
 - This represents nearly one-quarter (24%) of people in Canada within this age range.

What proportion of people developed OA over the following 3-year period?

- By the first follow-up of the Canadian Longitudinal Study on Aging, 2015-2018, nearly 16% of people initially without OA reported receiving an OA diagnosis.
 - This represents about 1.3 million new cases of OA within this group.

What is the average number of new diagnoses of OA per year?

- On average, there were about 420,000 new diagnoses of knee, hand, or hip OA reported per year over the 3-year period.

Risk factors for developing OA

- 18% of females and 13% of males reported a new diagnosis of OA over the 3-year period.
- Lower socioeconomic status (i.e. lower educational attainment and lower household income) was associated with an increased risk of developing OA over the 3-year period.
- A higher risk of developing OA over the 3-year period was observed among people who were obese.
 - This increased risk was evident among those aged 45-74.
- People with knee, hand or hip joint symptoms (e.g. joint pain) but without an OA diagnosis represent a large and important segment of the population at increased risk of developing OA.

- People reporting joint symptoms were more than twice as likely to report a new diagnosis of OA during a 3-year follow-up period compared to people without joint symptoms.

Well-being of people with OA in Canada

- Overall, those who reported a new diagnosis of OA were more likely to report worsening indicators of well-being compared to those without OA.
 - People with incident OA were more likely to indicate that their self-reported general health and self-reported healthy aging were worse than 3 years prior compared to those without OA.
 - The risk of developing two or more new functional difficulties in the 3-year period was more than two-fold higher for those with incident OA compared to those without.
 - Among those 45-54 years old, those with incident OA were at a much greater risk of developing symptoms of depression and becoming dissatisfied with life compared to those without incident OA.

Table of Contents

Executive Summary.....	2
How common is osteoarthritis (OA)?	2
What proportion of people developed OA over the following 3-year period?	2
What is the average number of new diagnoses of OA per year?.....	2
Risk factors for developing OA	2
Well-being of people with OA in Canada	3
Table of Contents	4
Arthritis Society Canada.....	5
The Arthritis Community Research and Epidemiology Unit.....	5
Preamble.....	5
Introduction to the Data.....	6
Prevalence of OA among People in Canada Aged 45-85.....	7
3-year Incidence of OA Among People in Canada Aged 45-85	8
Risk Factors for Incident OA.....	9
Level of Education	9
Household Income.....	10
Obesity.....	11
Joint Symptoms.....	12
Well-Being of People in Canada with Incident OA	13
Self-Rated Health.....	13
Self-Rated Healthy Aging.....	14
Functional Difficulties	15
Depressive Symptoms.....	16
Life Satisfaction	17
Conclusions.....	18
Acknowledgement.....	18
Appendix.....	19
Key Definitions.....	19
Formulas for Prevalence and Incidence Estimates	19

Arthritis Society Canada

Arthritis Society Canada is a national health charity, fueled by donors and volunteers, with a vision to live in a world where people are free from the devastating effects that arthritis has on lives. Founded in 1948 with one very clear goal – to alleviate the suffering of people crippled by arthritis – that same volunteer-led passion carries on today in communities across Canada.

Through the trust and support of donors and sponsors, Arthritis Society Canada is Canada's largest charitable source of investments in cutting-edge arthritis research, proactive advocacy and information and support that will deliver better health outcomes for people affected by arthritis.

The Arthritis Community Research and Epidemiology Unit

Since its founding in 1991, the interdisciplinary research team at the Arthritis Community Research and Epidemiology Unit (ACREU) has been committed to shedding light on the impact of arthritis on people, their families, and the overall population, and how arthritis care is delivered.

For the past 14 years, Arthritis Society Canada has partnered with ACREU to evaluate the prevalence and impact of arthritis in Canada. By learning more about the burden that arthritis places on Canadians and our healthcare system, this partnership has helped showcase where we need to do more to support people living with this arthritis.

Preamble

Arthritis is a serious disease that can have devastating impacts on people's lives. As one of the most common long-term health conditions in Canada, it places a tremendous burden on the healthcare system and Canadian society at large. About 6 million people in Canada live with arthritis, along with their caregivers, families and friends.

Osteoarthritis (OA) is the most common type of arthritis. OA is a joint disease in which the tissues of the joint break down, including surrounding cartilage, the lining of the joint, underlying bone, tendons, and ligaments. It was once described as a "wear-and-tear" form of arthritis, however it is now described as the effect of the body's failed attempt to heal damaged joint tissues. OA is characterized by pain, stiffness, and/or swelling of the joints that can lead to disability, and it contributes to poorer physical and mental health and an overall reduced quality of life. OA is typically diagnosed through a physical examination to assess symptoms and sometimes followed-up with X-rays for confirmation of diagnosis. There is currently no cure for OA, however there are ways to manage the symptoms and improve daily function. OA frequently affects the knee, hand and hip joints, among others.

Introduction to the Data

The information in this report is based on data from the ongoing Canadian Longitudinal Study on Aging (CLSA), which collects medical, physical, psychological, and sociodemographic information from people in Canada¹. The CLSA consists of two complementary groups: (1) the Tracking Cohort, consisting of a representative sample of people living in the 10 provinces of Canada aged 45 to 85 years and (2) the Comprehensive Cohort, consisting of a representative sample of people living within 50 km of 11 data collection sites located across seven provinces. The majority of the current report utilizes data from the Tracking Cohort. Where the focus is on joint symptoms, this relied on the Comprehensive Cohort dataset. The dataset used is indicated in figure footnotes. The CLSA began in 2011 and will follow respondents every three years for 20 years or until death. The initial (captured from 2011-2015) and first follow-up (captured from 2015-2018) CLSA survey data were used in this report.

The initial survey asked respondents about a list of chronic health conditions, or long-term conditions, which “are expected to last, or have already lasted 6 months or more and that have been diagnosed by a health professional”. Among the list of conditions, respondents were asked (1) “Has a doctor ever told you that you have osteoarthritis in the knee?” (2) “Has a doctor ever told you that you have osteoarthritis in the hip?” and (3) “Has a doctor ever told you that you have osteoarthritis in one or both hands?”. Those who responded ‘Yes’ to any of these three questions were considered to have OA. The reported prevalence data in this report is based on this group. Those respondents who said ‘No’ to all three questions were considered to not have knee, hand, or hip OA and were therefore considered ‘at risk’ of developing knee, hand, or hip OA. The reported incidence data in this report is based on this group. At the follow-up survey three years later, respondents were again asked the same three OA questions. Anyone who responded ‘Yes’ to any of the three were considered to be an incident case of OA, that is, to have a new diagnosis of knee, hand, or hip OA. ‘OA’ is thus defined as knee, hand or hip OA throughout this report.

A more detailed explanation of how the statistics presented in this report were calculated is provided in the Technical Appendix following the report.

¹ Raina P., Wolfson C., Kirkland S.A., Griffith L.E., Oremus M., Patterson C., Tuokko H., Hogan D., Wister A., Payette H., Brazil K., Shannon H. (2009) The Canadian Longitudinal Study on Aging (CLSA). *Canadian Journal on Aging*, Special Issue on the CLSA, Volume 28, Issue3, 221-229, <https://doi.org/10.1017/S0714980809990055>

Prevalence of OA among People in Canada Aged 45-85

OA was reported by about 2.6 million people in Canada between the ages of 45 and 85. This represented nearly one-quarter (24.3%) of the Canadian population within this age range. OA was more common in females than males, with nearly 1 in 3 females (29.3%) and 1 in 5 males (18.8%) reporting OA.

The bars in Figure 1 show the proportion of males and females in each age group who reported having OA. The line on the graph shows the total number of people with OA in each age group. The proportion of people within each age group who reported OA increased with increasing age. Even so, the majority of people with OA, 1.48 million, were 64 years of age or younger.

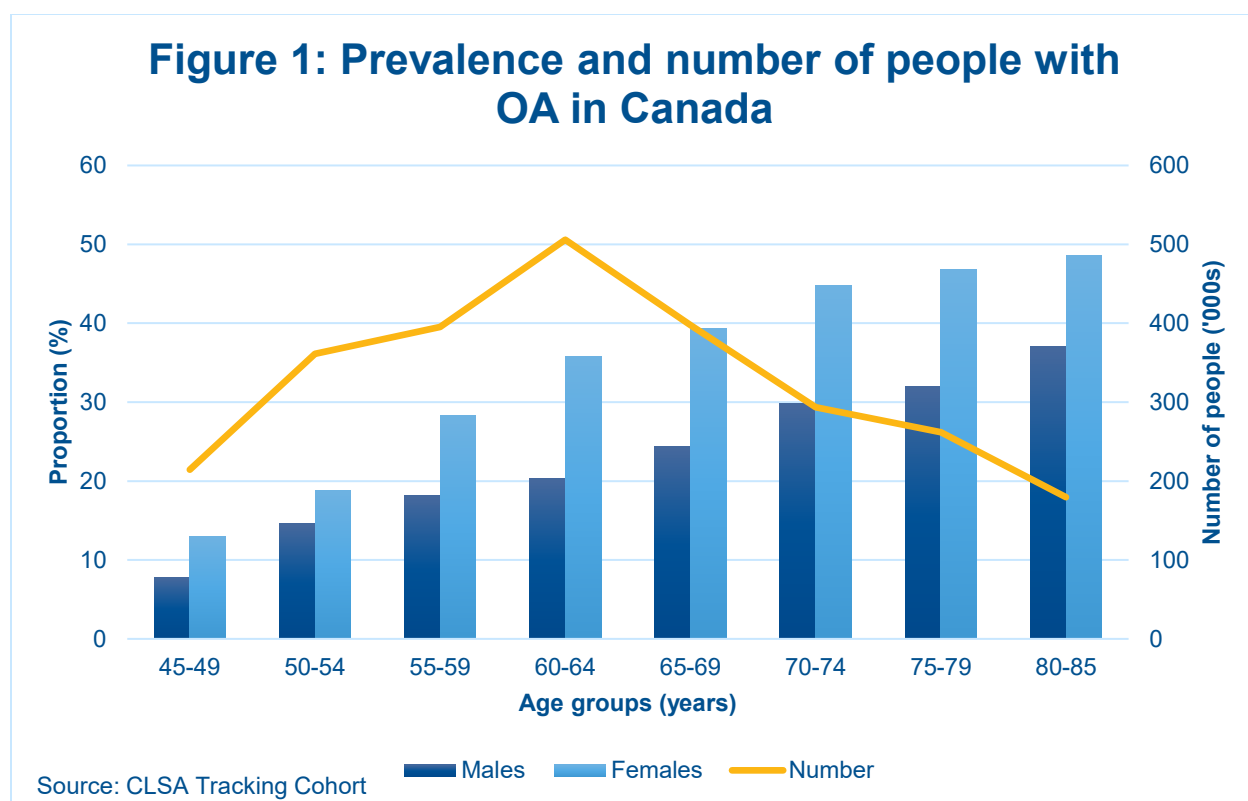


Figure 1. During the initial survey, people with knee, hand, or hip osteoarthritis were identified if they responded 'Yes' to at least one of three questions: (1) 'Has a doctor ever told you that you have osteoarthritis in the knee?' (2) 'Has a doctor ever told you that you have osteoarthritis in the hip?' and (3) 'Has a doctor ever told you that you have osteoarthritis in one or both hands?'

3-year Incidence of OA Among People in Canada Aged 45-85

Overall, there were about 1.3 million new diagnoses of OA reported during the 3-year follow-up period. This means that nearly 1 in 6 (15.5%) people in Canada aged 45-85 who did not initially have OA received a diagnosis of OA within the following 3 years, with an average of about 420,000 new diagnoses of OA per year.

The incidence of OA was higher among females than males, with more than 1 in 6 (18.3%) females compared to nearly 1 in 7 (12.8%) males who reported a new OA diagnosis over the 3-year period.

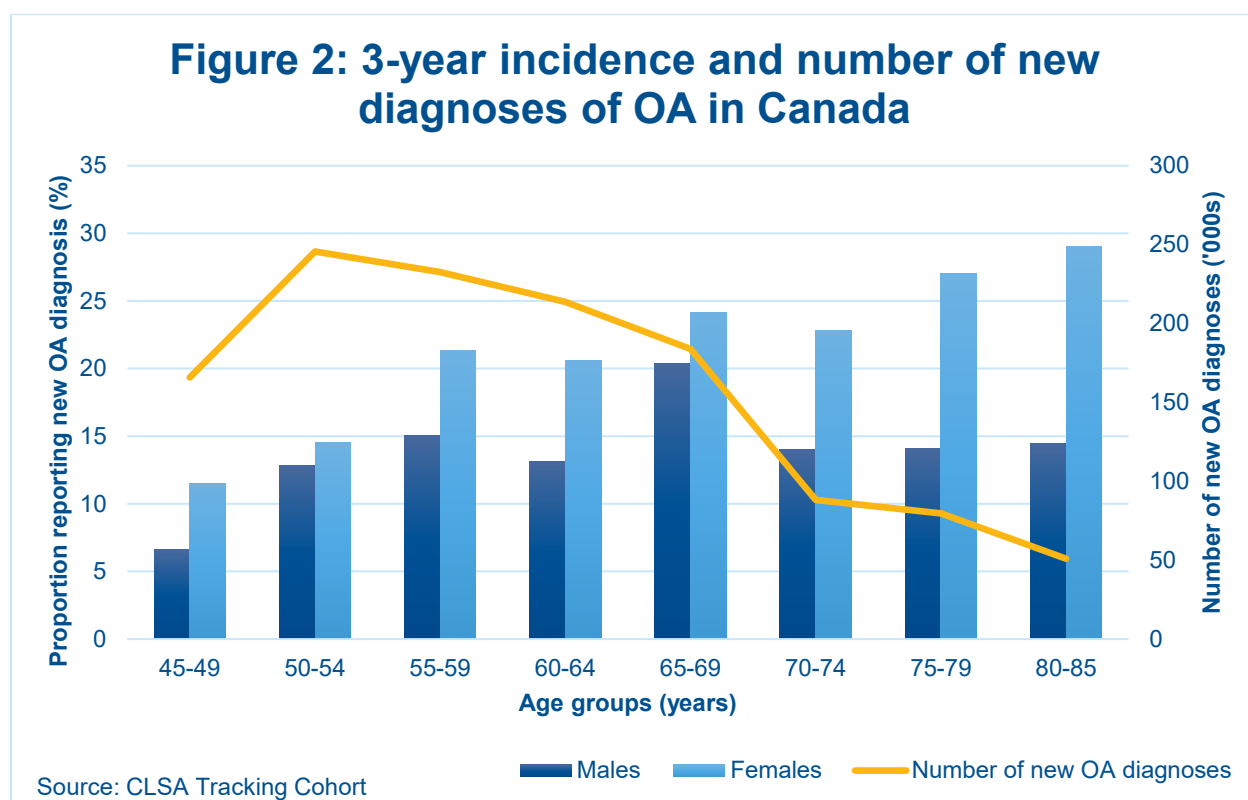


Figure 2. People who did not report having knee, hand, or hip OA during the initial survey were then asked the same questions three years later : (1) 'Has a doctor ever told you that you have osteoarthritis in the knee?' (2) 'Has a doctor ever told you that you have osteoarthritis in the hip?' and (3) 'Has a doctor ever told you that you have osteoarthritis in one or both hands?' Anyone who responded 'Yes' to at least one of the questions at follow-up were considered to have a new diagnosis of knee, hand, or hip OA.

Risk Factors for Incident OA

Level of Education

Overall, the incidence of OA was higher among those with less than a post-secondary education compared to those with at least some post-secondary education (18.0% versus 14.5%, respectively). A difference was most apparent among those aged 55-74 years.

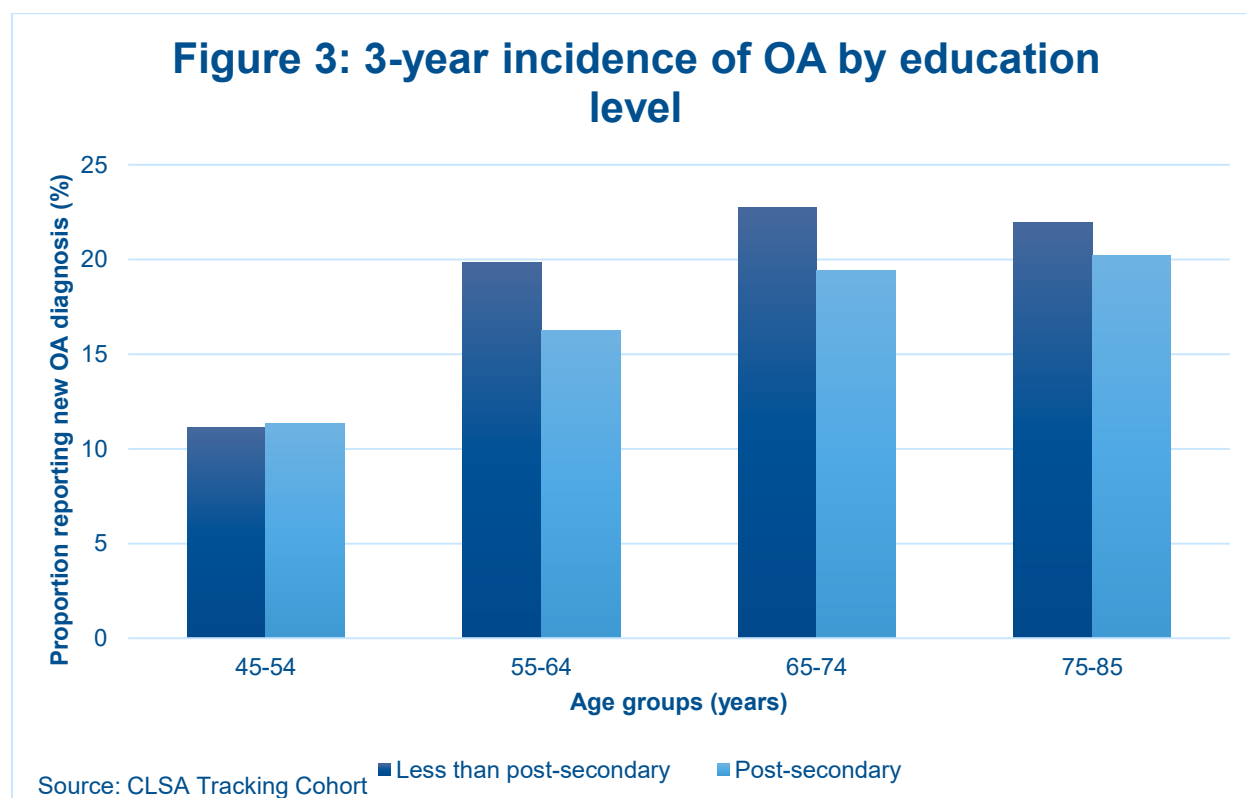


Figure 3. During the initial survey, respondents were asked a series of questions to ascertain the highest level of education they had attained. Respondents were grouped as either having received anything less than post-secondary education or having completed at least some post-secondary education.

Household Income

Similar to the pattern seen with level of education, the incidence of OA was higher among those who have a lower household income compared to those with a moderate to high household income (18.3% compared to 14.2%, respectively). A difference was most prominent among females.

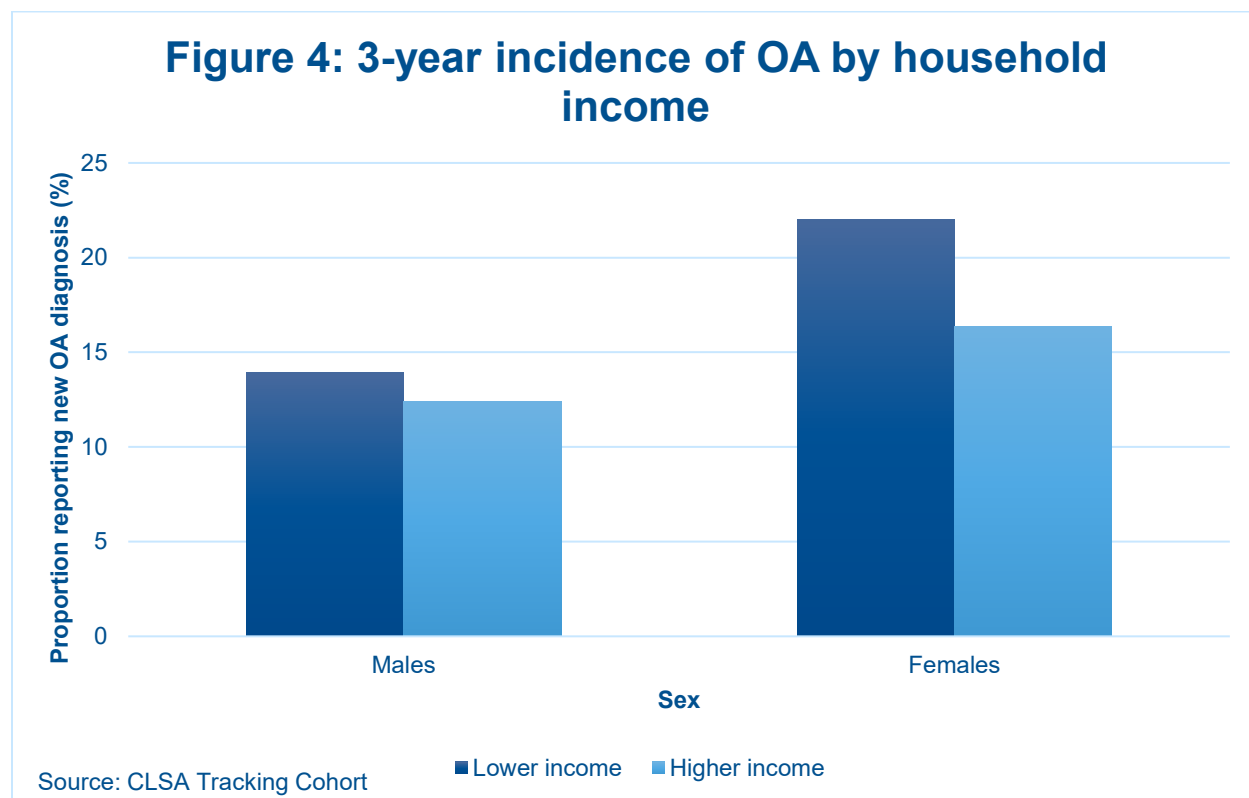


Figure 4. During the initial survey, respondents were asked to provide their best estimate of the total household income received by all household members, before taxes and deductions, in the past 12 months. Those who indicated their household income to be less than \$50,000 were considered to have a lower income.

Obesity

Overall, people who were obese were more likely to receive a new diagnosis of OA compared to those who were not obese. More than 1 in 5 obese people (21.4%) received a diagnosis of OA, compared to less than 1 in 7 people who were not obese (13.6%), over the 3-year period. While this pattern was apparent in all age groups, the differences were most notable among those aged 45-74.

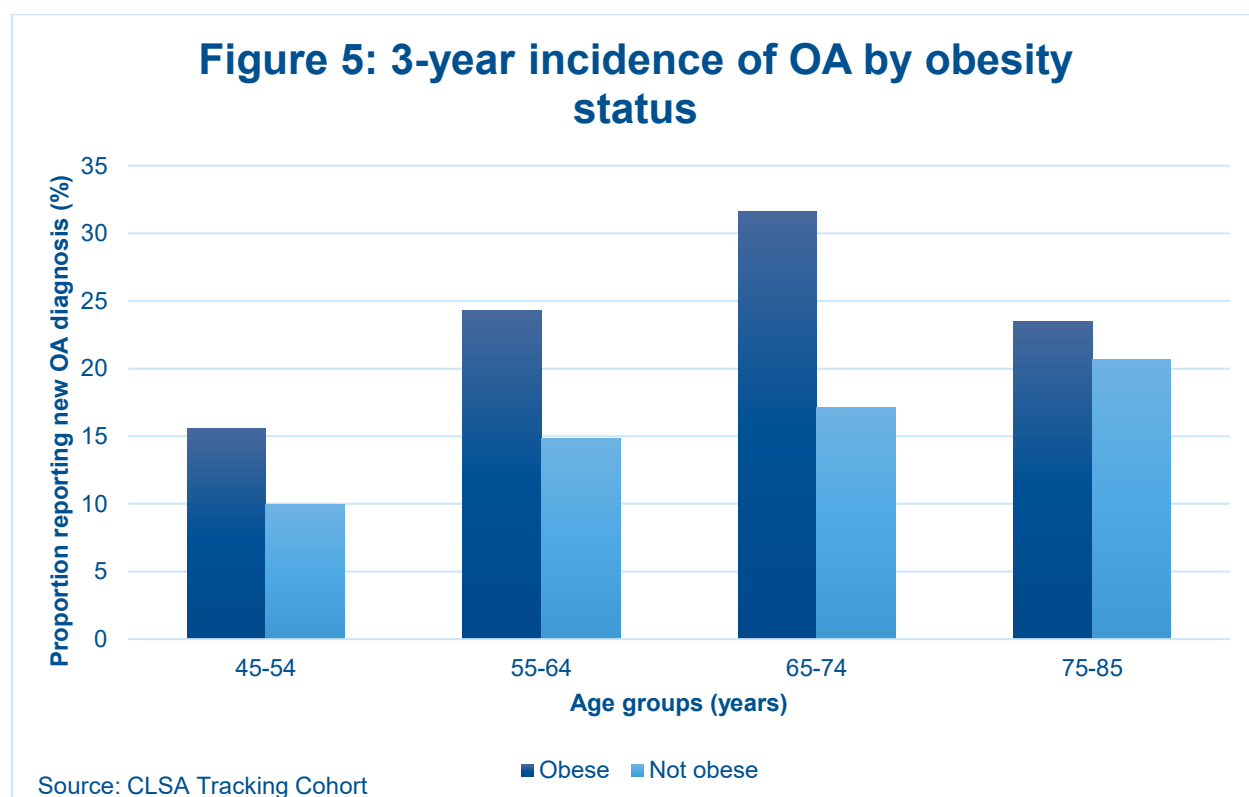


Figure 5. Obese status was based on body mass index (BMI) calculated from self-reported weight and height during the initial survey. BMI was calculated by dividing weight in kilograms by height in metres squared. Pregnant women were excluded from calculations. Respondents with BMI ≥ 30 were classified as obese according to international standards.

Joint Symptoms

Overall, people with joint symptoms (e.g. pain, stiffness, or swelling) were more than twice as likely to report being newly diagnosed with OA over a 3-year period compared to those without joint symptoms (16.6% compared to 7.1%). Differences in risk of OA onset were apparent across all age groups.

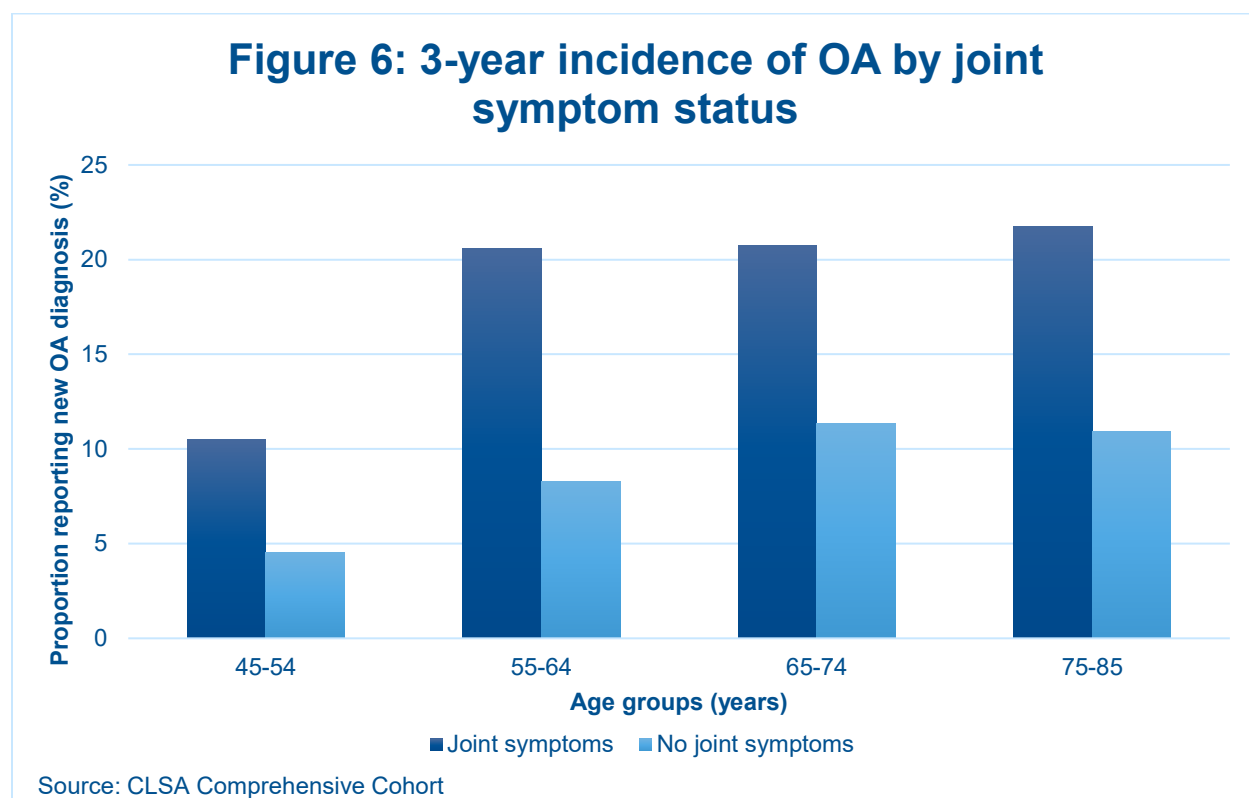


Figure 6. Respondents were asked in the initial survey if they had experienced joint symptoms typical of OA in the past four weeks in the hands, in the hips, or in the knees. Knee symptoms included knee pain on most days, knee pain while climbing stairs or walking down slopes, or knee swelling. Hand symptoms included pain or enlargement in the small joints closest to the fingernails or the base of the thumb. Hip symptoms included pain in the groin or upper inner thigh on most days, pain in the groin or upper thigh while climbing stairs or walking down slopes, or limitation in the range of motion of the hips. Respondents who indicated having at least one of the above symptoms in any joint, were considered to have joint symptoms.

Well-Being of People in Canada with Incident OA

Self-Rated Health

Self-rated health refers to a person's perception of their general health-related well-being, and is an indicator of overall health status.

People newly diagnosed with OA were about 1.5 times more likely to indicate worsening general health over the 3-year period compared to those without incident OA (9.1% compared to 5.9%). This difference was most notable among the youngest and oldest age groups.

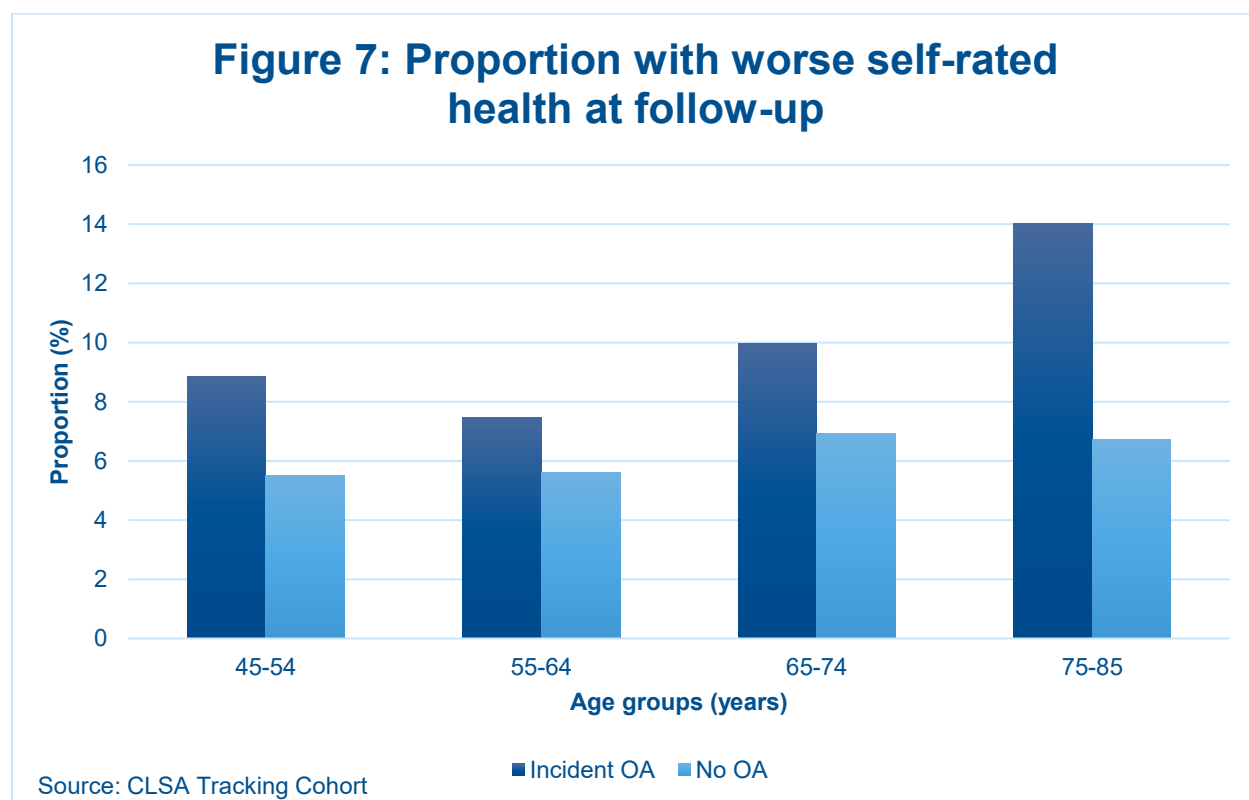


Figure 7. In both the initial and follow-up surveys, respondents were asked "In general, would you say your health is excellent, very good, good, fair, or poor?". Individuals were considered to have worse self-rated health at follow-up if they reported their health was "excellent, very good, or good at baseline" but then "fair or poor" at follow-up.

Self-Rated Healthy Aging

Healthy aging is defined as the process of developing and maintaining the functional ability that enables well-being as we age. Healthy aging does not necessarily require a person to be free of disease, but that any health conditions they may have are well controlled. Respondents were asked about their impression of their healthy aging.

Those who reported a new OA diagnosis were nearly 1.5 times more likely to report a worsening healthy aging process over the 3-year period compared to those without incident OA (7.1% compared to 4.6%). This difference was evident even in the youngest age group.

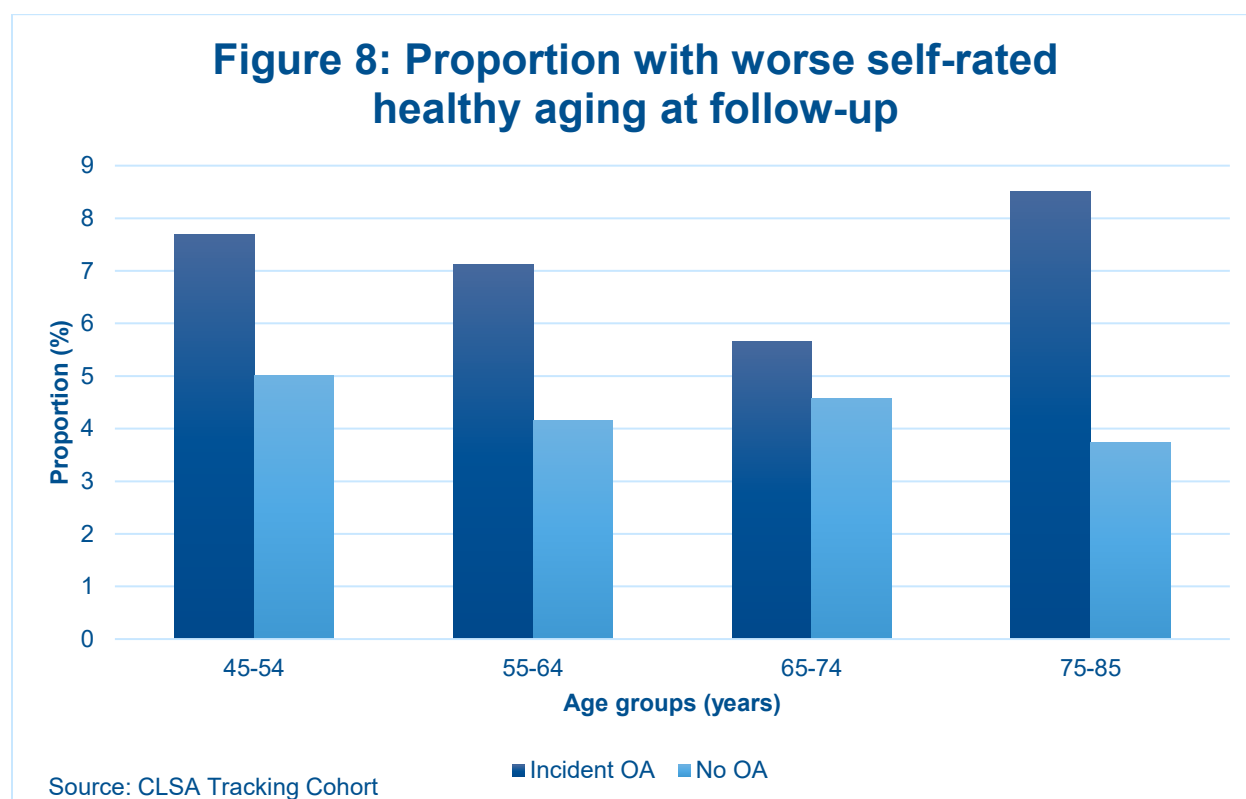


Figure 8. In both the initial and follow-up surveys, respondents were asked “In terms of your own health aging, would you say it is excellent, very good, good, fair, or poor?”. Individuals were considered to have worse self-rated healthy aging at follow-up if they reported it was “excellent, very good, or good at baseline” but then “fair or poor” at follow-up.

Functional Difficulties

Respondents were asked about whether they had any difficulty with a list of 14 movements (e.g. reaching or extending arms above shoulders; stooping, crouching, or kneeling down, etc.).

Nearly half (46.3%) of people with incident OA reported at least one additional functional difficulty over the follow-up period, and over one-quarter (27.4%) reported at least two additional functional difficulties. This compares to 27.8% and 12.3%, respectively, of people without incident OA.

The greatest differences between those with and without incident OA were found in the proportion of people reporting three or more additional difficulties. Furthermore, the difference in the experiencing of additional functional difficulties was greatest in the youngest age group (45-54 years).

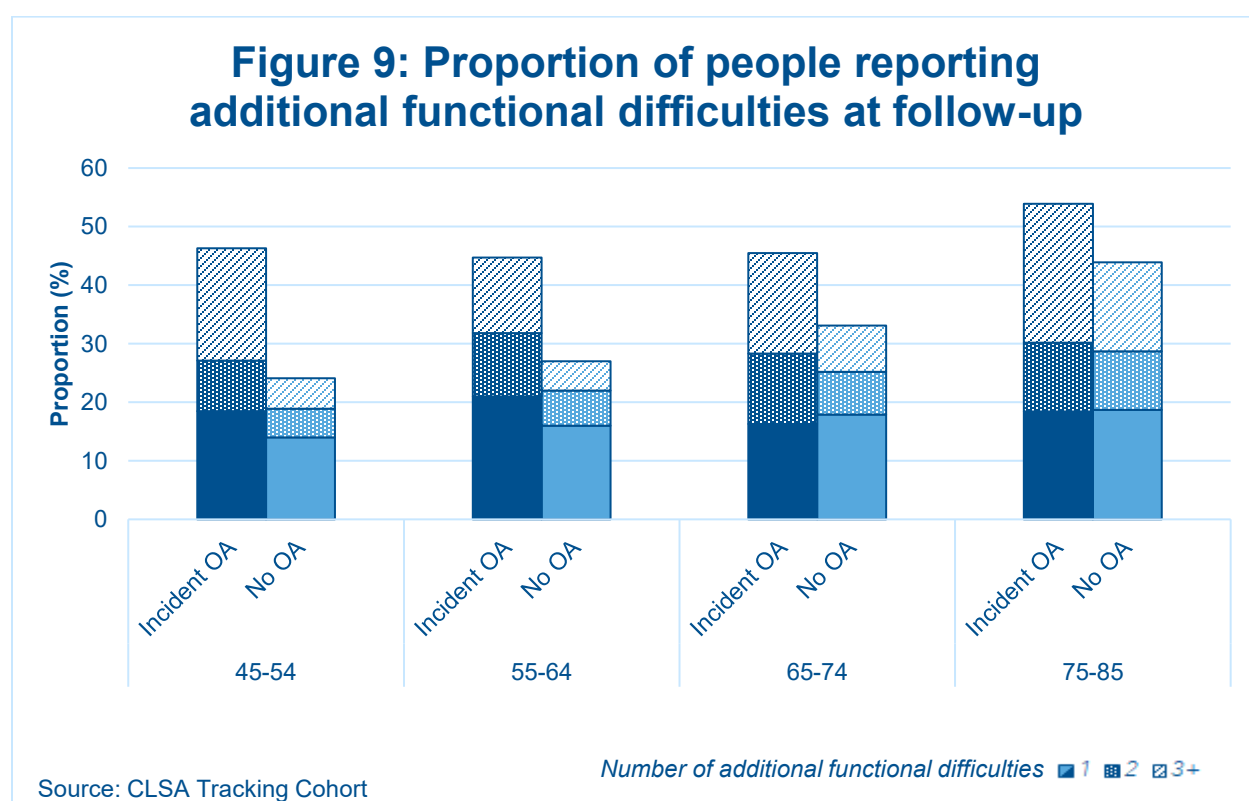


Figure 9. In both the initial and follow-up surveys, respondents were asked if they had any difficulty performing movements such as lifting their arms above their shoulders, stooping, crouching or kneeling, pushing or pulling large objects, lifting 10 pounds, handling small objects, standing or sitting for long periods of time, standing up after sitting, walking for various amounts of time, making their bed, washing their backs, cutting food with a knife, and, finally, able to withstand some force or impact through their arm. A sum of functional difficulties was calculated and categorized as 1, 2, and 3+.

Depressive Symptoms

Respondents were screened for depressive symptoms using the Center for Epidemiological Studies Short Depression Scale (CESD-10), which contains 10 questions about items such as feelings of depression, loneliness, hopefulness for the future, and restless sleep. An overall score is calculated which identifies people with depressive symptoms.

There was minimal difference between those with and without incident OA for the development of depressive symptoms among those aged 55 years or older. However, among the youngest age group, a significant difference in the development of depressive symptoms was evident among those with and without new onset OA. In this age group, those with incident OA were nearly twice as likely to report new depressive symptoms compared to those without incident OA (16.7% compared to 9.5%).

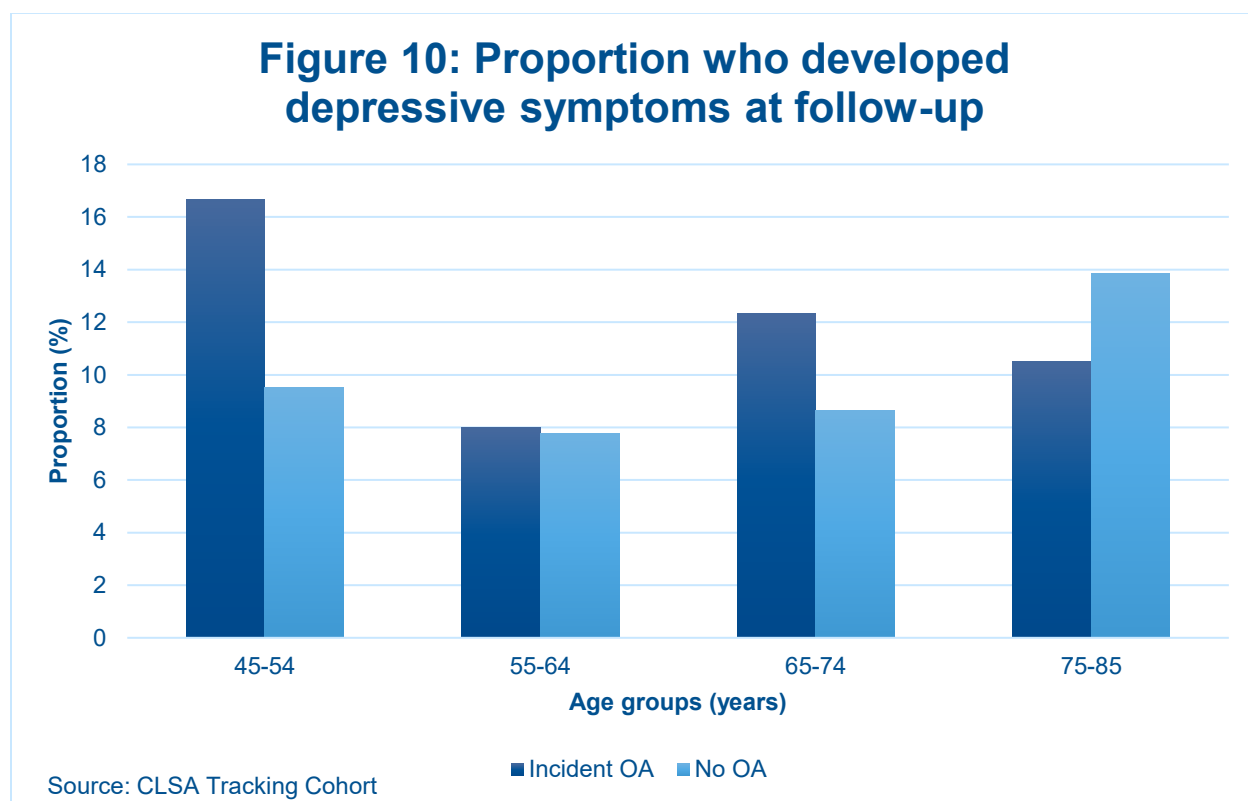
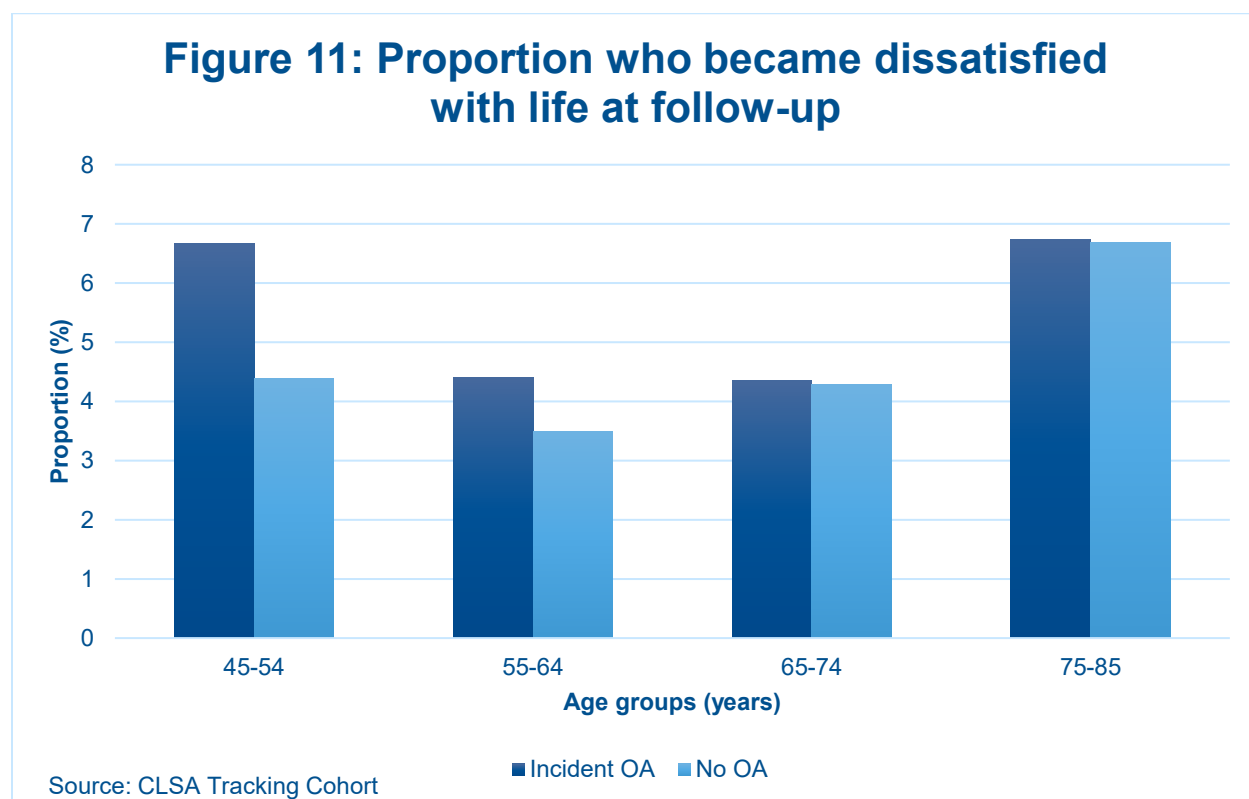


Figure 10. In both the initial and follow-up surveys respondents completed the Center for Epidemiological Studies Short Depression Scale (CES-D 10) and were given a total score (range 0–30). Any score of 10 or higher was considered to signify a depressive symptoms. Those with a score less than 10 in the initial survey and then 10 or higher at follow-up were considered to have developed depressive symptoms.

Life Satisfaction

Respondents completed the Satisfaction with Life Scale², which is used to determine a person's global life satisfaction.

Among those aged 55 years or older, a similar proportion of people with and without incident OA became dissatisfied with life over the follow-up period. However, among the youngest age group, those with incident OA were 1.5 times as likely to become newly dissatisfied with life compared to those without incident OA (6.7% compared to 4.4%).



² Diener, E., Emmons, R.A., Larsen, R.J., Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71-75, DOI: 10.1207/s15327752jpa4901_13

Figure 11. In both the initial and follow-up surveys respondents completed the Satisfaction with Life Scale (SWLS) and were asked to read a series of five statements that people might use to describe their satisfaction with their lives and respond whether they disagreed or agreed with the statement. An overall score was calculated (range 5-35) and a score of less than 20 was considered to signify dissatisfaction with life. Those with a score of 20 or higher in the initial survey and then 19 or lower at follow-up were considered to have become dissatisfied with their life.

Conclusions

Based on the nationally representative data from the Canadian Longitudinal Study on Aging, 2.6 million people in Canada aged 45-85 initially reported having knee, hand, or hip OA. Within just three years, 1.3 million additional cases of OA were diagnosed. This means that nearly 1 in 6 reported developing the disease within only a 3-year time period. Furthermore, those reporting joint symptoms were at particularly increased risk of being diagnosed with OA over this time. This group is often neglected in assessments of the impact of OA in Canada. Finally, it was apparent that those with new onset OA were at greater risk of worsening overall well-being. Given the significant number of people in Canada living with or at risk of developing with OA, it is important to understand not only current OA burden in Canada, but also to anticipate and plan for its growing burden for individuals, communities and the healthcare system.

Acknowledgement

This research was made possible using the data collected by the Canadian Longitudinal Study on Aging (CLSA). Funding for the Canadian Longitudinal Study on Aging (CLSA) is provided by the Government of Canada through the Canadian Institutes of Health Research (CIHR) under grant reference: LSA 94473 and the Canada Foundation for Innovation, as well as the following provinces: Newfoundland, Nova Scotia, Quebec, Ontario, Manitoba, Alberta, and British Columbia. This research has been conducted using the CLSA Baseline Tracking Dataset version 3.6, Follow-up 1 Tracking Dataset version 3.1, Baseline Comprehensive Dataset version 7.0 and Follow-up 1 Comprehensive Dataset version 5.0 under Application Number 2010009. The CLSA is led by Drs. Parminder Raina, Christina Wolfson and Susan Kirkland.

The opinions expressed in this report are the author's own and do not reflect the views of the Canadian Longitudinal Study on Aging.

Appendix

This appendix provides definitions and explanations of key epidemiological concepts used in this report and outlines how the estimates were calculated. Please refer to the “Introduction to the Data” section above for more detailed information on the data source used for the report.

Key Definitions

- **Prevalence** refers to the proportion of people in a population who have a specific condition, such as OA, at a given point in time. Prevalence estimates give insight into how common a condition is.
- **Incidence** refers to the number of **new** cases of a condition, such as OA, that develop in a population over a certain period of time (e.g. the 3 years between initial and follow-up data collection for the CLSA). Incidence estimates give insight into the risk of developing a condition. In the current report we provided two measures of incidence:
 - The proportion of people who were diagnosed with OA over the following 3-year period (cumulative incidence); and
 - The average number of new diagnoses of OA per year.

Formulas for Prevalence and Incidence Estimates

Prevalence =

$$\frac{\text{Number of people reporting knee, hand, hip OA diagnoses in the initial survey}}{\text{Total number of people who completed the initial survey}} \times 100$$

This formula provides the percentage of people who have a diagnosis of OA at the time of the initial survey.

Cumulative Incidence =

$$\frac{\text{Number of new knee, hand, hip OA diagnoses reported at the follow – up survey}}{\text{Number of people at risk of knee, hand, hip OA at the time of the initial survey}}$$

This formula provides the fraction of people who didn’t report OA during the initial survey who received a diagnosis of OA within the 3 years to the follow-up survey.

Average Number of New Diagnoses Per Year =

$$\frac{\text{Number of new knee, hand, hip OA diagnoses reported at the follow – up survey}}{3 \text{ years}}$$

This formula provides the number of new diagnoses of OA that occurred each year on average between the initial and follow-up surveys.