clsa élcv
Canadian Longitudinal Study on Aging
Étude longitudinale canadienne sur le vieillissement

Public Health Agency of Canada | Agence de la santé publique du Canada

McMaster University | DEPARTMENT OF HEI
Health Research Methodology

Understanding experiences of stress during the COVID-19 pandemic among adults from the Canadian Longitudinal Study on Aging (CLSA)

Dr. Vanessa De Rubeis
Department of Health Research Methods, Evidence and Impact
McMaster University

CLSA Webinar
March 7, 2023

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Consequences of the COVID-19 pandemic

DISASTERS

LONG-TERM HEALTH OUTCOMES

Consequences of the COVID-19 pandemic

DISASTE

-TERM HEALTH
UTCOMES

Open access Original research

BMJ Open

Impact of disasters, including pandemics, on cardiometabolic outcomes across the life-course: a systematic review

Vanessa De Rubeis ,[1] Jinhee Lee,[1] Muhammad Saqib Anwer,[1] Yulika Yoshida-Montezuma,[1] Alessandra T Andreacchi ,[1] Erica Stone,[1] Saman Iftikhar,[1] Jason D Morgenstern,[1] Reid Rebinsky,[1,2] Sarah E Neil-Sztramko ,[1,3] Elizabeth Alvarez ,[1,4] Emma Apatu,[1,4] Laura N Anderson [1,4]

To cite: De Rubeis V, Lee J, Anwer MS, *et al*. Impact of disasters, including pandemics, on cardiometabolic outcomes across the life-course: a systematic review. *BMJ Open* 2021;**11**:e047152. doi:10.1136/bmjopen-2020-047152

► Prepublication history and supplemental material for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2020-047152).

Received 19 November 2020
Revised 27 March 2021
Accepted 29 March 2021

ABSTRACT

Background Disasters are events that disrupt the daily functioning of a community or society, and may increase long-term risk of adverse cardiometabolic outcomes, including cardiovascular disease, obesity and diabetes. The objective of this study was to conduct a systematic review to determine the impact of disasters, including pandemics, on cardiometabolic outcomes across the life-course.

Design A systematic search was conducted in May 2020 using two electronic databases, EMBASE and Medline. All studies were screened in duplicate at title and abstract, and full-text level. Studies were eligible for inclusion if they assessed the association between a population-level or community disaster and cardiometabolic outcomes ≥1 month following the disaster. There were no restrictions on age, year of publication, country or population. Data were extracted on study characteristics, exposure (eg, type of disaster, region, year), cardiometabolic outcomes and measures of effect. Study quality was evaluated using the Joanna Briggs Institute critical appraisal tools.

Results A total of 58 studies were included, with 24

Strengths and limitations of this study

- This systematic review is one of the first to review the literature on disasters, including pandemics, and subsequent cardiometabolic outcomes throughout the life-course.
- A comprehensive search strategy was used to identify studies that covered a range of disasters (eg, famine, war, terrorism, natural disasters and infectious disease epidemics), periods of exposure from pregnancy, childhood to older adulthood and a wide breadth of cardiometabolic outcomes.
- Only studies published in English were included and a search of the grey literature was not conducted.
- Due to the heterogeneity of studies, a meta-analysis could not be conducted, and results were only synthesised narratively.
- Limited evidence was available on the impact of pandemics specifically, and few studies evaluated proposed mechanisms or risk modification across subgroups of the populations.

The impact of disasters, including pandemics, on cardiometabolic outcomes across the life course: a systematic review

Open access Original research

BMJ Open

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- Limited evidence was available on the impact of pandemics specifically, and few studies evaluated proposed mechanisms or risk modification across subgroups of the populations.

Objective

To conduct a systematic review to determine the impact of disasters, including pandemics, on cardiometabolic outcomes across the life course

Methods

- Systematic search conducted in May 2020 on databases EMBASE and Medline
- Assessed association between population-level disaster and any cardiometabolic outcomes ≥ 1 month following the disaster
- No restrictions on age, year of publication, country or population

Study characteristics (n=58)

62% of studies published in North America

76% of studies published from 2010-2020

71% of studies cohort/longitudinal design

41% of studies investigated pregnancy/childhood exposure

59% of studies investigated adulthood exposure

60% of studies explored impact of natural disaster

71% of studies explored impact on cardiovascular disease

21% of studies explored impact on obesity or BMI

Exposure to disaster and subsequent cardiometabolic outcomes

	Number of studies that found increased risk (n=47)
Exposure to disaster during pregnancy and childhood	
Human-made disasters (n=12)	10
Natural disasters (n=12)	11
Exposure to disaster during adulthood	
Human-made disasters	9
Natural disasters	17

Exposure to disaster and subsequent cardiometabolic outcomes

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For instance, those in utero during the 1918 Influenza pandemic (born April to June 1919) had 36.7% excess risk of diabetes compared to those born after the pandemic (95% CI: 18.9, 54.4)

(Mazumder, 2010)

Exposure to disaster and subsequent cardiometabolic outcomes

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For instance, people with higher perceived stress following Hurricane Ike had an average BMI of 28.43 kg/m^2 compared to those with lower perceived stress who had an average BMI of 20.83 kg/m^2 (p=0.02)

(An, 2015)

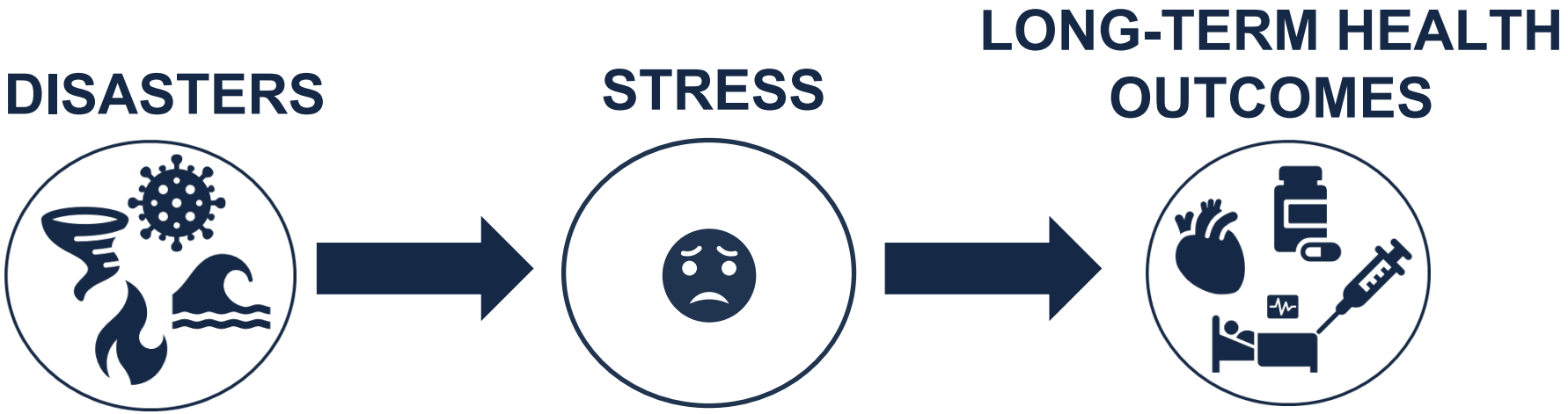
Key Findings

The burden of disasters extends beyond the known direct harm, attention is needed on the detrimental indirect long-term effects on cardiometabolic health, including obesity.

Findings may inform public health prevention strategies to mitigate the impact of disasters, including the COVID-19 pandemic, on future cardiometabolic risk.

Mechanisms underlying this association were not well studied, however, one hypothesized pathway includes stress.

Consequences of the COVID-19 pandemic



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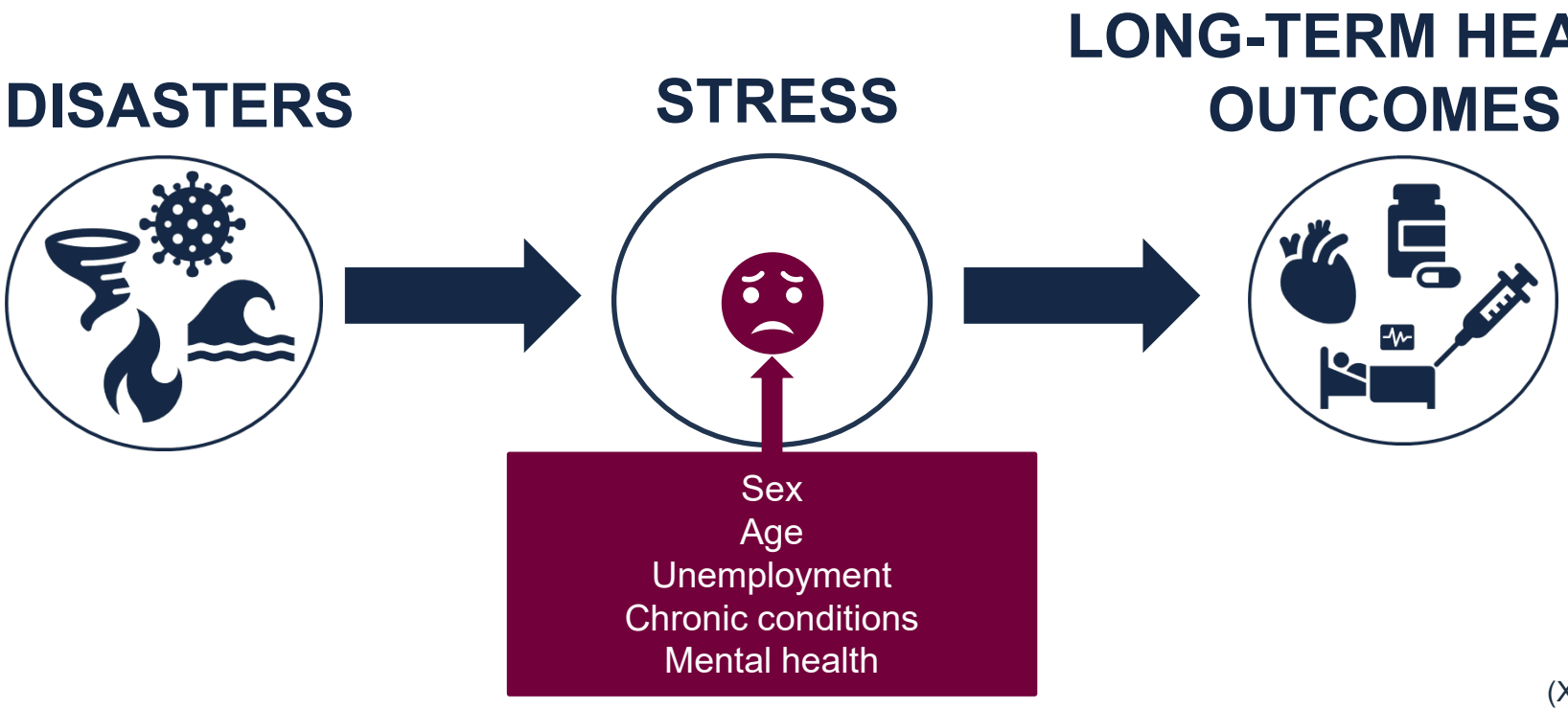
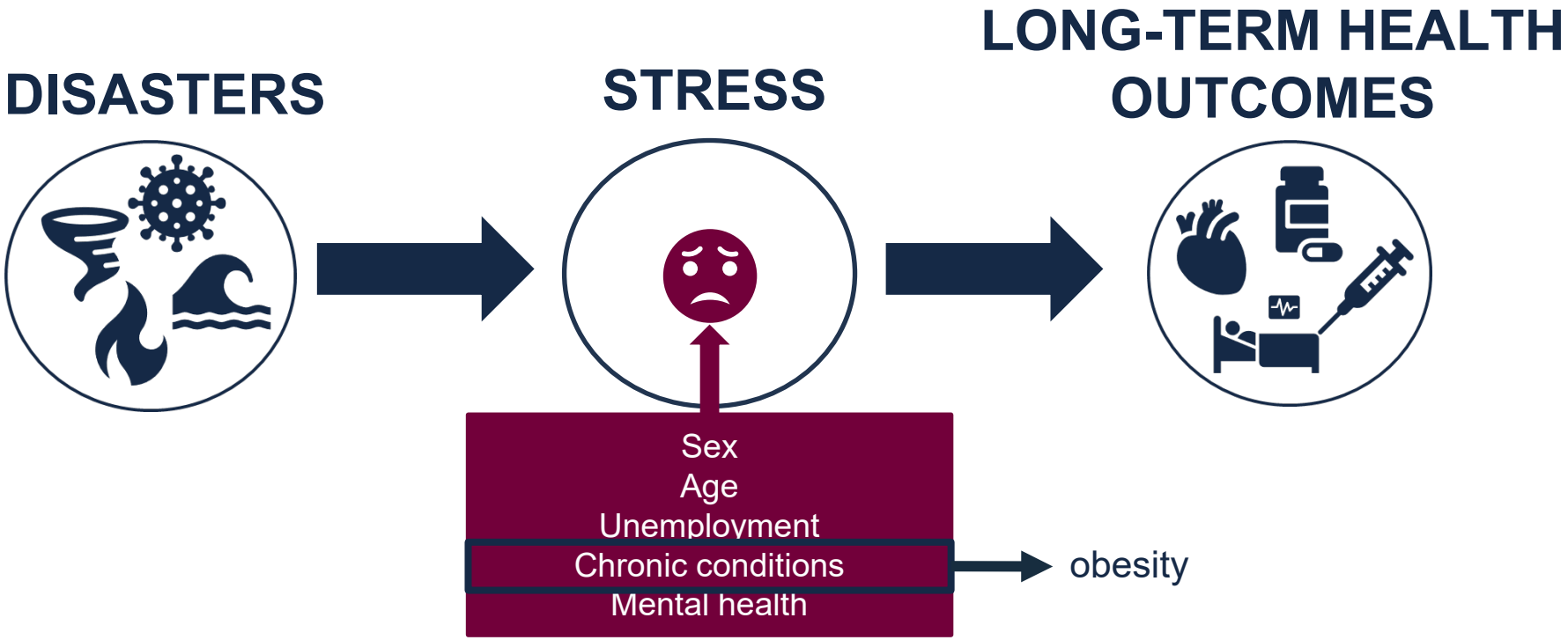


(Xiong, 2020)

Consequences of the COVID-19 pandemic



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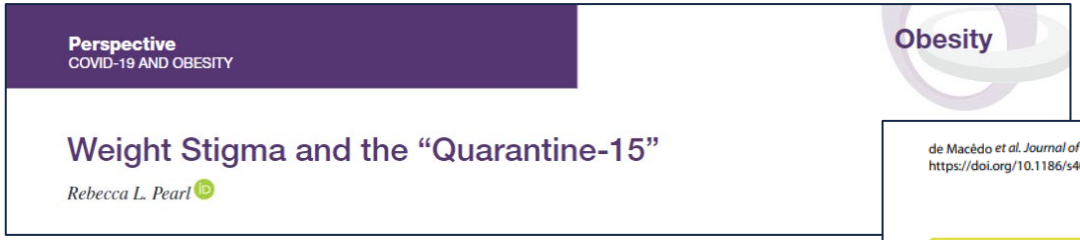
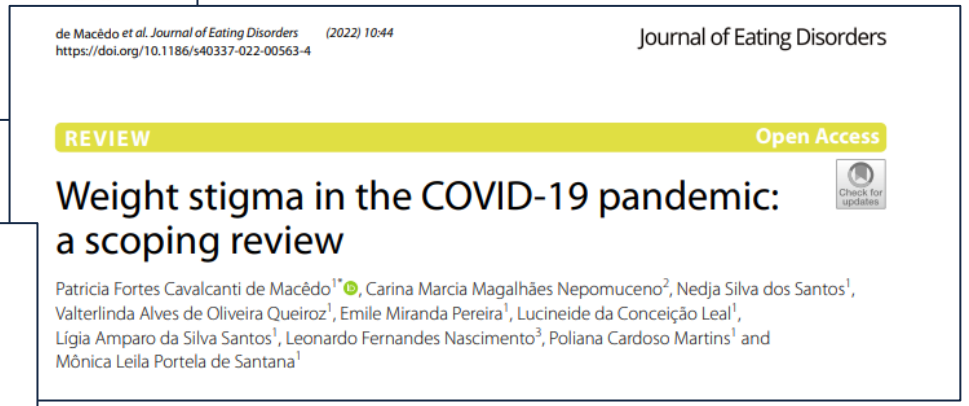


Perspective
COVID-19 AND OBESITY

Obesity

Weight Stigma and the "Quarantine-15"

Rebecca L. Pearl



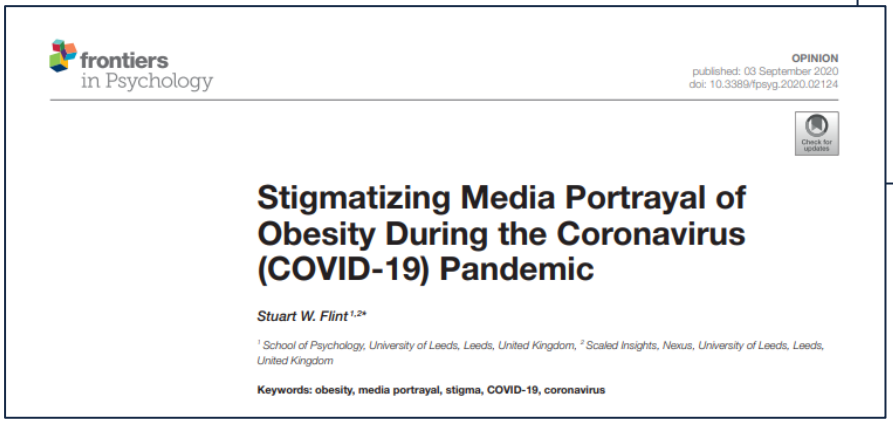
de Macêdo *et al. Journal of Eating Disorders* (2022) 10:44
https://doi.org/10.1186/s40337-022-00563-4

Journal of Eating Disorders

REVIEW Open Access

Weight stigma in the COVID-19 pandemic: a scoping review

Patricia Fortes Cavalcanti de Macêdo[1*], Carina Marcia Magalhães Nepomuceno[2], Nedja Silva dos Santos[1], Valterlinda Alves de Oliveira Queiroz[1], Emile Miranda Pereira[1], Lucineide da Conceição Leal[1], Lígia Amparo da Silva Santos[1], Leonardo Fernandes Nascimento[3], Poliana Cardoso Martins[1] and Mônica Leila Portela de Santana[1]



frontiers in Psychology

OPINION
published: 03 September 2020
doi: 10.3389/fpsyg.2020.02124

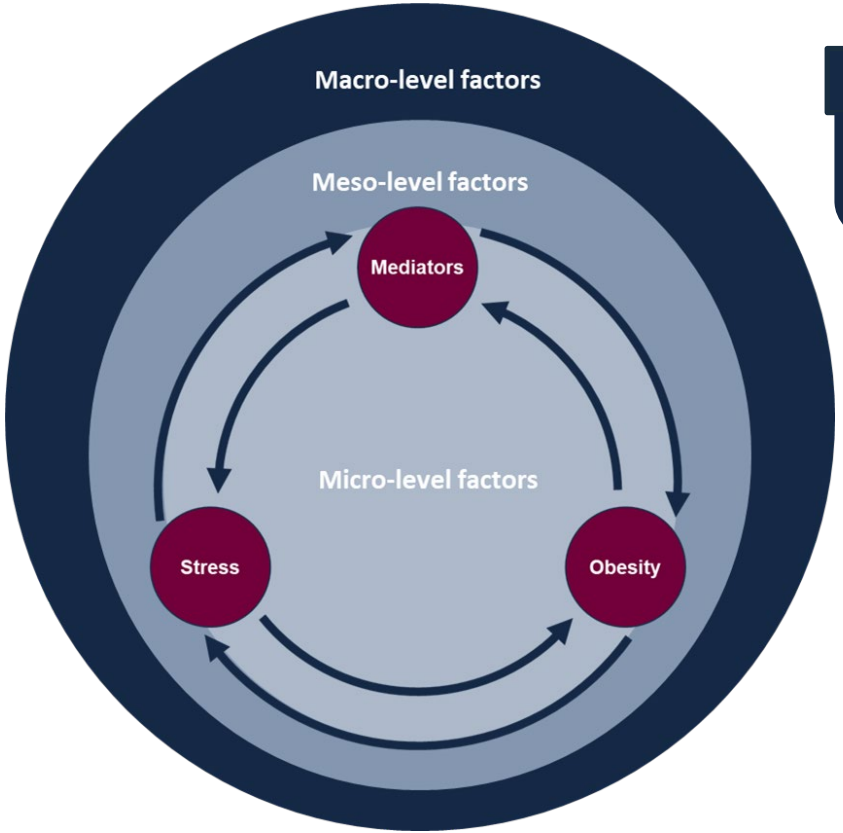
Stigmatizing Media Portrayal of Obesity During the Coronavirus (COVID-19) Pandemic

Stuart W. Flint[1,2*]

[1] School of Psychology, University of Leeds, Leeds, United Kingdom, [2] Scaled Insights, Nexus, University of Leeds, Leeds, United Kingdom

Keywords: obesity, media portrayal, stigma, COVID-19, coronavirus

Complex relationship between obesity & stress

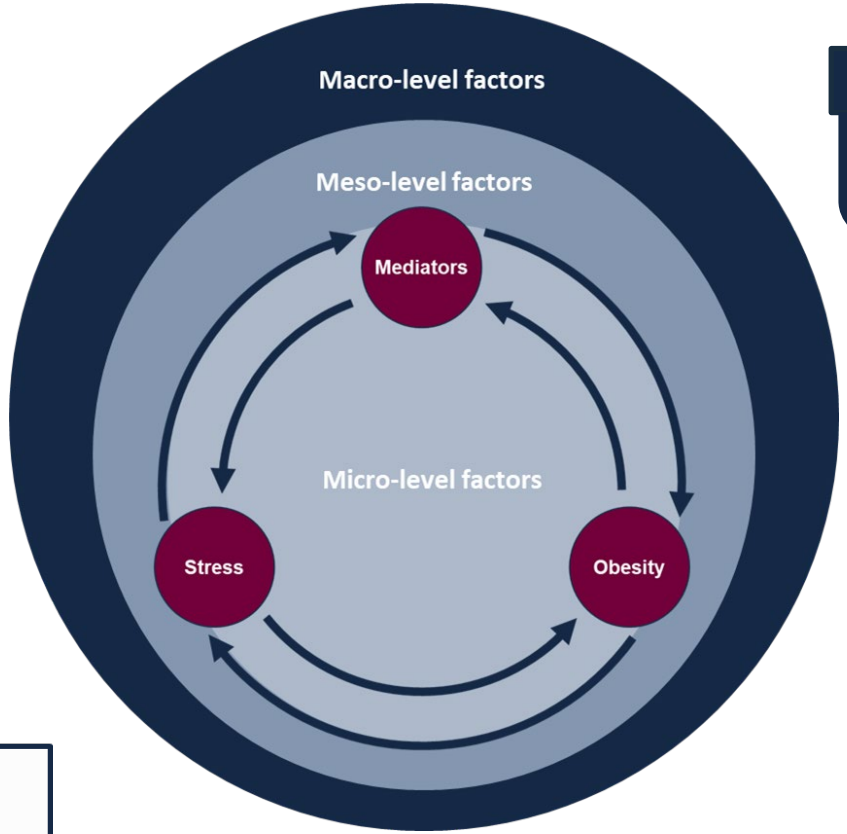


MEDIATORS

- Lifestyle
- Behavioural
- Genetic
- Stress response

Figure adapted from van der Valk et al. 2018

Complex relationship between obesity & stress



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STRESS

- ADVERSE CHILDHOOD EXPERIENCES (ACEs)
- STRESS DURING COVID-19 PANDEMIC

Figure adapted from van der Valk et al. 2018

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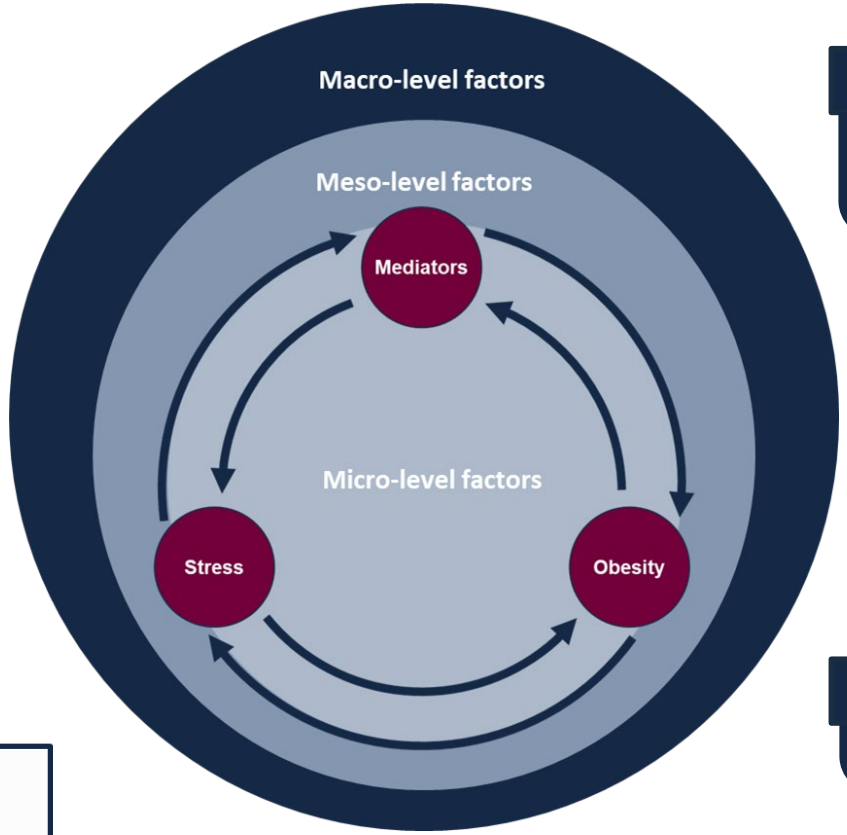

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- STRESS DURING COVID-19 PANDEMIC

OBESITY

- 26% of Canadian adults have obesity

Figure adapted from van der Valk et al. 2018

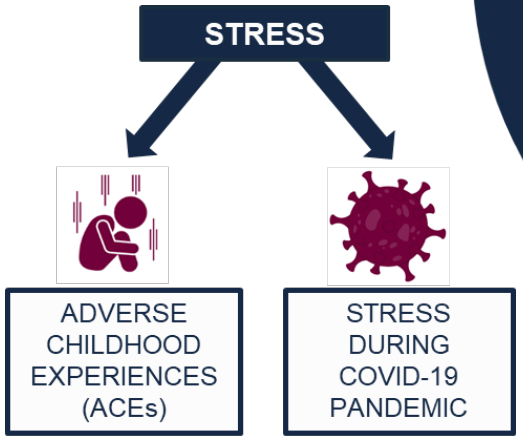
Complex relationship between obesity & stress

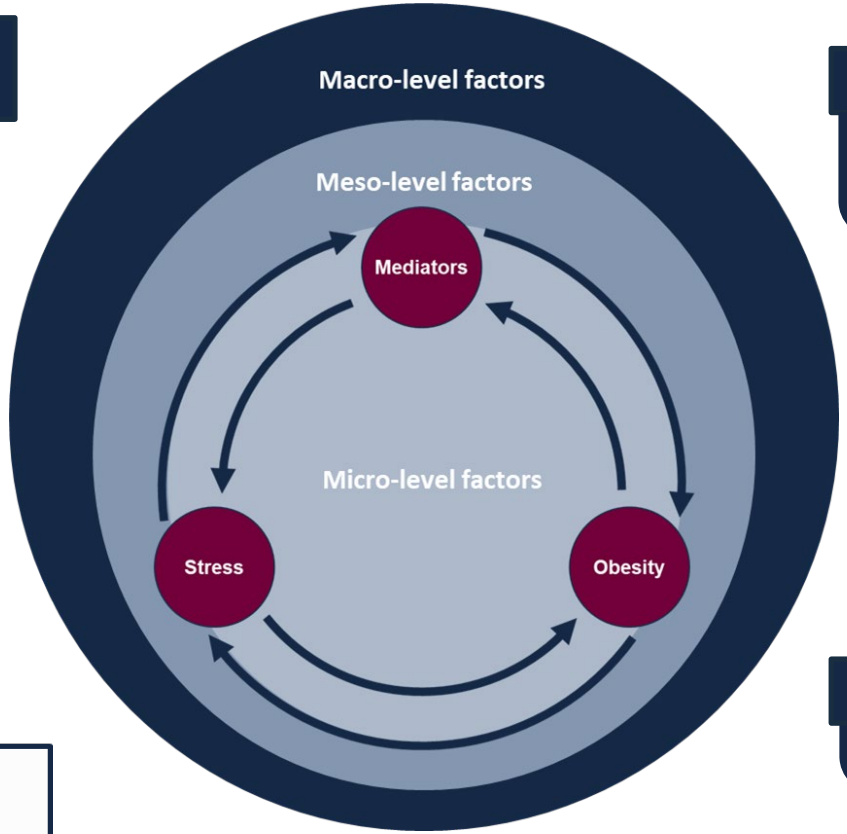
Different factors influencing association

Micro-level: Age, sex

Meso-level: Interactions with family and friends

Macro-level: Economic support for families





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Stress response

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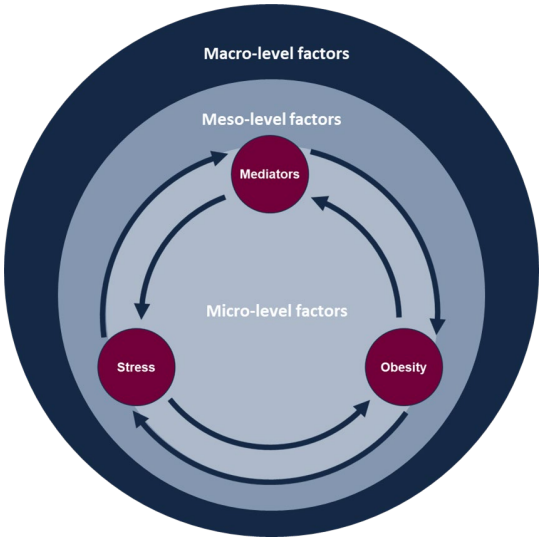

INDIVIDUAL CHARACTERISTICS

ADVERSE CHILDHOOD EXPERIENCES (ACEs)

ADULTHOOD OBESITY

STRESS DURING COVID-19 PANDEMIC

Objectives

<u>Overall objective</u>: To understanding experiences of stress during the COVID-19 pandemic among Canadian adults

1. Describe stress during the COVID-19 pandemic by socioeconomic factors

2. Determine how ACEs and obesity impacted stress during the COVID-19 pandemic

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Canadian Longitudinal Study on Aging (CLSA)

Characteristics of CLSA COVID-19 Exit Survey participants (n=23,785)

55%
female

58%
household income
$50,000 to $150,000

66%
aged 65 to 96
years

97%
white racial
background

78%
post-secondary
degree or diploma

82%
live in urban
setting

61%
reported one
or more ACE

31% have
obesity

Measures of stress at CLSA COVID-19 Exit Survey

(King & Laplante, 2005)

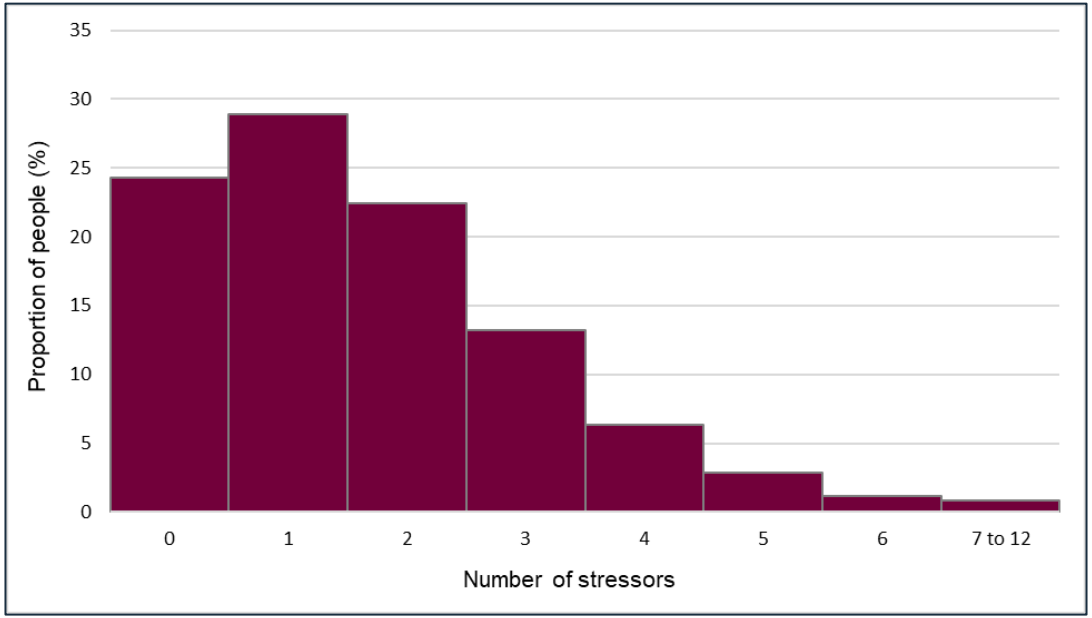
Stressors

Participants were asked if they had experienced any of the 12 stressors since the start of the pandemic:

- Participant ill
- Someone close to participant ill
- Someone close died
- Loss of income
- Unable to access food/supplies
- Increased caregiving
- Unable to care for others
- Unable to access healthcare
- Unable to access prescriptions
- Increased conflict
- Separation from family
- Breakdown in family relationships

Total Stressor Score

Sum of total reported stressors (Range: 0-12)



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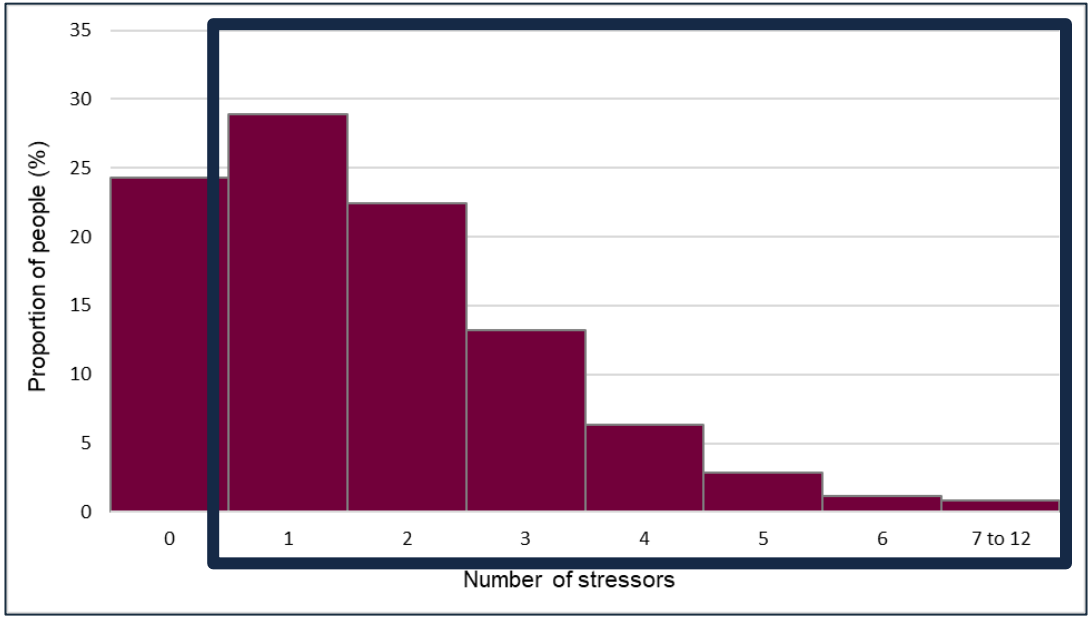


Stressor Domains

HEALTH DOMAIN

- Participant ill
- Someone close to participant ill
- Someone close died

RESOURCES DOMAIN

- Loss of income
- Unable to access food/supplies
- Unable to access healthcare
- Unable to access prescriptions

RELATIONSHIPS DOMAIN

- Increased conflict
- Separation from family
- Breakdown in family relationships

CAREGIVING DOMAIN

- Increased caregiving
- Unable to care for others

Proportion of people who experienced one or more stressor within each domain:

32%
health domain

34%
resources domain

54%
relationships domain

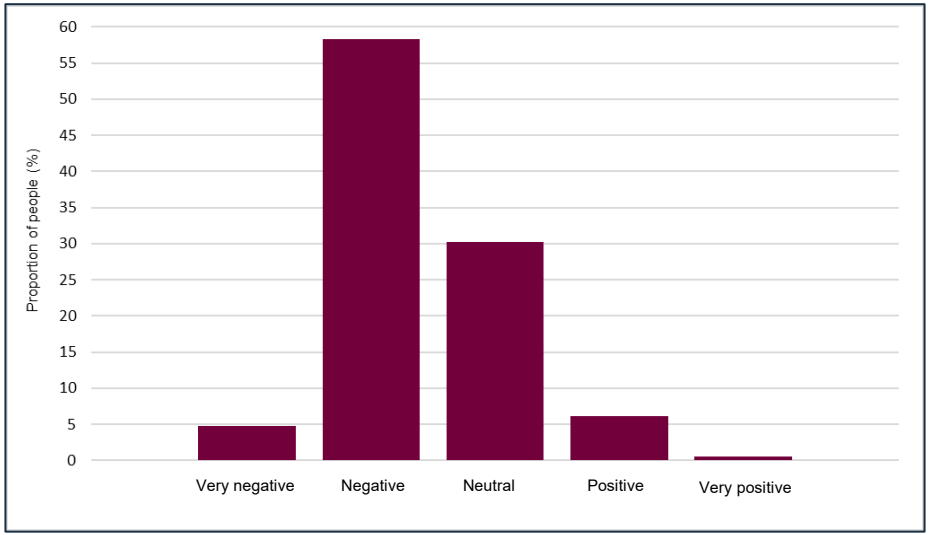
17%
caregiving domain

Perceived consequences of the pandemic

"Taking everything about COVID-19 into account, how would you describe the consequences of COVID-19 on you and your household?"

Response options: 5-point Likert scale ranging from very negative to very positive
Dichotomized as: Negative/Very negative versus Neutral/Positive/Very positive

(Lazarus & Folkman, 1984)



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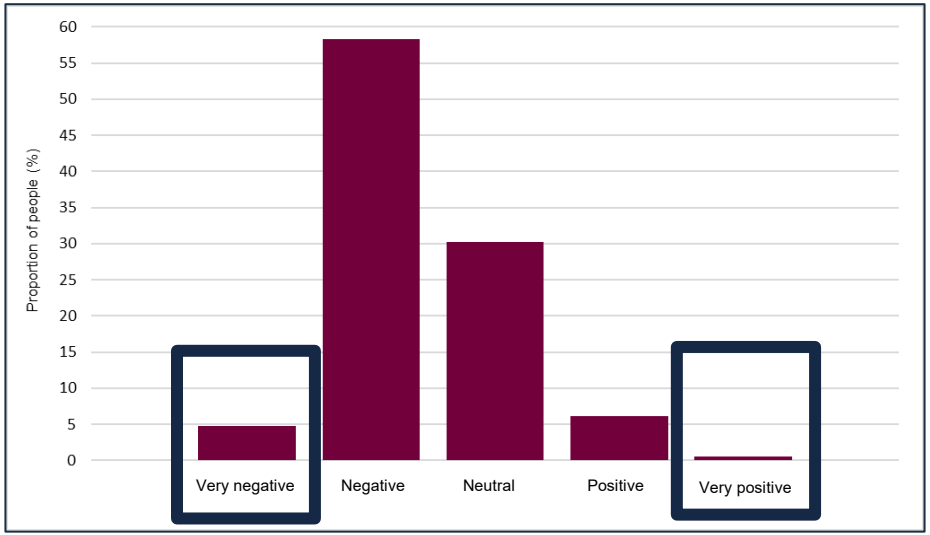

1

Stressors and perceived consequences of the COVID-19 pandemic among older adults: a cross-sectional study using data from the Canadian Longitudinal Study on Aging (CLSA)

Vanessa De Rubeis, Laura N. Anderson, Jayati Khattar, Margaret de Groh, Ying Jiang, Urun Erbas Oz, Nicole E. Basta, Susan Kirkland, Christina Wolfson, Lauren E. Griffith, Parminder Raina on behalf of the Canadian Longitudinal Study on Aging (CLSA) Team

Published in CMAJ Open

Objectives

1. To describe the prevalence of stressors and the perceived consequences reported by older adults during the COVID-19 pandemic

2. To evaluate how they differed by socioeconomic factors.

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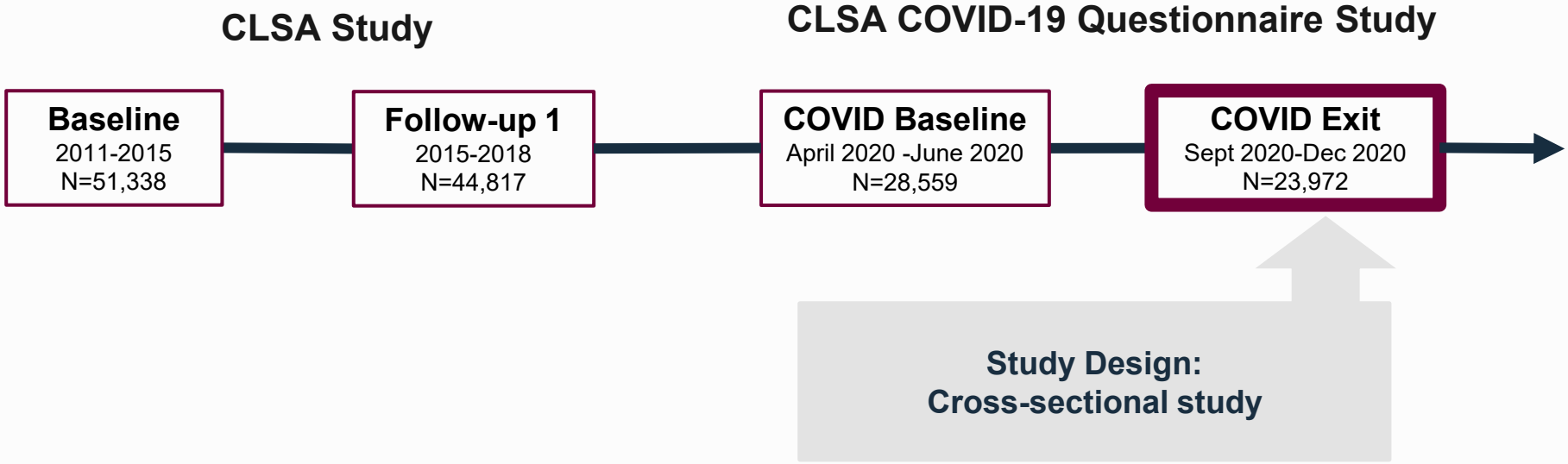
Étude longitudinale canadienne sur le vieillissement

Data source & Study design

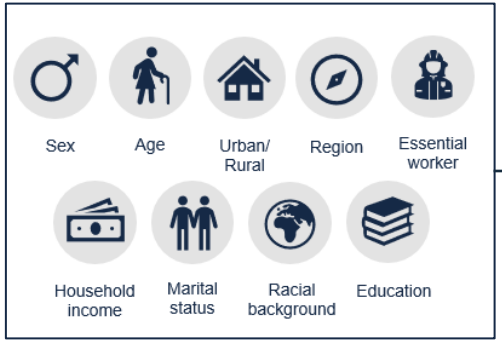


Socioeconomic factors

Sex | Age | Urban/ Rural | Region | Essential worker

Household income | Marital status | Racial background | Education

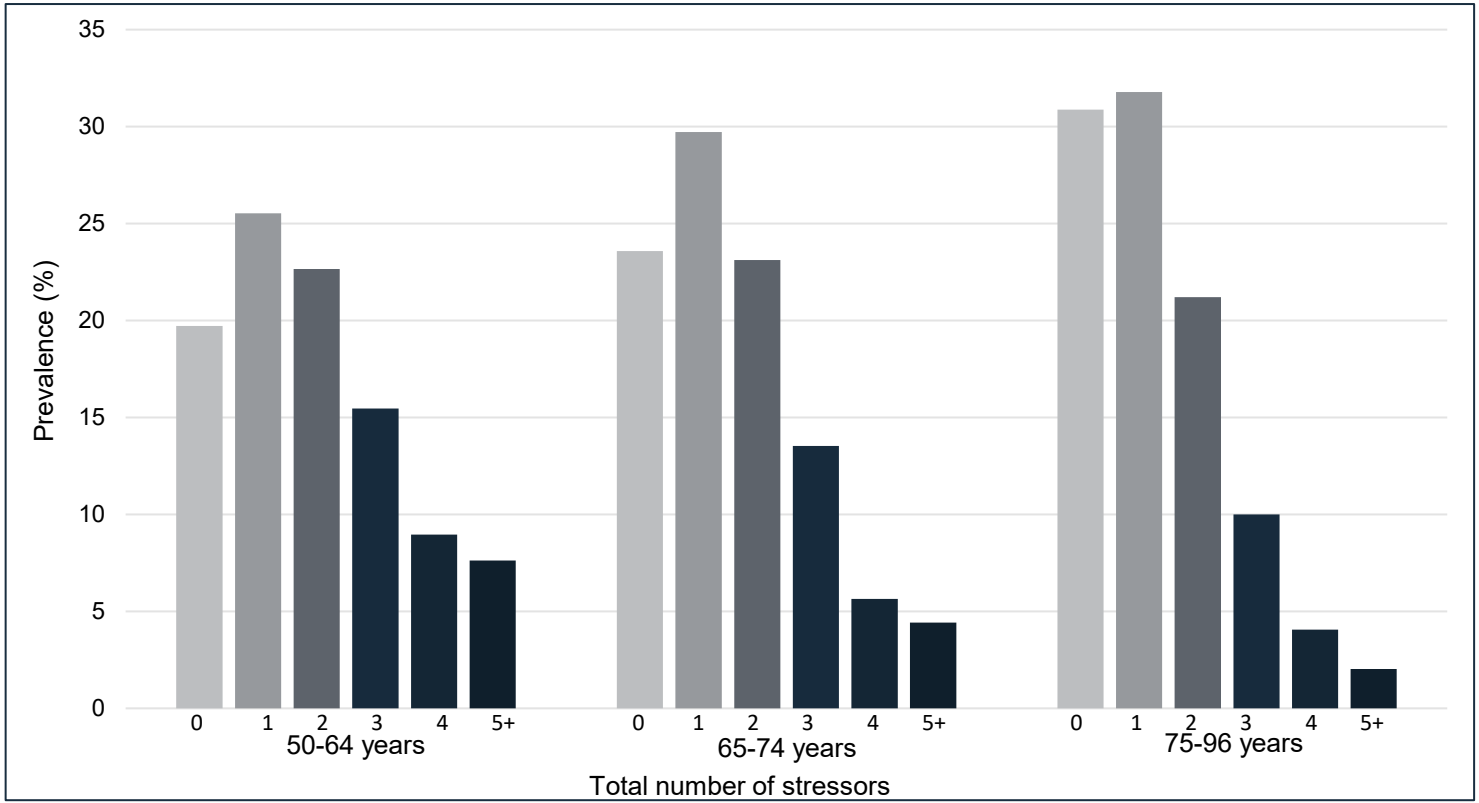
Statistical analyses



1) STRESSORS (Logistic regression)
2)TOTAL STRESSOR SCORE (Negative binomial regression)
3) PERCEIVED CONSEQUENCES (Logistic regression)

Software: SAS 9.4
PROC GENMOD estimate prevalence ratios (PRs) and 95% confidence intervals
Adjusted models for all SES variables: sex, age group, urban/rural, region, essential worker, household income, marital status, racial background and education

Prevalence of total reported stressors by age group among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)



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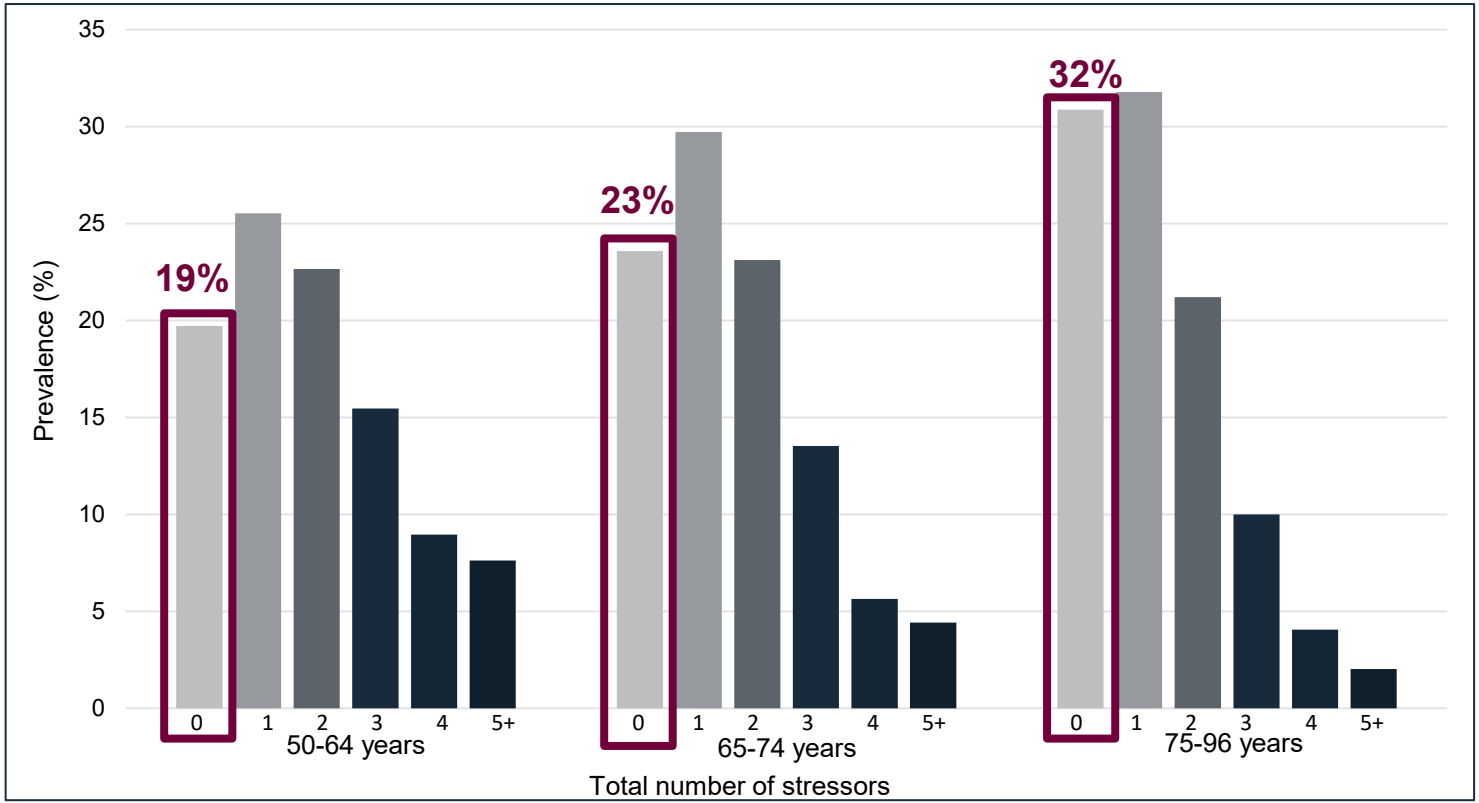

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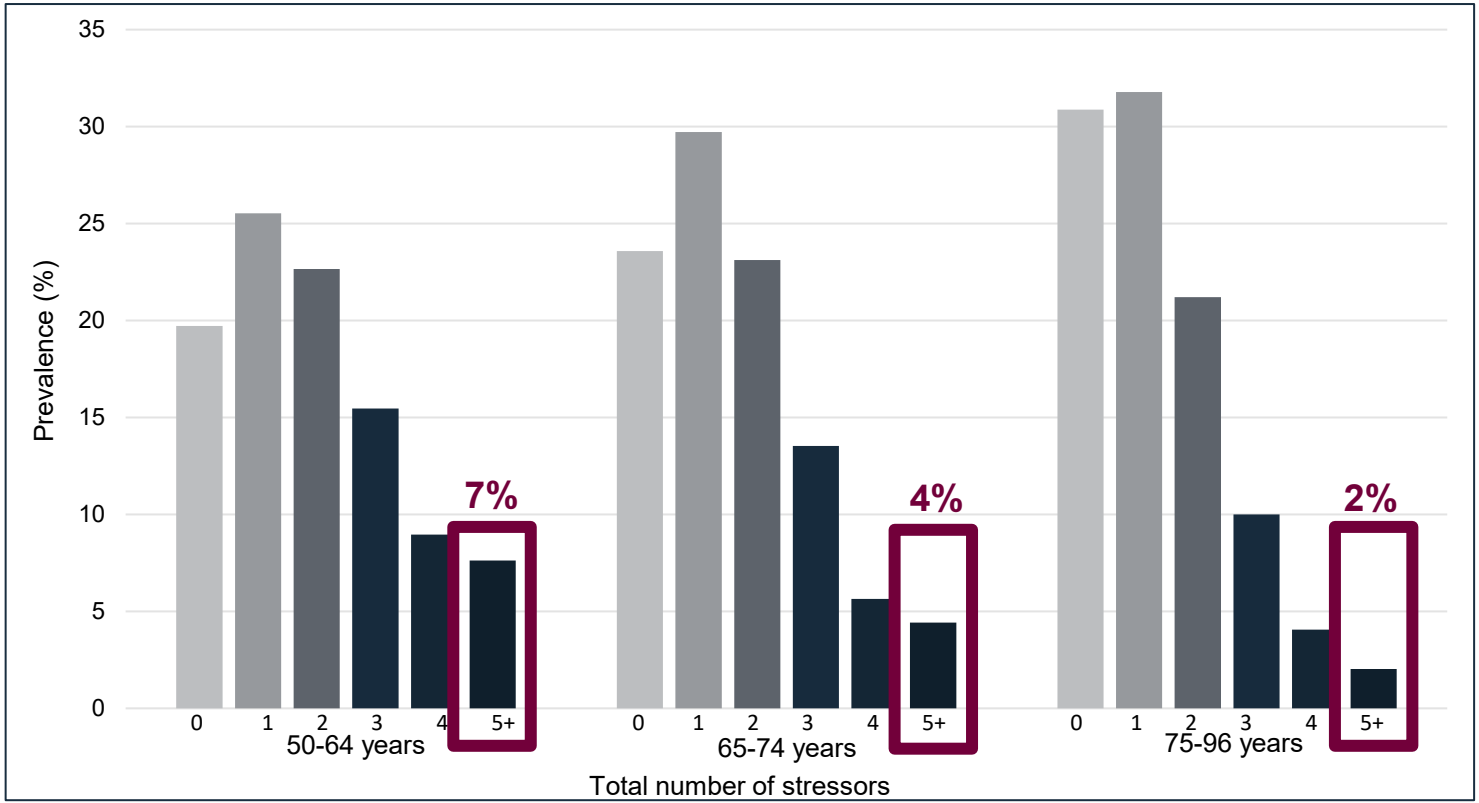
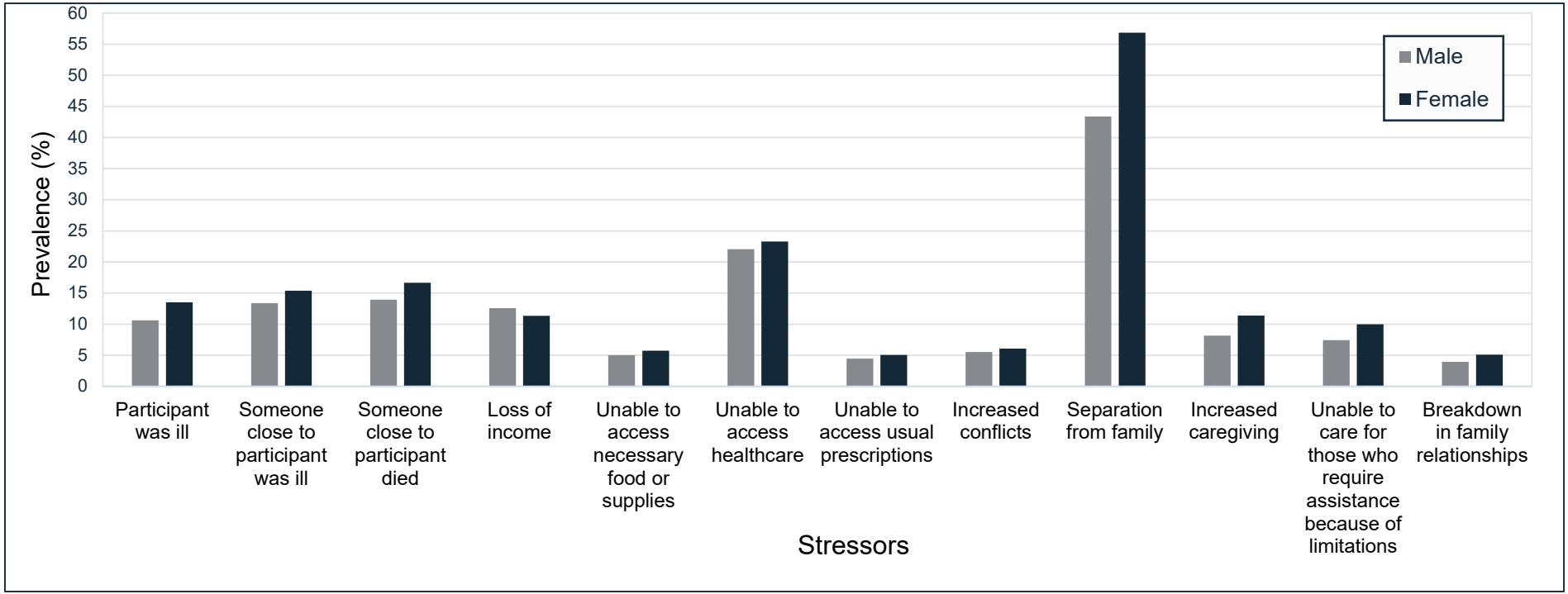


Prevalence of stressors among Canadian adults by sex group among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)



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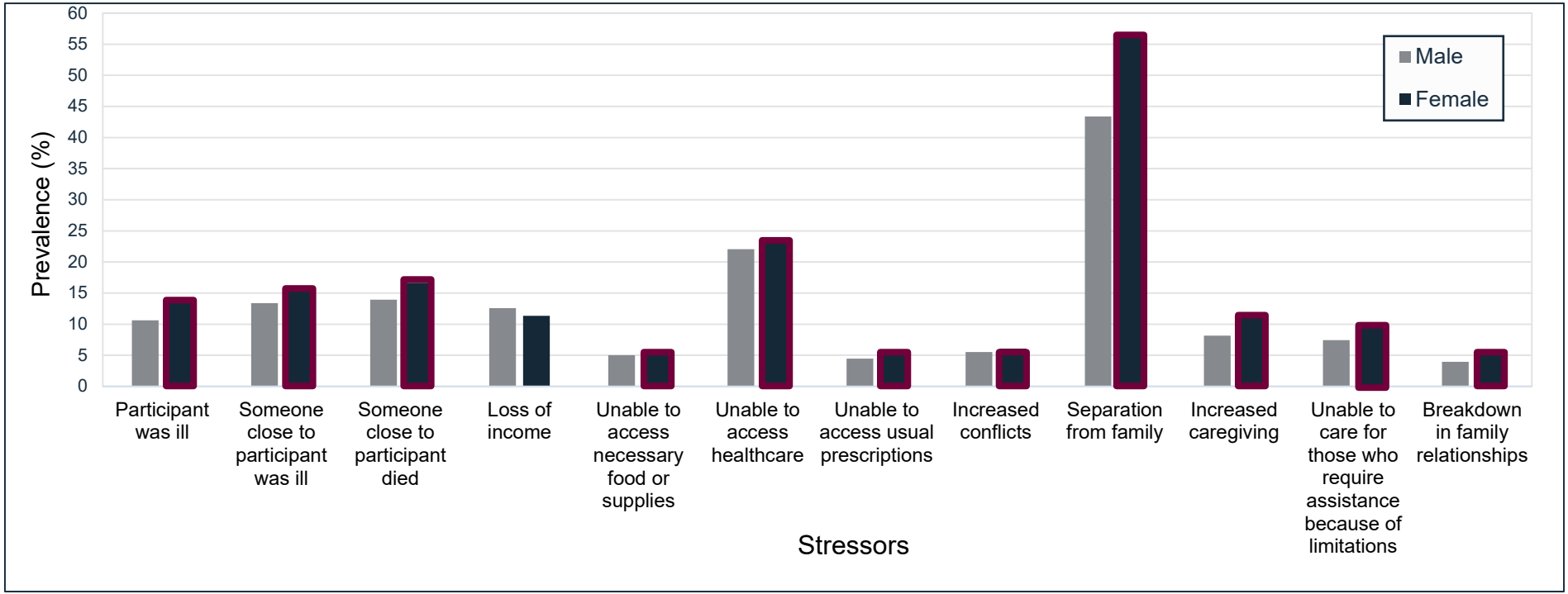
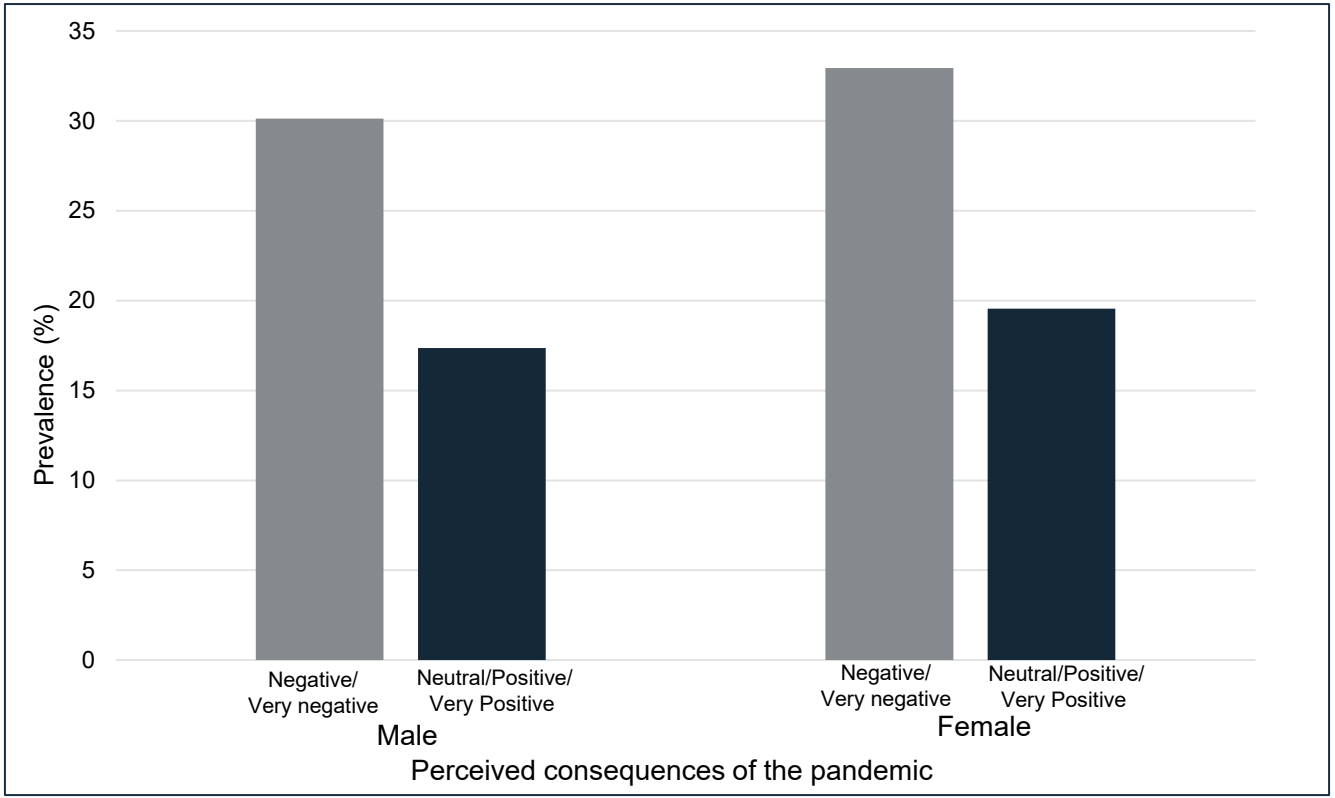


Perceived consequences of the COVID-19 pandemic experienced by Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)



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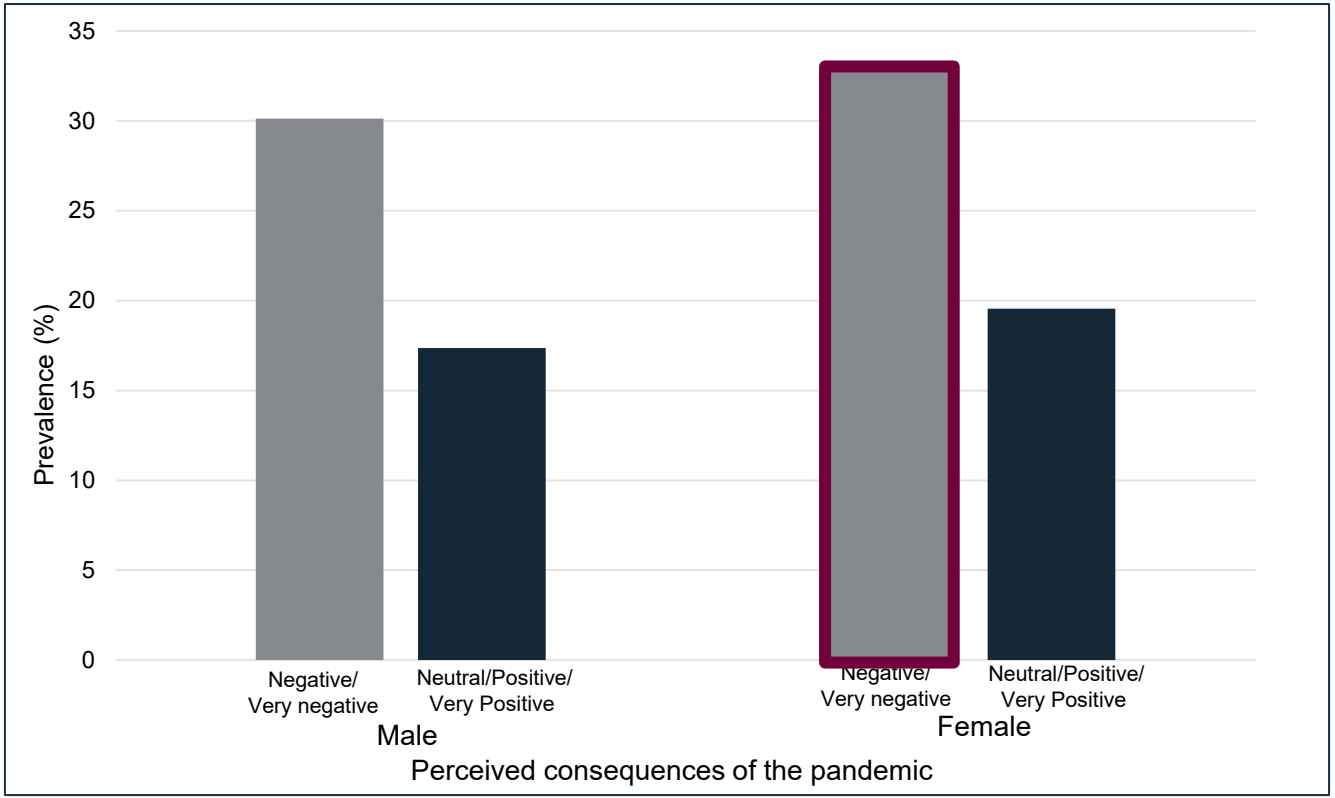

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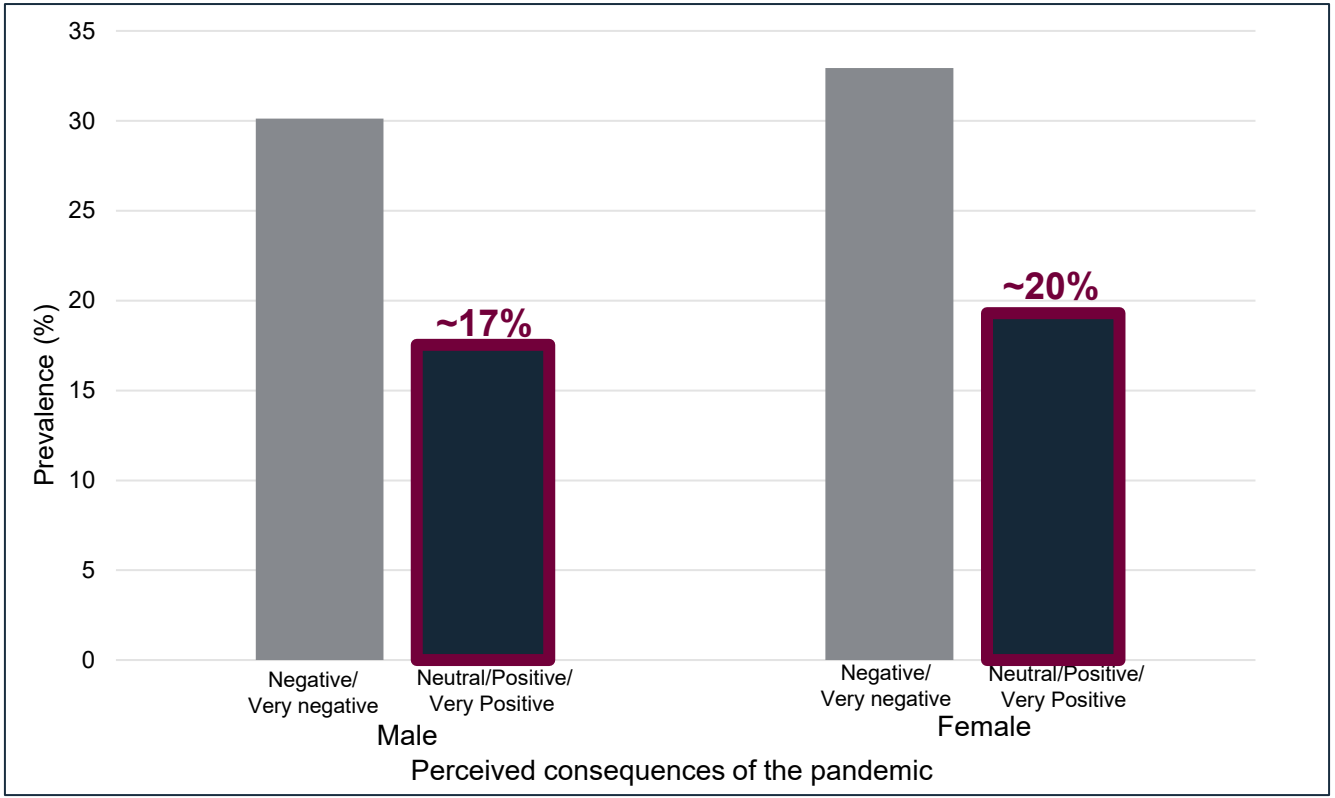
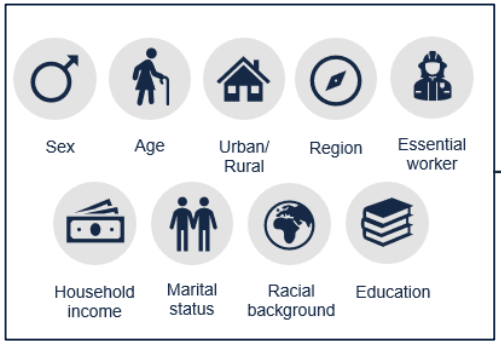


Results



1) STRESSORS
2) TOTAL STRESSOR SCORE
3) PERCEIVED CONSEQUENCES

The adjusted association between socioeconomic characteristics and **individual stressors** among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressors Adjusted PR (95% CI) [1]					
	1. Participant was ill	2. Someone close to participant was ill	3. Someone close to participant died	4. Loss of income	5. Unable to access necessary food or supplies	6. Unable to access healthcare
Sex						
Male	**1.00**	**1.00**	**1.00**	1.00	1.00	1.00
Female	**1.22 (1.14, 1.33)**	**1.16 (1.09, 1.24)**	**1.17 (1.10, 1.25)**	0.89 (0.83, 0.96)	1.05 (0.93, 1.18)	1.05 (1.00, 1.09)
Age group						
50-64 years	1.00	1.00	1.00	1.00	1.00	1.00
65-74 years	**0.90 (0.82, 0.99)**	**0.84 (0.77, 0.92)**	0.96 (0.88, 1.05)	**0.62 (0.57, 0.68)**	**0.63 (0.54 ,0.72)**	**0.92 (0.87, 0.98)**
75-96 years	**0.70 (0.62, 0.78)**	**0.80 (0.72, 0.88)**	1.04 (0.95, 1.15)	**0.31 (0.26, 0.36)**	**0.36 (0.29, 0.43)**	**0.68 (0.63, 0.74)**
Education						
Secondary school graduation or less	**0.87 (0.77, 0.97)**	**0.86 (0.77, 0.95)**	0.97 (0.88, 1.07)	0.95 (0.85, 1.07)	0.90 (0.75, 1.07)	**0.90 (0.84, 0.98)**
Some post-secondary education	1.01 (0.75, 1.15)	1.09 (0.96, 1.23)	1.05 (0.93, 1.18)	1.02 (0.89, 1.16)	1.14 (0.93, 1.38)	1.01 (0.92, 1.10)
Post-secondary degree or diploma	1.00	1.00	1.00	1.00	1.00	1.00
Household income						
Less than $50,000	**1.22 (1.08, 1.38)**	1.04 (0.93, 1.16)	1.08 (0.98, 1.20)	**1.31 (1.17, 1.47)**	**1.40 (1.16, 1.69)**	1.03 (0.95, 1.12)
$50,000 or more, but less than $100,000	1.04 (0.93, 1.15)	1.02 (0.94, 1.12)	0.99 (0.91, 1.09)	1.03 (0.94, 1.14)	1.10 (0.93, 1.29)	1.03 (0.96, 1.10)
$100,000 or more, but less than $150,000	1.00	1.00	1.00	1.00	1.00	1.00
$150,000 or more	1.05 (0.93, 1.19)	1.04 (0.94, 1.16)	**0.86 (0.77, 0.96)**	**0.84 (0.76, 0.93)**	1.10 (0.92, 1.32)	0.96 (0.88, 1.04)
Region						
Atlantic	1.00	1.00	1.00	1.00	1.00	1.00
Quebec	1.01 (0.89, 1.14)	**1.52 (1.37, 1.69)**	0.84 (0.76, 0.94)	1.02 (0.90, 1.16)	0.47 (0.37, 0.60)	0.53 (0.48, 0.58)
Ontario	1.07 (0.95, 1.19)	1.08 (0.97, 1.21)	0.91 (0.83, 1.01)	1.29 (1.14, 1.45)	1.34 (1.13, 1.60)	1.19 (1.11, 1.28)
Prairies	0.96 (0.85, 1.08)	1.16 (1.04, 1.30)	0.88 (0.79, 0.97)	1.50 (1.34, 1.68)	1.19 (0.99, 1.42)	0.70 (0.64, 0.76)
British Columbia	**1.13 (1.01, 1.27)**	1.09 (0.97, 1.22)	0.83 (0.75, 0.92)	1.44 (1.28, 1.62)	1.41 (1.18, 1.69)	1.03 (0.96, 1.11)
Marital Status						
Single (never married/never lived with partner)	**1.18 (1.03, 1.34)**	**0.85 (0.75, 0.97)**	0.94 (0.83, 1.07)	0.95 (0.84, 1.08)	1.06 (0.85, 1.30)	1.06 (0.96, 1.16)
Married or common law relationship	1.00	1.00	1.00	1.00	1.00	1.00
Widowed	1.06 (0.92, 1.22)	**0.82 (0.71, 0.93)**	1.01 (0.90, 1.14)	0.86 (0.71, 1.03)	0.98 (0.76, 1.25)	0.95 (0.86, 1.06)
Divorced and separated	**1.15 (1.02, 1.29)**	**0.81 (0.72, 0.91)**	1.00 (0.90, 1.11)	**1.12 (1.01, 1.24)**	**1.35 (1.13, 1.59)**	1.08 (0.99, 1.16)

1. Adjusted for: sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **individual stressors** among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressors Adjusted PR (95% CI) [1]					
	1. Participant was ill	2. Someone close to participant was ill	3. Someone close to participant died	4. Loss of income	5. Unable to access necessary food or supplies	6. Unable to access healthcare
Sex						
Male	**1.00**	**1.00**	**1.00**	1.00	1.00	1.00
Female	**1.22 (1.14, 1.33)**	**1.16 (1.09, 1.24)**	**1.17 (1.10, 1.25)**	0.89 (0.83, 0.96)	1.05 (0.93, 1.18)	1.05 (1.00, 1.09)
Age group						
50-64 years	1.00	1.00	1.00	1.00	1.00	1.00
65-74 years	**0.90 (0.82, 0.99)**	**0.84 (0.77, 0.92)**	0.96 (0.88, 1.05)	**0.62 (0.57, 0.68)**	**0.63 (0.54 ,0.72)**	**0.92 (0.87, 0.98)**
75-96 years	**0.70 (0.62, 0.78)**	**0.80 (0.72, 0.88)**	1.04 (0.95, 1.15)	**0.31 (0.26, 0.36)**	**0.36 (0.29, 0.43)**	**0.68 (0.63, 0.74)**
Education						
Secondary school graduation or less	**0.87 (0.77, 0.97)**	**0.86 (0.77, 0.95)**	0.97 (0.88, 1.07)	0.95 (0.85, 1.07)	0.90 (0.75, 1.07)	**0.90 (0.84, 0.98)**
Some post-secondary education	1.01 (0.75, 1.15)	1.09 (0.96, 1.23)	1.05 (0.93, 1.18)	1.02 (0.89, 1.16)	1.14 (0.93, 1.38)	1.01 (0.92, 1.10)
Post-secondary degree or diploma	1.00	1.00	1.00	1.00	1.00	1.00
Household income						
Less than $50,000	**1.22 (1.08, 1.38)**	1.04 (0.93, 1.16)	1.08 (0.98, 1.20)	**1.31 (1.17, 1.47)**	**1.40 (1.16, 1.69)**	1.03 (0.95, 1.12)
$50,000 or more, but less than $100,000	1.04 (0.93, 1.15)	1.02 (0.94, 1.12)	0.99 (0.91, 1.09)	1.03 (0.94, 1.14)	1.10 (0.93, 1.29)	1.03 (0.96, 1.10)
$100,000 or more, but less than $150,000	1.00	1.00	1.00	1.00	1.00	1.00
$150,000 or more	1.05 (0.93, 1.19)	1.04 (0.94, 1.16)	**0.86 (0.77, 0.96)**	**0.84 (0.76, 0.93)**	1.10 (0.92, 1.32)	0.96 (0.88, 1.04)
Region						
Atlantic	1.00	1.00	1.00	1.00	1.00	1.00
Quebec	1.01 (0.89, 1.14)	**1.52 (1.37, 1.69)**	0.84 (0.76, 0.94)	1.02 (0.90, 1.16)	0.47 (0.37, 0.60)	0.53 (0.48, 0.58)
Ontario	1.07 (0.95, 1.19)	1.08 (0.97, 1.21)	0.91 (0.83, 1.01)	1.29 (1.14, 1.45)	1.34 (1.13, 1.60)	1.19 (1.11, 1.28)
Prairies	0.96 (0.85, 1.08)	1.16 (1.04, 1.30)	0.88 (0.79, 0.97)	1.50 (1.34, 1.68)	1.19 (0.99, 1.42)	0.70 (0.64, 0.76)
British Columbia	**1.13 (1.01, 1.27)**	1.09 (0.97, 1.22)	0.83 (0.75, 0.92)	1.44 (1.28, 1.62)	1.41 (1.18, 1.69)	1.03 (0.96, 1.11)
Marital Status						
Single (never married/never lived with partner)	**1.18 (1.03, 1.34)**	**0.85 (0.75, 0.97)**	0.94 (0.83, 1.07)	0.95 (0.84, 1.08)	1.06 (0.85, 1.30)	1.06 (0.96, 1.16)
Married or common law relationship	1.00	1.00	1.00	1.00	1.00	1.00
Widowed	1.06 (0.92, 1.22)	**0.82 (0.71, 0.93)**	1.01 (0.90, 1.14)	0.86 (0.71, 1.03)	0.98 (0.76, 1.25)	0.95 (0.86, 1.06)
Divorced and separated	**1.15 (1.02, 1.29)**	**0.81 (0.72, 0.91)**	1.00 (0.90, 1.11)	**1.12 (1.01, 1.24)**	**1.35 (1.13, 1.59)**	1.08 (0.99, 1.16)

1. Adjusted for: sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **individual stressors** among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressors Adjusted PR (95% CI) [1]					
	1. Participant was ill	2. Someone close to participant was ill	3. Someone close to participant died	4. Loss of income	5. Unable to access necessary food or supplies	6. Unable to access healthcare
Sex						
Male	**1.00**	**1.00**	**1.00**	1.00	1.00	1.00
Female	**1.22 (1.14, 1.33)**	**1.16 (1.09, 1.24)**	**1.17 (1.10, 1.25)**	0.89 (0.83, 0.96)	1.05 (0.93, 1.18)	1.05 (1.00, 1.09)
Age group						
50-64 years	1.00	1.00	1.00	1.00	1.00	1.00
65-74 years	**0.90 (0.82, 0.99)**	**0.84 (0.77, 0.92)**	0.96 (0.88, 1.05)	**0.62 (0.57, 0.68)**	**0.63 (0.54 ,0.72)**	**0.92 (0.87, 0.98)**
75-96 years	**0.70 (0.62, 0.78)**	**0.80 (0.72, 0.88)**	1.04 (0.95, 1.15)	**0.31 (0.26, 0.36)**	**0.36 (0.29, 0.43)**	**0.68 (0.63, 0.74)**
Education						
Secondary school graduation or less	**0.87 (0.77, 0.97)**	**0.86 (0.77, 0.95)**	0.97 (0.88, 1.07)	0.95 (0.85, 1.07)	0.90 (0.75, 1.07)	**0.90 (0.84, 0.98)**
Some post-secondary education	1.01 (0.75, 1.15)	1.09 (0.96, 1.23)	1.05 (0.93, 1.18)	1.02 (0.89, 1.16)	1.14 (0.93, 1.38)	1.01 (0.92, 1.10)
Post-secondary degree or diploma	1.00	1.00	1.00	1.00	1.00	1.00
Household income						
Less than $50,000	**1.22 (1.08, 1.38)**	1.04 (0.93, 1.16)	1.08 (0.98, 1.20)	**1.31 (1.17, 1.47)**	**1.40 (1.16, 1.69)**	1.03 (0.95, 1.12)
$50,000 or more, but less than $100,000	1.04 (0.93, 1.15)	1.02 (0.94, 1.12)	0.99 (0.91, 1.09)	1.03 (0.94, 1.14)	1.10 (0.93, 1.29)	1.03 (0.96, 1.10)
$100,000 or more, but less than $150,000	1.00	1.00	1.00	1.00	1.00	1.00
$150,000 or more	1.05 (0.93, 1.19)	1.04 (0.94, 1.16)	**0.86 (0.77, 0.96)**	**0.84 (0.76, 0.93)**	1.10 (0.92, 1.32)	0.96 (0.88, 1.04)
Region						
Atlantic	1.00	1.00	1.00	1.00	1.00	1.00
Quebec	1.01 (0.89, 1.14)	**1.52 (1.37, 1.69)**	0.84 (0.76, 0.94)	1.02 (0.90, 1.16)	0.47 (0.37, 0.60)	0.53 (0.48, 0.58)
Ontario	1.07 (0.95, 1.19)	1.08 (0.97, 1.21)	0.91 (0.83, 1.01)	1.29 (1.14, 1.45)	1.34 (1.13, 1.60)	1.19 (1.11, 1.28)
Prairies	0.96 (0.85, 1.08)	1.16 (1.04, 1.30)	0.88 (0.79, 0.97)	1.50 (1.34, 1.68)	1.19 (0.99, 1.42)	0.70 (0.64, 0.76)
British Columbia	**1.13 (1.01, 1.27)**	1.09 (0.97, 1.22)	0.83 (0.75, 0.92)	1.44 (1.28, 1.62)	1.41 (1.18, 1.69)	1.03 (0.96, 1.11)
Marital Status						
Single (never married/never lived with partner)	**1.18 (1.03, 1.34)**	**0.85 (0.75, 0.97)**	0.94 (0.83, 1.07)	0.95 (0.84, 1.08)	1.06 (0.85, 1.30)	1.06 (0.96, 1.16)
Married or common law relationship	1.00	1.00	1.00	1.00	1.00	1.00
Widowed	1.06 (0.92, 1.22)	**0.82 (0.71, 0.93)**	1.01 (0.90, 1.14)	0.86 (0.71, 1.03)	0.98 (0.76, 1.25)	0.95 (0.86, 1.06)
Divorced and separated	**1.15 (1.02, 1.29)**	**0.81 (0.72, 0.91)**	1.00 (0.90, 1.11)		**1.35 (1.13, 1.59)**	1.08 (0.99, 1.16)

1. Adjusted for: sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **individual stressors** among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressors Adjusted PR (95% CI) [1]					
	7. Unable to access usual prescriptions	8. Increased conflict	9. Separation from family	10. Increased caregiving	11. Unable to care for those who require assistance	12. Breakdown in family relationships
Sex						
Male	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.11 (0.98, 1.26)	1.10 (0.98, 1.23)	**1.31 (1.28, 1.35)**	**1.49 (1.37, 1.62)**	**1.33 (1.22, 1.45)**	**1.28 (1.12, 1.45)**
Age group						
50-64 years	1.00	1.00	1.00	1.00	1.00	1.00
65-74 years	**0.82 (0.70, 0.96)**	**0.69 (0.60, 0.79)**	1.01 (0.97, 1.04)	**0.70 (0.63, 0.78)**	**0.78 (0.70, 0.87)**	**0.68 (0.58, 0.80)**
75-96 years	**0.62 (0.51, 0.75)**	**0.57 (0.47, 0.67)**	**0.87 (0.83, 0.90)**	**0.52 (0.46, 0.60)**	**0.51 (0.44, 0.59)**	**0.50 (0.41, 0.61)**
Household income						
Less than $50,000	1.12 (0.92, 1.37)	1.15 (0.96, 1.38)	**0.91 (0.87, 0.95)**	0.89 (0.77, 1.02)	1.06 (0.92, 1.23)	**1.27 (1.03, 1.56)**
$50,000 or more, but less than $100,000	0.96 (0.81, 1.14)	0.97 (0.83, 1.12)	0.99 (0.96, 1.03)	1.04 (0.93, 1.16)	0.97 (0.86, 1.09)	1.04 (0.87, 1.24)
$100,000 or more, but less than $150,000	1.00	1.00	1.00	1.00	1.00	1.00
$150,000 or more	0.95 (0.78, 1.15)	**0.83 (0.69, 0.98)**	1.01 (0.97, 1.05)	1.08 (0.96, 1.22)	0.99 (0.87, 1.13)	0.98 (0.80, 1.20)
Region						
Atlantic	1.00	1.00	1.00	1.00	1.00	1.00
Quebec	**0.37 (0.28, 0.48)**	**1.31 (1.07, 1.59)**	**0.81 (0.77, 0.85)**	**0.58 (0.49, 0.67)**	0.90 (0.76, 1.06)	**2.15 (1.74, 2.67)**
Ontario	**1.25 (1.04, 1.50)**	**1.50 (1.25, 1.80)**	**1.20 (1.15, 1.24)**	**1.15 (1.02, 1.30)**	**1.39 (1.21, 1.60)**	**1.44 (1.15, 1.81)**
Prairies	1.11 (0.92, 1.34)	**1.40 (1.16, 1.69)**	**1.15 (1.11, 1.20)**	1.08 (0.95, 1.22)	**1.32 (1.14, 1.52)**	**1.47 (1.17, 1.84)**
British Columbia	1.10 (0.91, 1.33)	**1.54 (1.28, 1.87)**	**1.10 (1.06, 1.15)**	1.15 (1.01, 1.31)	**1.28 (1.11, 1.49)**	**1.50 (1.20, 1.88)**
Marital Status						
Single (never married/never lived with partner)	**1.27 (1.02, 1.57)**	0.81 (0.65, 1.00)	**0.89 (0.84, 0.94)**	**0.72 (0.60, 0.86)**	**0.82 (0.69, 0.98)**	0.99 (0.79, 1.22)
Married or common law relationship	1.00	1.00	1.00	1.00	1.00	1.00
Widowed	0.93 (0.73, 1.19)	**0.67 (0.51, 0.85)**	1.00 (0.96, 1.05)	**0.61 (0.49, 0.74)**	0.85 (0.71, 1.03)	0.93 (0.71, 1.19)
Divorced and separated	1.13 (0.92, 1.37)	**0.91 (0.76, 1.09)**	1.04 (1.00, 1.08)	**0.80 (0.69, 0.93)**	0.91 (0.78, 1.05)	1.00 (0.81, 1.21)

1. Adjusted for sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **individual stressors** among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressors Adjusted PR (95% CI) [1]					
	7. Unable to access usual prescriptions	8. Increased conflict	9. Separation from family	10. Increased caregiving	11. Unable to care for those who require assistance	12. Breakdown in family relationships
Sex						
Male	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.11 (0.98, 1.26)	1.10 (0.98, 1.23)	**1.31 (1.28, 1.35)**	**1.49 (1.37, 1.62)**	**1.33 (1.22, 1.45)**	**1.28 (1.12, 1.45)**
Age group						
50-64 years	1.00	1.00	1.00	1.00	1.00	1.00
65-74 years	**0.82 (0.70, 0.96)**	**0.69 (0.60, 0.79)**	1.01 (0.97, 1.04)	**0.70 (0.63, 0.78)**	**0.78 (0.70, 0.87)**	**0.68 (0.58, 0.80)**
75-96 years	**0.62 (0.51, 0.75)**	**0.57 (0.47, 0.67)**	**0.87 (0.83, 0.90)**	**0.52 (0.46, 0.60)**	**0.51 (0.44, 0.59)**	**0.50 (0.41, 0.61)**
Household income						
Less than $50,000	1.12 (0.92, 1.37)	1.15 (0.96, 1.38)	**0.91 (0.87, 0.95)**	0.89 (0.77, 1.02)	1.06 (0.92, 1.23)	**1.27 (1.03, 1.56)**
$50,000 or more, but less than $100,000	0.96 (0.81, 1.14)	0.97 (0.83, 1.12)	0.99 (0.96, 1.03)	1.04 (0.93, 1.16)	0.97 (0.86, 1.09)	1.04 (0.87, 1.24)
$100,000 or more, but less than $150,000	1.00	1.00	1.00	1.00	1.00	1.00
$150,000 or more	0.95 (0.78, 1.15)	**0.83 (0.69, 0.98)**	1.01 (0.97, 1.05)	1.08 (0.96, 1.22)	0.99 (0.87, 1.13)	0.98 (0.80, 1.20)
Region						
Atlantic	1.00	1.00	1.00	1.00	1.00	1.00
Quebec	**0.37 (0.28, 0.48)**	**1.31 (1.07, 1.59)**	**0.81 (0.77, 0.85)**	**0.58 (0.49, 0.67)**	0.90 (0.76, 1.06)	**2.15 (1.74, 2.67)**
Ontario	**1.25 (1.04, 1.50)**	**1.50 (1.25, 1.80)**	**1.20 (1.15, 1.24)**	**1.15 (1.02, 1.30)**	**1.39 (1.21, 1.60)**	**1.44 (1.15, 1.81)**
Prairies	1.11 (0.92, 1.34)	**1.40 (1.16, 1.69)**	**1.15 (1.11, 1.20)**	1.08 (0.95, 1.22)	**1.32 (1.14, 1.52)**	**1.47 (1.17, 1.84)**
British Columbia	1.10 (0.91, 1.33)	**1.54 (1.28, 1.87)**	**1.10 (1.06, 1.15)**	1.15 (1.01, 1.31)	**1.28 (1.11, 1.49)**	**1.50 (1.20, 1.88)**
Marital Status						
Single (never married/never lived with partner)	**1.27 (1.02, 1.57)**	0.81 (0.65, 1.00)	**0.89 (0.84, 0.94)**	**0.72 (0.60, 0.86)**	**0.82 (0.69, 0.98)**	0.99 (0.79, 1.22)
Married or common law relationship	1.00	1.00	1.00	1.00	1.00	1.00
Widowed	0.93 (0.73, 1.19)	**0.67 (0.51, 0.85)**	1.00 (0.96, 1.05)	**0.61 (0.49, 0.74)**	0.85 (0.71, 1.03)	0.93 (0.71, 1.19)
Divorced and separated	1.13 (0.92, 1.37)	**0.91 (0.76, 1.09)**	1.04 (1.00, 1.08)	**0.80 (0.69, 0.93)**	0.91 (0.78, 1.05)	1.00 (0.81, 1.21)

1. Adjusted for sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **individual stressors** among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressors Adjusted PR (95% CI) [1]					
	7. Unable to access usual prescriptions	8. Increased conflict	9. Separation from family	10. Increased caregiving	11. Unable to care for those who require assistance	12. Breakdown in family relationships
Sex						
Male	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.11 (0.98, 1.26)	1.10 (0.98, 1.23)	**1.31 (1.28, 1.35)**	**1.49 (1.37, 1.62)**	**1.33 (1.22, 1.45)**	**1.28 (1.12, 1.45)**
Age group						
50-64 years	1.00	1.00	1.00	1.00	1.00	1.00
65-74 years	**0.82 (0.70, 0.96)**	**0.69 (0.60, 0.79)**	1.01 (0.97, 1.04)	**0.70 (0.63, 0.78)**	**0.78 (0.70, 0.87)**	**0.68 (0.58, 0.80)**
75-96 years	**0.62 (0.51, 0.75)**	**0.57 (0.47, 0.67)**	**0.87 (0.83, 0.90)**	**0.52 (0.46, 0.60)**	**0.51 (0.44, 0.59)**	**0.50 (0.41, 0.61)**
Household income						
Less than $50,000	1.12 (0.[illegible], 1.37)	1.15 (0.96, 1.38)	**0.91 (0.[illegible], 0.95)**	0.89 (0.[illegible], 1.02)	1.06 (0.92, 1.23)	**1.27 (1.03, 1.56)**
$50,000 or more, but less than $100,000	0.96 (0.[illegible], 1.14)	0.97 (0.83, 1.12)	0.99 (0.[illegible], 1.03)	1.04 (0.[illegible], 1.16)	0.97 (0.86, 1.09)	1.04 (0.87, 1.24)
$100,000 or more, but less than $150,000	[illegible]	1.00	[illegible]	[illegible]	1.00	1.00
$150,000 or more	0.95 (0.[illegible], 1.15)	**0.83 (0.69, 0.98)**	1.01 (0.[illegible], 1.05)	1.08 (0.[illegible], 1.22)	0.99 (0.87, 1.13)	0.98 (0.80, 1.20)
Region						
Atlantic	1.00	1.00	1.00	1.00	1.00	1.00
Quebec	**0.37 (0.28, 0.48)**	**1.31 (1.07, 1.59)**	**0.81 (0.77, 0.85)**	**0.58 (0.49, 0.67)**	0.90 (0.76, 1.06)	**2.15 (1.74, 2.67)**
Ontario	**1.25 (1.04, 1.50)**	**1.50 (1.25, 1.80)**	**1.20 (1.15, 1.24)**	**1.15 (1.02, 1.30)**	**1.39 (1.21, 1.60)**	**1.44 (1.15, 1.81)**
Prairies	1.11 (0.92, 1.34)	**1.40 (1.16, 1.69)**	**1.15 (1.11, 1.20)**	1.08 (0.95, 1.22)	**1.32 (1.14, 1.52)**	**1.47 (1.17, 1.84)**
British Columbia	1.10 (0.91, 1.33)	**1.54 (1.28, 1.87)**	**1.10 (1.06, 1.15)**	1.15 (1.01, 1.31)	**1.28 (1.11, 1.49)**	**1.50 (1.20, 1.88)**
Marital Status						
Single (never married/never lived with partner)	**1.27 (1.02, 1.57)**	0.81 (0.65, 1.00)	**0.89 (0.84, 0.94)**	**0.72 (0.60, 0.86)**	**0.82 (0.69, 0.98)**	0.99 (0.79, 1.22)
Married or common law relationship	1.00	1.00	1.00	1.00	1.00	1.00
Widowed	0.93 (0.73, 1.19)	**0.67 (0.51, 0.85)**	1.00 (0.96, 1.05)	**0.61 (0.49, 0.74)**	0.85 (0.71, 1.03)	0.93 (0.71, 1.19)
Divorced and separated	1.13 (0.92, 1.37)	**0.91 (0.76, 1.09)**	1.04 (1.00, 1.08)	**0.80 (0.69, 0.93)**	0.91 (0.78, 1.05)	1.00 (0.81, 1.21)

1. Adjusted for sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **individual stressors** among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressors Adjusted PR (95% CI) [1]					
	7. Unable to access usual prescriptions	8. Increased conflict	9. Separation from family	10. Increased caregiving	11. Unable to care for those who require assistance	12. Breakdown in family relationships
Sex						
Male	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.11 (0.98, 1.26)	1.10 (0.98, 1.23)	**1.31 (1.28, 1.35)**	**1.49 (1.37, 1.62)**	**1.33 (1.22, 1.45)**	**1.28 (1.12, 1.45)**
Age group						
50-64 years	1.00	1.00	1.00	1.00	1.00	1.00
65-74 years	**0.82 (0.70, 0.96)**	**0.69 (0.60, 0.79)**	1.01 (0.97, 1.04)	**0.70 (0.63, 0.78)**	**0.78 (0.70, 0.87)**	**0.68 (0.58, 0.80)**
75-96 years	**0.62 (0.51, 0.75)**	**0.57 (0.47, 0.67)**	**0.87 (0.83, 0.90)**	**0.52 (0.46, 0.60)**	**0.51 (0.44, 0.59)**	**0.50 (0.41, 0.61)**
Household income						
Less than $50,000	1.12 (0.92, 1.37)	1.15 (0.[illegible], 1.38)	**0.91 (0.87, 0.95)**	0.89 (0.77, 1.02)	1.06 (0.92, 1.23)	**1.27 (1.[illegible], 1.56)**
$50,000 or more, but less than $100,000	0.96 (0.81, 1.14)	0.97 (0.[illegible], 1.12)	0.99 (0.96, 1.03)	1.04 (0.93, 1.16)	0.97 (0.86, 1.09)	1.04 (0.[illegible], 1.24)
$100,000 or more, but less than $150,000	1.00	1.[illegible]0	1.00	1.00	1.00	1.[illegible]0
$150,000 or more	0.95 (0.78, 1.15)	**0.83 (0.[illegible], 0.98)**	1.01 (0.97, 1.05)	1.08 (0.96, 1.22)	0.99 (0.87, 1.13)	0.98 (0.[illegible], 1.20)
Region						
Atlantic	1.00	1.00	1.00	1.00	1.00	1.00
Quebec	**0.37 (0.28, 0.48)**	**1.31 (1.07, 1.59)**	**0.81 (0.77, 0.85)**	**0.58 (0.49, 0.67)**	0.90 (0.76, 1.06)	**2.15 (1.74, 2.67)**
Ontario	**1.25 (1.04, 1.50)**	**1.50 (1.25, 1.80)**	**1.20 (1.15, 1.24)**	**1.15 (1.02, 1.30)**	**1.39 (1.21, 1.60)**	**1.44 (1.15, 1.81)**
Prairies	1.11 (0.92, 1.34)	**1.40 (1.16, 1.69)**	**1.15 (1.11, 1.20)**	1.08 (0.95, 1.22)	**1.32 (1.14, 1.52)**	**1.47 (1.17, 1.84)**
British Columbia	1.10 (0.91, 1.33)	**1.54 (1.28, 1.87)**	**1.10 (1.06, 1.15)**	1.15 (1.01, 1.31)	**1.28 (1.11, 1.49)**	**1.50 (1.20, 1.88)**
Marital Status						
Single (never married/never lived with partner)	**1.27 (1.02, 1.57)**	0.81 (0.65, 1.00)	**0.89 (0.84, 0.94)**	**0.72 (0.60, 0.86)**	**0.82 (0.69, 0.98)**	0.99 (0.79, 1.22)
Married or common law relationship	1.00	1.00	1.00	1.00	1.00	1.00
Widowed	0.93 (0.73, 1.19)	**0.67 (0.51, 0.85)**	1.00 (0.96, 1.05)	**0.61 (0.49, 0.74)**	0.85 (0.71, 1.03)	0.93 (0.71, 1.19)
Divorced and separated	1.13 (0.92, 1.37)	**0.91 (0.76, 1.09)**	1.04 (1.00, 1.08)	**0.80 (0.69, 0.93)**	0.91 (0.78, 1.05)	1.00 (0.81, 1.21)

1. Adjusted for sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **individual stressors** among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressors Adjusted PR (95% CI) [1]					
	7. Unable to access usual prescriptions	8. Increased conflict	9. Separation from family	10. Increased caregiving	11. Unable to care for those who require assistance	12. Breakdown in family relationships
Sex						
Male	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.11 (0.98, 1.26)	1.10 (0.98, 1.23)	**1.31 (1.28, 1.35)**	**1.49 (1.37, 1.62)**	**1.33 (1.22, 1.45)**	**1.28 (1.12, 1.45)**
Age group						
50-64 years	1.00	1.00	1.00			
65-74 years	**0.82 (0.70, 0.96)**	**0.69 (0.60, 0.79)**	1.01 (0.97, 1.04)	**0.70 (0.[illegible], 0.78)**	**0.78 (0.[illegible], 0.87)**	**0.68 (0.[illegible], 0.80)**
75-96 years	**0.62 (0.51, 0.75)**	**0.57 (0.47, 0.67)**	**0.87 (0.[illegible]3, 0.90)**	**0.52 (0.[illegible], 0.60)**	**0.51 (0.[illegible], 0.59)**	**0.50 (0.[illegible], 0.61)**
Household income						
Less than $50,000	1.12 (0.92, 1.37)	1.15 (0.96, 1.38)	**0.91 (0.[illegible]7, 0.95)**	0.89 (0.[illegible], 1.02)	1.06 (0.[illegible], 1.23)	**1.27 (1.[illegible], 1.56)**
$50,000 or more, but less than $100,000	0.96 (0.81, 1.14)	0.97 (0.83, 1.12)	0.99 (0.96, 1.03)	1.04 (0.93, 1.16)	0.97 (0.86, 1.09)	1.04 (0.87, 1.24)
$100,000 or more, but less than $150,000	1.00	1.00	1.00	1.00	1.00	1.00
$150,000 or more	0.95 (0.78, 1.15)	**0.83 (0.69, 0.98)**	1.01 (0.97, 1.05)	1.08 (0.96, 1.22)	0.99 (0.87, 1.13)	0.98 (0.80, 1.20)
Region						
Atlantic	1.00	1.00	1.00	1.00	1.00	1.00
Quebec	**0.37 (0.28, 0.48)**	**1.31 (1.07, 1.59)**	**0.81 (0.77, 0.85)**	**0.58 (0.49, 0.67)**	0.90 (0.76, 1.06)	**2.15 (1.74, 2.67)**
Ontario	**1.25 (1.04, 1.50)**	**1.50 (1.25, 1.80)**	**1.20 (1.15, 1.24)**	**1.15 (1.02, 1.30)**	**1.39 (1.21, 1.60)**	**1.44 (1.15, 1.81)**
Prairies	1.11 (0.92, 1.34)	**1.40 (1.16, 1.69)**	**1.15 (1.11, 1.20)**	1.08 (0.95, 1.22)	**1.32 (1.14, 1.52)**	**1.47 (1.17, 1.84)**
British Columbia	1.10 (0.91, 1.33)	**1.54 (1.28, 1.87)**	**1.10 (1.06, 1.15)**	1.15 (1.01, 1.31)	**1.28 (1.11, 1.49)**	**1.50 (1.20, 1.88)**
Marital Status						
Single (never married/never lived with partner)	**1.27 (1.02, 1.57)**	0.81 (0.65, 1.00)	**0.89 (0.84, 0.94)**	**0.72 (0.60, 0.86)**	**0.82 (0.69, 0.98)**	0.99 (0.79, 1.22)
Married or common law relationship	1.00	1.00	1.00	1.00	1.00	1.00
Widowed	0.93 (0.73, 1.19)	**0.67 (0.51, 0.85)**	1.00 (0.96, 1.05)	**0.61 (0.49, 0.74)**	0.85 (0.71, 1.03)	0.93 (0.71, 1.19)
Divorced and separated	1.13 (0.92, 1.37)	**0.91 (0.76, 1.09)**	1.04 (1.00, 1.08)	**0.80 (0.69, 0.93)**	0.91 (0.78, 1.05)	1.00 (0.81, 1.21)

1. Adjusted for sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **total number of stressors** at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Adjusted PR (95% CI)[1]
Sex	
Male	1.00
Female	**1.20 (1.17, 1.23)**
Age group	
50-64 years	1.00
65-74 years	**0.86 (0.84, 0.89)**
75-96 years	**0.70 (0.67, 0.73)**
Racial background	
White	1.00
Non-white	**0.91 (0.85, 0.98)**
Education	
Secondary school graduation or less	**0.89 (0.86, 0.92)**
Some post-secondary education	0.99 (0.95, 1.04)
Post-secondary degree or diploma	1.00
Household income	
$50,000 or less	1.04 (1.00, 1.08)
$50,000 or more, but less than $100,000	1.01 (0.98, 1.05)
$100,000 or more, but less than $150,000	1.00
$150,000 or more	0.99 (0.95, 1.02)
Region	
Atlantic	1.00
Quebec	**0.86 (0.82, 0.89)**
Ontario	**1.17 (1.13, 1.22)**
Prairies	**1.07 (1.03, 1.11)**
British Columbia	**1.12 (1.07, 1.16)**
Marital Status	
Single (never married/never lived with partner)	**0.94 (0.90, 0.98)**
Married or common law relationship	1.00
Widowed	**0.92 (0.88, 0.97)**
Divorced and separated	1.02 (0.98, 1.06)
Essential worker status	
Doesn't work outside the home	1.00
Essential worker	1.02 (0.98, 1.06)
Not essential worker	**1.08 (1.05, 1.12)**
Urban/rural status	
Urban	1.00
Rural	0.99 (0.96, 1.02)

1. Adjusted for all variables listed in the table: sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **total number of stressors** at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Adjusted PR (95% CI)[1]
Sex	
Male	**1.00**
Female	**1.20 (1.17, 1.23)**
Age group	
50-64 years	1.00
65-74 years	**0.86 (0.84, 0.89)**
75-96 years	**0.70 (0.67, 0.73)**
Racial background	
White	1.00
Non-white	**0.91 (0.85, 0.98)**
Education	
Secondary school graduation or less	**0.89 (0.86, 0.92)**
Some post-secondary education	0.99 (0.95, 1.04)
Post-secondary degree or diploma	1.00
Household income	
$50,000 or less	1.04 (1.00, 1.08)
$50,000 or more, but less than $100,000	1.01 (0.98, 1.05)
$100,000 or more, but less than $150,000	1.00
$150,000 or more	0.99 (0.95, 1.02)
Region	
Atlantic	1.00
Quebec	**0.86 (0.82, 0.89)**
Ontario	**1.17 (1.13, 1.22)**
Prairies	**1.07 (1.03, 1.11)**
British Columbia	**1.12 (1.07, 1.16)**
Marital Status	
Single (never married/never lived with partner)	**0.94 (0.90, 0.98)**
Married or common law relationship	1.00
Widowed	**0.92 (0.88, 0.97)**
Divorced and separated	1.02 (0.98, 1.06)
Essential worker status	
Doesn't work outside the home	1.00
Essential worker	1.02 (0.98, 1.06)
Not essential worker	**1.08 (1.05, 1.12)**
Urban/rural status	
Urban	1.00
Rural	0.99 (0.96, 1.02)

1. Adjusted for all variables listed in the table: sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

The adjusted association between socioeconomic characteristics and **total number of stressors** at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Adjusted PR (95% CI)[1]
Sex	
Male	1.00
Female	**1.20 (1.17, 1.23)**
Age group	
50-64 years	**1.00**
65-74 years	**0.86 (0.84, 0.89)**
75-96 years	**0.70 (0.67, 0.73)**
Racial background	
White	1.00
Non-white	**0.91 (0.85, 0.98)**
Education	
Secondary school graduation or less	**0.89 (0.86, 0.92)**
Some post-secondary education	0.99 (0.95, 1.04)
Post-secondary degree or diploma	1.00
Household income	
$50,000 or less	1.04 (1.00, 1.08)
$50,000 or more, but less than $100,000	1.01 (0.98, 1.05)
$100,000 or more, but less than $150,000	1.00
$150,000 or more	0.99 (0.95, 1.02)
Region	
Atlantic	1.00
Quebec	**0.86 (0.82, 0.89)**
Ontario	**1.17 (1.13, 1.22)**
Prairies	**1.07 (1.03, 1.11)**
British Columbia	**1.12 (1.07, 1.16)**
Marital Status	
Single (never married/never lived with partner)	**0.94 (0.90, 0.98)**
Married or common law relationship	1.00
Widowed	**0.92 (0.88, 0.97)**
Divorced and separated	1.02 (0.98, 1.06)
Essential worker status	
Doesn't work outside the home	1.00
Essential worker	1.02 (0.98, 1.06)
Not essential worker	**1.08 (1.05, 1.12)**
Urban/rural status	
Urban	1.00
Rural	0.99 (0.96, 1.02)

1. Adjusted for all variables listed in the table: sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

Adjusted PRs and 95% CI for the association between socioeconomic characteristics and negative/very negative versus neutral/positive/very positive **perception of the consequences of the COVID-19 pandemic**

	Adjusted PR (95% CI)[1]
Sex	
Male	1.00
Female	0.98 (0.97, 1.01)
Age group	
50-64 years	1.00
65-74 years	0.98 (0.95, 1.00)
75-96 years	0.93 (0.90, 0.95)
Racial background	
White	1.00
Non-white	**0.89 (0.83, 0.95)**
Education	
Secondary school graduation or less	0.90 (0.87, 0.93)
Some post-secondary education	0.97 (0.93, 1.01)
Post-secondary degree or diploma	1.00
Household income	
$50,000 or less	**0.94 (0.91, 0.97)**
$50,000 or more, but less than $100,000	0.98 (0.96, 1.01)
$100,000 or more, but less than $150,000	1.00
$150,000 or more	0.99 (0.96, 1.03)
Region	
Atlantic	1.00
Quebec	**0.87 (0.84, 0.91)**
Ontario	**1.20 (1.16, 1.24)**
Prairies	**1.21 (1.17, 1.25)**
British Columbia	**1.17 (1.13, 1.21)**
Marital Status	
Single (never married/never lived with partner)	0.99 (0.95, 1.03)
Married or common law relationship	1.00
Widowed	1.04 (1.00, 1.08)
Divorced and separated	1.02 (0.99, 1.05)
Essential worker status	
Doesn't work outside the home	1.00
Essential worker	**0.92 (0.89, 0.95)**
Not essential worker	**0.96 (0.93, 0.99)**
Urban/rural status	
Urban	1.00
Rural	**0.93 (0.90, 0.96)**

1. Adjusted for all variables listed in the table: sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

Adjusted PRs and 95% CI for the association between socioeconomic characteristics and negative/very negative versus neutral/positive/very positive **perception of the consequences of the COVID-19 pandemic**

	Adjusted PR (95% CI)[1]
Sex	
Male	1.00
Female	0.98 (0.97, 1.01)
Age group	
50-64 years	1.00
65-74 years	0.98 (0.95, 1.00)
75-96 years	0.93 (0.90, 0.95)
Racial background	
White	1.00
Non-white	**0.89 (0.83, 0.95)**
Education	
Secondary school graduation or less	0.90 (0.87, 0.93)
Some post-secondary education	0.97 (0.93, 1.01)
Post-secondary degree or diploma	1.00
Household income	
$50,000 or less	**0.94 (0.91, 0.97)**
$50,000 or more, but less than $100,000	0.98 (0.96, 1.01)
$100,000 or more, but less than $150,000	1.00
$150,000 or more	0.99 (0.96, 1.03)
Region	
Atlantic	**1.00**
Quebec	**0.87 (0.84, 0.91)**
Ontario	**1.20 (1.16, 1.24)**
Prairies	**1.21 (1.17, 1.25)**
British Columbia	**1.17 (1.13, 1.21)**
Marital Status	
Single (never married/never lived with partner)	0.99 (0.95, 1.03)
Married or common law relationship	1.00
Widowed	1.04 (1.00, 1.08)
Divorced and separated	1.02 (0.99, 1.05)
Essential worker status	
Doesn't work outside the home	1.00
Essential worker	**0.92 (0.89, 0.95)**
Not essential worker	**0.96 (0.93, 0.99)**
Urban/rural status	
Urban	1.00
Rural	**0.93 (0.90, 0.96)**

1. Adjusted for all variables listed in the table: sex, age group, racial background, education, household income, region, marital status, essential worker status and urban/rural status

Key Findings

Adults across Canada experienced stressors and perceived the consequences of the pandemic as negative, which varied by socioeconomic factors and geography, highlighting inequalities in experiencing stress.

Future research will be needed to determine the impact of stress during the pandemic on future health outcomes and how this varies by socioeconomic factors.

2

Obesity and adverse childhood experiences in relation to stress during the COVID-19 pandemic: an analysis of the Canadian Longitudinal Study on Aging

Vanessa De Rubeis, Andrea Gonzalez, Margaret de Groh, Ying Jiang, Urun Erbas Oz, Jean-Eric Tarride, Nicole E. Basta, Susan Kirkland, Christina Wolfson, Lauren E. Griffith, Parminder Raina, Laura N. Anderson on behalf of the Canadian Longitudinal Study on Aging (CLSA) Team

Published in International Journal of Obesity

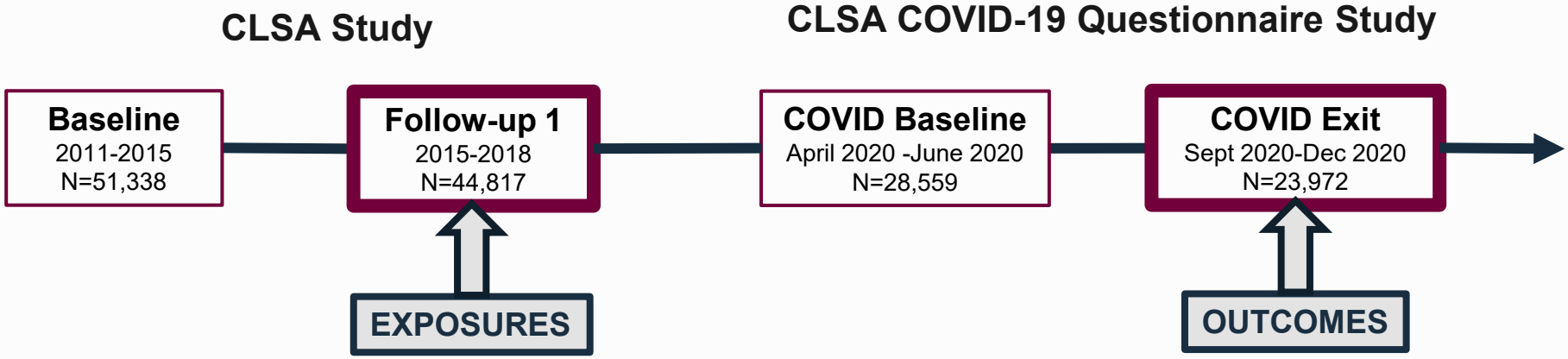
Objectives

1. To evaluate the associations between
(1) ACEs and stress during the pandemic
(2) obesity and stress during the pandemic

2. To examine if the association between obesity and stress during pandemic is modified by ACEs

clsa élcv
Canadian Longitudinal Study on Aging
Étude longitudinale canadienne sur le vieillissement

Data source & Study design



Study Design:
Longitudinal study

Exposure 1: Adverse Childhood Experiences (ACEs)

Participants asked to report which of the following 8 ACEs they experienced before the age of 18:

Exposure 2: Obesity

Height and Weight
Measured or self-reported

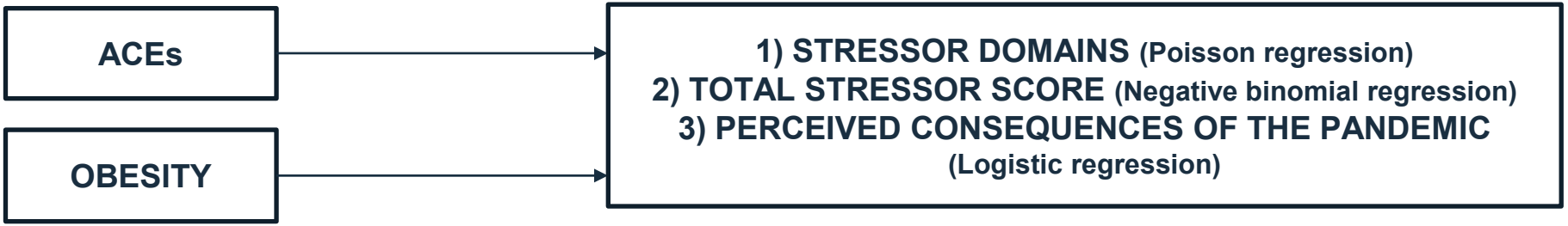
BMI

Normal: ≤24.9 kg/m^2
Overweight: 25.0-29.9 kg/m^2
Obesity class I: 30.0-34.9 kg/m^2
Obesity class II: 35.0-39.9 kg/m^2
Obesity class III: ≥40.0 kg/m^2

Shields et al., 2008; Weir & Jan, 2020)

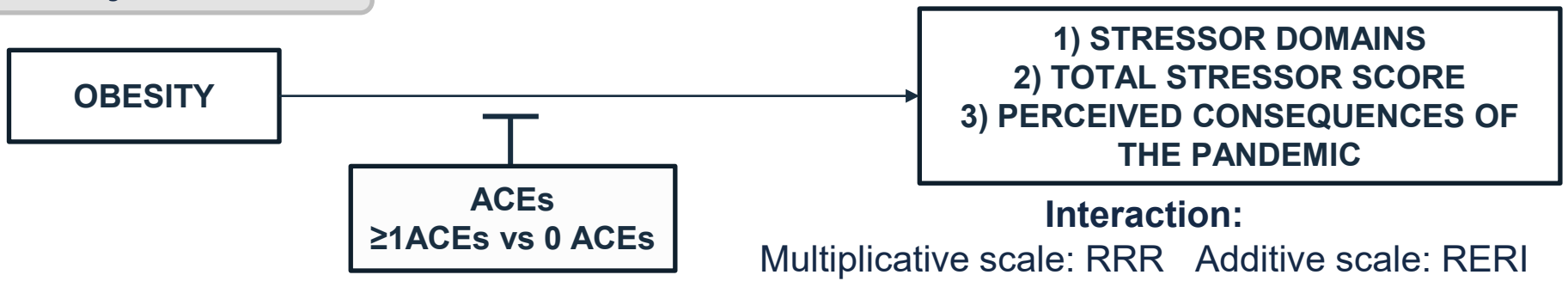
Statistical analyses

Objective 1



PROC GENMOD to estimate relative risks (RRs) and 95% confidence intervals
Models adjusted for sex, age group, racial background, physical activity, household income, alcohol consumption and depression

Objective 2



Interaction:
Multiplicative scale: RRR Additive scale: RERI

The adjusted association between ACEs, obesity and stress among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

	Stressor domains				Total number of stressors
	Health	Resources	Relationships	Caregiving	
	Adjusted[1] RR (95% CI)	Adjusted[1] RR (95% CI)	Adjusted[1] RR (95% CI)	Adjusted[1] RR (95% CI)	Adjusted[1] RR (95% CI)
Adverse childhood experiences (ACEs)					
0	1.00	1.00	1.00	1.00	1.00
1	1.17 (1.11, 1.23)	1.08 (1.02, 1.13)	1.07 (1.02, 1.12)	1.09 (1.01, 1.18)	1.10 (1.07, 1.13)
2	1.22 (1.15, 1.30)	1.17 (1.10, 1.24)	1.11 (1.05, 1.16)	1.13 (1.03, 1.24)	1.15 (1.11, 1.19)
3	1.38 (1.28, 1.48)	1.30 (1.22, 1.40)	1.15 (1.08, 1.22)	1.22 (1.09, 1.36)	1.25 (1.20, 1.31)
4-8	1.39 (1.30, 1.49)	1.53 (1.43, 1.63)	1.24 (1.17, 1.32)	1.44 (1.20, 1.59)	1.38 (1.33, 1.44)
Obesity					
Normal weight	1.00	1.00	1.00	1.00	1.00
Overweight	1.03 (0.98, 1.08)	1.05 (1.00, 1.11)	1.01 (0.97, 1.05)	1.01 (0.94, 1.09)	1.02 (0.99, 1.05)
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Obesity Class III	1.25 (1.12, 1.39)	1.38 (1.25, 1.53)	1.04 (0.95, 1.14)	1.08 (0.91, 1.27)	1.19 (1.12, 1.27)

1. Adjusted for sex, age group, racial background, physical activity, household income, alcohol consumption and depression

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As number of <u>ACEs</u> increases, risk of reporting additional stressor increases

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As <u>obesity</u> level increases, risk of reporting additional stressor increases

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The adjusted association between ACEs, obesity and stress among Canadian adults at CLSA COVID-19 Questionnaire Exit Survey (September-December 2020)

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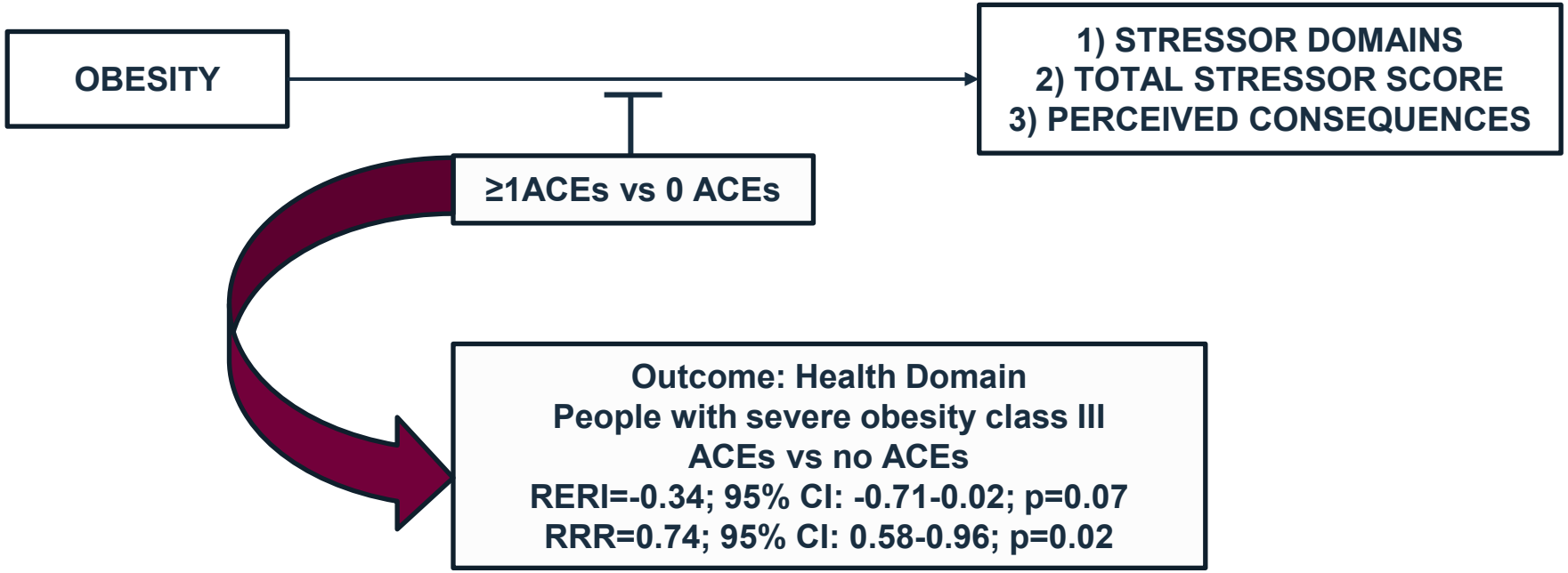
As <u>obesity</u> level increases, risk of reporting additional stressor increases

1. Adjusted for sex, ag… …mption and depression

Objective 2: The association between obesity and stress during the pandemic modified by ACEs

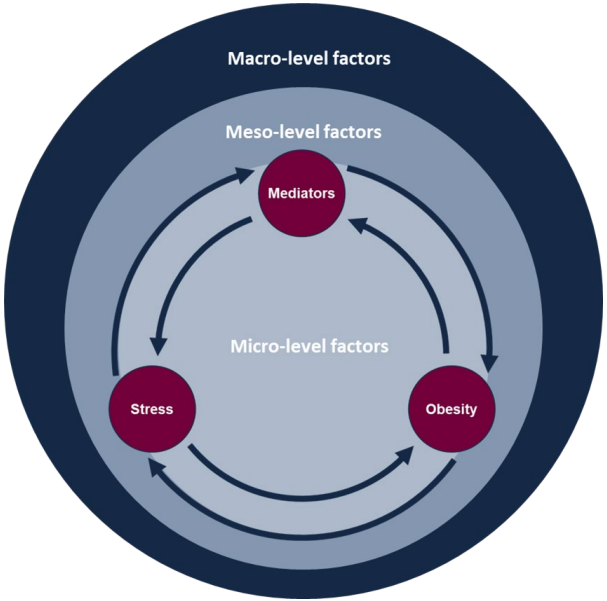


Key Findings

Experiences across the life course, including obesity and ACEs were associated with increased stress during the COVID-19 pandemic, confirming subgroups of people are more susceptible to stress associated with a stressful event.

Important for future research to determine the long-term effects of stress during the pandemic.

Conclusions



INDIVIDUAL CHARACTERISTICS

ADVERSE CHILDHOOD EXPERIENCES (ACEs)

ADULTHOOD OBESITY

STRESS DURING COVID-19 PANDEMIC

Strengths

- First studies to describe the stress and associated factors during pandemic in Canada
- CLSA is a large nationally generalizable sample with a population-based sampling strategy
- Surveys collected by phone and web to accommodate limited internet access
- Future waves of data being collected by CLSA allow for longitudinal research on how stress during pandemic impact health outcomes

Limitations

- Participants were primarily white limiting the representativeness
- Stressor list was developed early in the pandemic and did not include all possible stressors
- Perceived stress scale not included
- COVID-19 questionnaire data collected in the first two waves of the pandemic in Canada

Future research

1

Additional mechanistic pathways need to be explored to help develop prevention strategies

2

Continued research needed on the lasting effects of the COVID-19 pandemic

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BMJ Open

Impact of disasters, including pandemics, on cardiometabolic outcomes across the life-course: a systematic review

Vanessa De Rubeis, Jinhee Lee, Muhammad Saqib Anwer, Yulika Yoshida-Montezuma, Alessandra T Andreacchi, Erica Stone, Saman Iftikhar, Jason D Morgenstern, Reid Rebinsky, Sarah E Neil-Sztramko, Elizabeth Alvarez, Emma Apatu, Laura N Anderson

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ABSTRACT

Background Disasters are events that disrupt the daily functioning of a community or society, and may increase long-term risk of adverse cardiometabolic outcomes, including cardiovascular disease, obesity and diabetes. The objective of this study was to conduct a systematic review to determine the impact of disasters, including pandemics, on cardiometabolic outcomes across the life-course.

Design A systematic search was conducted in May 2020 using two electronic databases, EMBASE and Medline. All studies were screened in duplicate at title and abstract, and full-text level. Studies were eligible for inclusion if they assessed the association between a population-level or community disaster and cardiometabolic outcomes ≥1 month following the disaster. There were no restrictions on age, year of publication, country or population. Data were extracted on study characteristics, exposure (eg, type of disaster, region, year), cardiometabolic outcomes and measures of effect. Study quality was evaluated using the Joanna Briggs Institute critical appraisal tools.

Results A total of 58 studies were included, with 24 studies reporting the effects of exposure to disaster during pregnancy/childhood and 34 studies reporting the effects of exposure during adulthood. Studies included exposure to natural (n=35; 60%) and human-made (n=23; 40%) disasters, with only three (5%) of these studies evaluating previous pandemics. Most studies reported increased cardiometabolic risk, including increased cardiovascular disease incidence or mortality, diabetes and obesity, but not all. Few studies evaluated the biological mechanisms or high-risk subgroups that may be at a greater risk of negative health outcomes following disasters.

Conclusions The findings from this study suggest that the burden of disasters extend beyond the known direct harm, and attention is needed on the detrimental indirect long-term effects on cardiometabolic health. Given the current COVID-19 pandemic, these findings may inform public health prevention strategies to mitigate the impact of future cardiometabolic risk.

PROSPERO registration number CRD42020186074

Strengths and limitations of this study

- This systematic review is one of the first to review the literature on disasters, including pandemics, and subsequent cardiometabolic outcomes throughout the life-course.
- A comprehensive search strategy was used to identify studies that covered a range of disasters (eg, famine, war, terrorism, natural disasters and infectious disease epidemics), periods of exposure from pregnancy, childhood to older adulthood and a wide breadth of cardiometabolic outcomes.
- Only studies published in English were included and a search of the grey literature was not conducted.
- Due to the heterogeneity of studies, a meta-analysis could not be conducted, and results were only synthesised narratively.
- Limited evidence was available on the impact of pandemics specifically, and few studies evaluated proposed mechanisms or risk modification across subgroups of the populations.

BACKGROUND

Disasters, as defined by the WHO, are events that disrupt the daily functioning of a community or society causing material, economic or environmental losses, overwhelming local capacity.[1] Disasters can be categorised into natural disasters, human-made disasters and hybrid disasters.[2] Natural disasters include natural phenomenon above and beneath the earth's surface (eg, tsunamis or landslides), meteorological phenomenon (eg, tornadoes or floods) or biological phenomenon (eg, epidemics and pandemics).[2] Human-made disasters include adverse transportation incidents, technological events (eg, fire or toxic leaks), terrorism, warfare or conflict.[2]

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DOI:10.1136/bmjopen-2020-047152

cmajOPEN

Research

Stressors and perceived consequences of the COVID-19 pandemic among older adults: a cross-sectional study using data from the Canadian Longitudinal Study on Aging

Vanessa De Rubeis MPH, Laura N. Anderson PhD, Jayati Khattar BSc, Margaret de Groh PhD, Ying Jiang MD MSc, Urun Erbas Oz PhD, Nicole E. Basta PhD, Susan Kirkland PhD, Christina Wolfson PhD, Lauren E. Griffith PhD, Parminder Raina PhD; the Canadian Longitudinal Study on Aging Team

Abstract

Background: The indirect consequences of the COVID-19 pandemic in older adults, such as stress, are unknown. We sought to describe the stressors and perceived consequences of the COVID-19 pandemic on older adults in Canada and to evaluate differences by socioeconomic factors.

Methods: We conducted a cross-sectional study using data from the Canadian Longitudinal Study on Aging COVID-19 Exit Questionnaire (September–December 2020). A 12-item checklist was used to assess stressors (e.g., income loss, separation from family) experienced during the pandemic, and a single question was used to measure perceived consequences. We used a generalized linear model with a binomial distribution and log link to estimate prevalence ratios and 95% confidence intervals (CIs) for the association between socioeconomic factors, stressors and perceived consequences.

Results: Among the 23972 older adults (aged 50–96 yr) included in this study, 17977 (75.5%) reported at least 1 stressor during the pandemic, with 5796 (24.4%) experiencing 3 or more stressors. Of the 23020 participants who reported on their perceptions of the consequences of the pandemic, 14520 (63.1%) participants perceived the consequences to be negative. Females were more likely to report most stressors than males, such as separation from family (adjusted prevalence ratio 1.31, 95% CI 1.28–1.35). The perceived consequences of the pandemic varied by region; residents of Quebec were less likely to perceive the consequences of the pandemic as negative (adjusted prevalence ratio 0.87, 95% CI 0.84–0.91) than those of the Atlantic provinces.

Interpretation: These findings suggest that older adults across Canada experienced stressors and perceived the pandemic consequences as negative, though stressors and perceptions of consequences varied by socioeconomic factors and geography, highlighting inequalities. Future research will be needed to estimate the impact of stress during the pandemic on future health outcomes.

In addition to the direct impacts of the COVID-19 pandemic and the associated public health measures of prevention, the pandemic has had several indirect consequences on population health.[1,2] One such indirect consequence of the pandemic is increased stress.[3] Stress has a major impact on both physical and mental health, including cardiovascular disease, stroke, diabetes, anxiety and depression.[2,4–6] Measures of stress can include both objective and perceived measures.[7,8] Objective measures include economic hardships, loss of possessions, family and social stressors, and loss of daily activities.[9] Perceived measures of stress include an individual's perceived ability to cope with the demands or presence of a disaster.[8,10] Previous research on population-level disasters, including earthquakes and floods, has found that exposure to stress during an acute disaster has a profound impact on long-term health outcomes, including chronic diseases.[11]

Given the dramatic change in daily functioning during the physical activity facilities, closures) may contribute to increased incidence of obesity, cardiovascular disease and type 2 diabetes; however, it has been hypothesized that chronic stress, in particular, may influence disease development.[12]

Competing interests: Laura Anderson reports grants from the Canadian Institutes of Health Research, the Cancer Research Society and the Canadian Cancer Society. Lauren Griffith is supported by the McLaughlin Foundation Professorship in Population and Public Health. Parminder Raina holds the Raymond and Margaret Labarge Chair in Research and Knowledge Application for Optimal Aging, is the Scientific Director of the McMaster Institute for Research on Aging and the Labarge Centre for Mobility in Aging and holds a Tier 1 Canada Research Chair in Geroscience.

This article has been peer reviewed.

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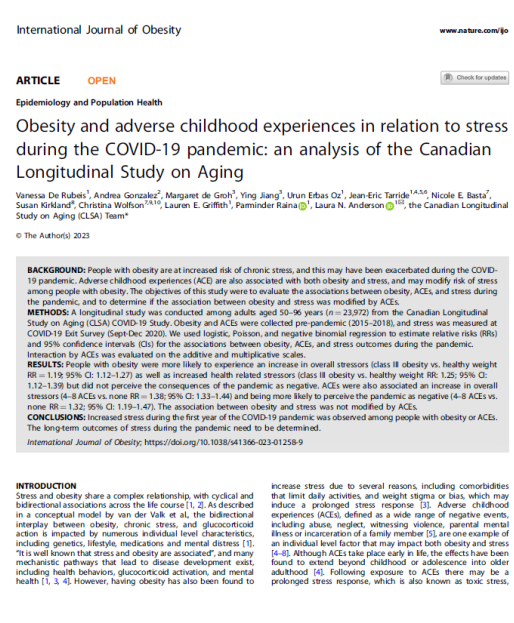

International Journal of Obesity

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ARTICLE OPEN

Epidemiology and Population Health

Obesity and adverse childhood experiences in relation to stress during the COVID-19 pandemic: an analysis of the Canadian Longitudinal Study on Aging

Vanessa De Rubeis[1], Andrea Gonzalez[2], Margaret de Groh[3], Ying Jiang[3], Urun Erbas Oz[1], Jean-Eric Tarride[1,4,5,6], Nicole E. Basta[7], Susan Kirkland[8], Christina Wolfson[2,9,10], Lauren E. Griffith[3], Parminder Raina[1], Laura N. Anderson[1,11], the Canadian Longitudinal Study on Aging (CLSA) Team*

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BACKGROUND: People with obesity are at increased risk of chronic stress, and this may have been exacerbated during the COVID-19 pandemic. Adverse childhood experiences (ACE) are also associated with both obesity and stress, and may modify risk of stress among people with obesity. The objectives of this study were to evaluate the associations between obesity, ACEs, and stress during the pandemic, and to determine if the association between obesity and stress was modified by ACEs.

METHODS: A longitudinal study was conducted among adults aged 50–96 years (*n* = 23,972) from the Canadian Longitudinal Study on Aging (CLSA) COVID-19 Study. Obesity and ACEs were collected pre-pandemic (2015–2018), and stress was measured at COVID-19 Exit Survey (Sept-Dec 2020). We used logistic, Poisson, and negative binomial regression to estimate relative risks (RRs) and 95% confidence intervals (CIs) for the associations between obesity, ACEs, and stress outcomes during the pandemic. Interaction by ACEs was evaluated on the additive and multiplicative scales.

RESULTS: People with obesity were more likely to experience an increase in overall stressors (class III obesity vs. healthy weight RR = 1.19; 95% CI: 1.12–1.27) as well as increased health related stressors (class III obesity vs. healthy weight RR: 1.25; 95% CI: 1.12–1.39) but did not perceive the consequences of the pandemic as negative. ACEs were also associated an increase in overall stressors (4–8 ACEs vs. none RR = 1.38; 95% CI: 1.33–1.44) and being more likely to perceive the pandemic as negative (4–8 ACEs vs. none RR = 1.32; 95% CI: 1.19–1.47). The association between obesity and stress was not modified by ACEs.

CONCLUSIONS: Increased stress during the first year of the COVID-19 pandemic was observed among people with obesity or ACEs. The long-term outcomes of stress during the pandemic need to be determined.

International Journal of Obesity; https://doi.org/10.1038/s41366-023-01258-9

INTRODUCTION

Stress and obesity share a complex relationship, with cyclical and bidirectional associations across the life course [1, 2]. As described in a conceptual model by van der Valk et al, the bidirectional interplay between obesity, chronic stress, and glucocorticoid action is impacted by numerous individual level characteristics, including genetics, lifestyle, medications and mental distress [1]. "It is well known that stress and obesity are associated", and many mechanistic pathways that lead to disease development exist, including health behaviors, glucocorticoid activation, and mental health [1, 3, 4]. However, having obesity has also been found to increase stress due to several reasons, including comorbidities that limit daily activities, and weight stigma or bias, which may induce a prolonged stress response [3]. Adverse childhood experiences (ACEs), defined as a wide range of negative events, including abuse, neglect, witnessing violence, parental mental illness or incarceration of a family member [5], are one example of an individual level factor that may impact both obesity and stress [4–8]. Although ACEs take place early in life, the effects have been found to extend beyond childhood or adolescence into older adulthood [4]. Following exposure to ACEs there may be a prolonged stress response, which is also known as toxic stress,

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