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Adverse childhood experiences and perceived body size across the life course: a longitudinal study using data from the Canadian Longitudinal Study on Aging (CLSA)

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ABSTRACT

Background Early life adversity has long-term effects; however, the influence on changes in body size across the life course is not well understood. Objectives of this study were to define trajectories of body size across the life course and to evaluate the association between adverse childhood experiences (ACEs) and perceived life course body size trajectories.

Methods A longitudinal study using data from the Canadian Longitudinal Study on Aging (CLSA) was conducted (n=11 830). Adults aged 49–93 were asked to recall eight ACEs and their perceived body size at ages 25, 45, 55, 65 and current using pictograms. Body size trajectories were identified using latent class growth mixture modelling. Multinomial logistic regression was used to estimate ORs and 95% CIs for the association between ACEs and perceived body size trajectories. Effect modification by sex was explored.

Results Six distinct life course body size trajectories were identified: consistently low (9.7%), consistently mid-size (24.7%), moderate increase (37.4%), strong increase (14.7%), decline (4.9%) and consistently high (8.6%). High ACE exposure, compared with none, was associated with increased odds of the strong increase (OR: 1.49; 95% CI: 1.21 to 1.83) and consistently high (OR: 1.36; 95% CI: 1.08 to 1.73) body size trajectories, compared with the moderate-increase trajectory. For females, there was a strong association for those who reported 4–8 ACEs with the consistently high trajectory (OR: 1.70; 95% CI: 1.24 to 2.34) but no association for males (OR: 0.99; 95% CI: 0.69 to 1.41).

Discussion Distinct patterns of body size throughout the life course exist. ACEs are associated with trajectories that are characterised by obesity incidence in both early and later life.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Adverse childhood experiences have been found to lead to poor health outcomes throughout the life course, including an increased risk of obesity.

WHAT THIS STUDY ADDS

⇒ Increased adversity in early life is associated with patterns of obesity defined by a strong increase and a consistently high perceived body size throughout the life course.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings inform targeted prevention strategies for people who may be at risk of a consistently high weight throughout the life course or for those who may have rapid decline of weight following exposure to adversity.

INTRODUCTION

It is well established that adversity during childhood has lasting effects on a person's health and well-being throughout the life course.[1 2] More specifically, it has been found that adverse childhood experiences (ACEs), including family dysfunction and maltreatment, increase the risk of developing obesity. This includes increased risk of obesity short-term, in childhood or adolescence, and longer-term during adulthood.[2–5] For instance, people who experienced ACEs had 1.34 to 1.46 higher odds of developing obesity during adulthood compared with those who did not experience adversity.[3–5] Some plausible mechanisms for the association between ACEs and obesity include social disruption (eg, lower income or education), poor health behaviours, increased chronic stress and poor mental health.[3] Given the strong, consistent association between ACEs and obesity, and the high prevalence of both ACEs and obesity in the population, further understanding of this association is needed.[6 7]

Previous studies of ACEs and obesity evaluated obesity, measured using Body Mass Index (BMI) or body size only at a single timepoint or age period, typically in adulthood.[8] Obesity is both a chronic disease itself and is also a risk factor for other chronic diseases, length of time someone lives with obesity significantly increases the risk of heart disease, diabetes and cancer.[9–13] Unlike many other chronic diseases, there is a high incidence of obesity in children and young adults, as well as older adults, and it is not well known whether the risk factors for obesity vary across the life course.[14]

Few studies have investigated adversity during childhood and trajectories of weight or BMI throughout the life course.[15–17] These few studies were conducted in Finland, the Netherlands and the USA. They found consistent evidence that adversity during childhood and adolescence, including childhood disadvantage and maltreatment, was associated with obesity trajectories across the life course, including trajectories characterised by a rapid weight gain[17] and trajectories that increased from normal weight to obesity, and overweight to obesity from young adulthood to middle and older adulthood.[15] Sex or gender differences in the association between ACEs and obesity or body size trajectories may be important[18] but have only been explored in one study.[15] The objectives of this study were to define trajectories of body size across the life course and to evaluate the association between ACEs and perceived life course body size trajectories among a population-based sample of middle to older-aged adults in Canada. A secondary objective was to evaluate if the association between ACEs and body size trajectories was modified by sex.

METHODS

Study design and population

A longitudinal study was conducted using data from the Canadian Longitudinal Study on Aging (CLSA). Briefly, the CLSA is a national prospective cohort study of Canadian adults from the 10 provinces of Canada aged 45 and older at the time of recruitment. The CLSA has collected data at baseline (2011–2015), follow-up 1 (2015–2018) and follow-up 2 (2018–2021). A more in-depth description of the CLSA has been previously published.[19] The CLSA consists of two cohorts, the comprehensive cohort, with in-person data collection, and the tracking cohort with telephone data collection only. Participants in the comprehensive cohort were recruited from geographically restricted areas (25–50 km) around 11 data collection sites across 7 provinces in Canada; whereas, tracking cohort participants were recruited across the 10 provinces. For this study, only participants from the comprehensive cohort were included since body size across the life course was only measured among this cohort during follow-up 2. Due to the COVID-19 pandemic (mid-way through follow-up 2), data collection transitioned from in-person home and data collection site visits to telephone visits only. Data on our primary outcome, body size across the life course, was not collected from the telephone visits after the onset of the pandemic and thus, study participants with a follow-up 2 visit after 16 March 2020 were excluded from this study. A detailed description of the participants included in this study can be found in figure 1.

Patient and public involvement

Patients and the public were not involved at any stage of this study. Participants were required to provide informed consent prior to participation in the CLSA.

Measures

Adverse Childhood Experiences (ACEs)

Participants were asked a series of questions at follow-up 1 (2015–2018) regarding events that occurred during childhood, including physical abuse, sexual abuse, emotional abuse, neglect and exposure to intimate partner violence that occurred before the age of 16. They were also asked if before the age of 18 years they had experienced the death of a parent, parental divorce/separation or lived with a family member who had mental health problems. A summary score of number of ACEs experienced was created which ranged from 0 to 8, with 4–8 ACEs grouped together since few people reported 5 or more experiences.[20 21] Increasing ACEs, specifically 4–8, are also linked to worse health outcomes.[2]

Recall of perceived body size across the life course

During in-person home visits, participants were asked to select the somatotype that best depicted their body size outline, at ages 25, 45, 55, 65 and current.[22] Somatotypes,[23] also known as pictograms or body silhouettes, included a wide range of body sizes, with each image assigned a number from 1 to 9 ranging from the smallest to largest body size,[22] and have extensively been used in previous research.[22 24–28] Since some participants were not yet aged 55 or 65, the recalled silhouette for their current body size was used in place. Recalled body size, including the use of somatotypes, has been found to be a reliable method of recalling past weight throughout the life course.[8]

Potential confounding variables

Confounding variables that are related to both ACEs and obesity and have been used in previous studies[4] were selected a priori. Variables were taken from CLSA baseline and follow-up 2. Variables from CLSA baseline (2011–2015) include sex (male; female), racial background (white; other, including Chinese, South Asian, Black, Filipino, Latin American, Southeast Asian, Arab, West Asian, Japanese, Korean or other) and education (less than secondary school graduation, secondary school graduation, some post-secondary education or post-secondary degree or diploma). To reflect the most up-to-date information, age (50–59, 60–69, 70–79, 80–93) and household income (less than $50 000, $50 000–$99 000, $100 000 or more) were taken from follow-up 2.

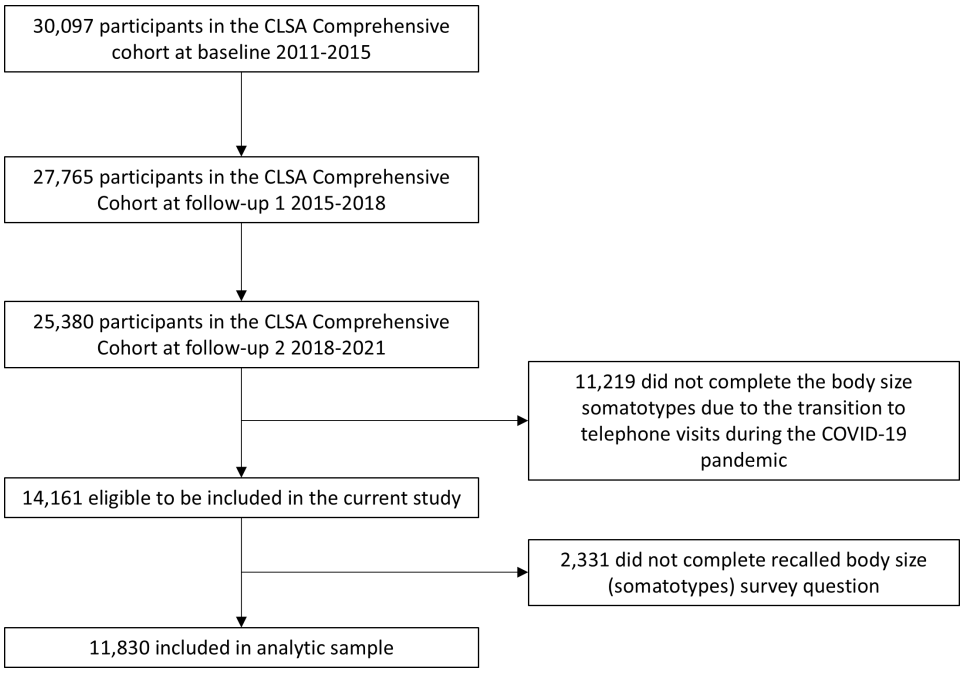

Figure 1 Participant flow diagram. 30 097 participants are in the Canadian Longitudinal Study on Ageing (CLSA) comprehensive cohort at baseline (2011–2015), 27 765 participants are in the CLSA comprehensive cohort at follow-up 1 (2015–2018) and 25 830 participants are in the CLSA comprehensive cohort at follow-up 2 (2018–2021). 11 219 participants did not complete the body size somatotypes due to the transition to telephone visits during the COVID-19 pandemic. This left 14 161 participants eligible to be included in the current study. However, an additional 2331 participants did not complete the somatotypes survey question, leaving 11 830 participants to be included in the analytic sample.

Statistical analysis

All statistical analysis was conducted using SAS v9.4. To develop the trajectories of body size across the life course, latent class growth mixture modelling (LCGMM) was used. A multistep process was followed to determine the best fitting model for the current study. This included assessing the Bayesian information criterion (BIC), significance of polynomial terms, posterior probabilities (>0.7) and percentage of group membership (>5%).[29] The model building approach was then replicated to generate distinct trajectories among males and females, separately.

Multinomial logistic regression was used to estimate ORs and 95% CIs. Multinomial logistic regression means there are multiple levels of the dependent variable. For ACEs (independent variable), zero ACEs was used as the reference group, and for the dependent variable, the moderate-increase trajectory was used as the reference group, since it most consistently was within what is hypothesised to be the healthy weight range and had the least fluctuations throughout the life course.[13] We ran a minimally adjusted model for age and sex, and a fully adjusted model adjusted for age, sex, education, racial background and household income. To determine effect modification by sex, the Wald test for interaction was conducted, and then models were also stratified. Complete case analysis was conducted since there was minimal missing (no variable had >7% missing).

A sensitivity analysis was conducted to explore if types of ACEs were differentially associated with trajectories of body size. Two new variables were created related to the dimensions of ACEs[30]: family dysfunction, which included parental divorce/separation, living with a family member with mental health problems, death of a parent (range: 0–3) and maltreatment, which included physical abuse, sexual abuse, emotional abuse, neglect and intimate partner violence (range: 0–5).

RESULTS

A total of 25 380 participants are included in the comprehensive cohort of the CLSA at follow-up 2. However, 11 219 participants did not have an in-home visit where data on recalled body size was collected due to the pandemic. An additional 2331 did not complete the recalled body size survey module, leaving 11 830 participants included in the current study (figure 1). Characteristics of the study sample can be found in table 1. Many participants reported at least 1 ACE (63.1%), with 12.8% of people reporting high ACE exposure (4–8 ACEs). The proportion of people who recalled somatotypes at each age can be found in online supplemental table 1. Six distinct life course body size trajectories were identified (figure 2). The first was a consistently low trajectory (9.7%) defined by smaller body size across the life course, the second was a consistently mid-size (24.7%) trajectory, the third was consistently high (8.6%), followed by the fourth and fifth trajectories which were defined by a moderate increase (37.4%) and a strong increase (14.7%). Lastly, the sixth trajectory was defined by a decline in body size across the life course (4.9%). These were named based on visual

Table 1 Descriptive characteristics of 11 830 study participants from the Canadian Longitudinal Study on Aging (CLSA)

Characteristics	Overall (n=11 830)	Consistently low (n=1112)	Consistently mid-size (n=2919)	Consistently high (n=999)	Moderate increase (n=4715)	Strong increase (n=1596)	Decline (n=489)
Adverse childhood experiences							
0	4627 (39.2%)	467 (42.3%)	1126 (38.7%)	380 (38.1%)	1870 (39.7%)	580 (36.6%)	204 (41.9%)
1	2580 (21.9%)	248 (22.4%)	643 (22.1%)	204 (20.5%)	1046 (22.2%)	347 (21.9%)	92 (18.9%)
2	2043 (17.3%)	153 (13.9%)	547 (18.8%)	165 (16.6%)	808 (17.2%)	279 (17.6%)	91 (18.7%)
3	1314 (11.1%)	112 (10.1%)	322 (11.1%)	116 (11.6%)	521 (11.1%)	186 (11.7%)	57 (11.7%)
4–8	1228 (10.4%)	125 (11.3%)	272 (9.4%)	132 (13.2%)	462 (9.8%)	194 (12.2%)	43 (8.8%)
Missing	38	7	9	2	8	10	2
Age							
49–59	2949 (24.9%)	269 (24.1%)	761 (26.1%)	327 (32.7%)	1123 (23.8%)	380 (23.8%)	89 (18.2%)
60–69	4034 (31.1%)	367 (33.0%)	973 (33.3%)	361 (36.1%)	1653 (35.1%)	526 (33.0%)	154 (31.5%)
70–89	2898 (24.5%)	256 (23.0%)	701 (24.0%)	222 (22.2%)	1168 (24.8%)	419 (26.3%)	132 (27.0%)
80–93	1949 (16.5%)	221 (19.9%)	484 (16.6%)	89 (9.9%)	770 (16.3%)	271 (17.0%)	114 (23.3%)
Sex							
Female	5815 (49.2%)	691 (62.1%)	1357 (46.5%)	408 (40.8%)	2703 (57.3%)	609 (38.2%)	247 (50.5%)
Male	6015 50.9%)	421 (37.9%)	1562 (53.5%)	591 (59.2%)	2012 (42.7%)	987 (61.8%)	242 (49.5%)
Racial background							
White	11 406 (96.5%)	1069 (96.3%)	2841 (97.3%)	972 (97.3%)	4526 (96.1%)	1529 (95.9%)	469 (95.9%)
Other	415 (3.5%)	41 (3.7%)	76 (2.6%)	26 (2.6%)	186 (3.9%)	66 (4.1%)	20 (4.1%)
Missing	9	2	2	1	3	1	0
Education							
Less than secondary school graduation	1547 (13.1%)	135 (12.2%)	366 (12.6%)	150 (15.0%)	577 (12.2%)	253 (15.9%)	66 (13.5%)
Secondary school graduation	806 (6.8%)	74 (6.7%)	185 (6.4%)	71 (7.1%)	325 (6.9%)	121 (7.6%)	30 (6.1%)
Some or most post-secondary degree or diploma	9460 (80.1%)	899 (81.1%)	2360 (81.1%)	778 (77.9%)	3811 (80.9%)	1219 (76.5%)	393 (80.4%)
Missing	17	4	8	0	2	3	0
Household income							
Less than $50 000	2754 (25.1%)	268 (26.3%)	670 (24.6%)	265 (28.5%)	1030 (23.6%)	403 (27.3%)	118 (26.2%)
$50 000–$99 000	3991 (36.4%)	341 (33.4%)	971 (35.7%)	321 (34.6%)	1616 (37.0%)	557 (37.7%)	185 (41.0%)
$100 000 or more	4218 (38.5%)	411 (40.3%)	1081 (39.7%)	343 (36.9%)	1717 (39.4%)	518 (35.1%)	148 (32.8%)
Missing	867	92	197	70	352	118	38

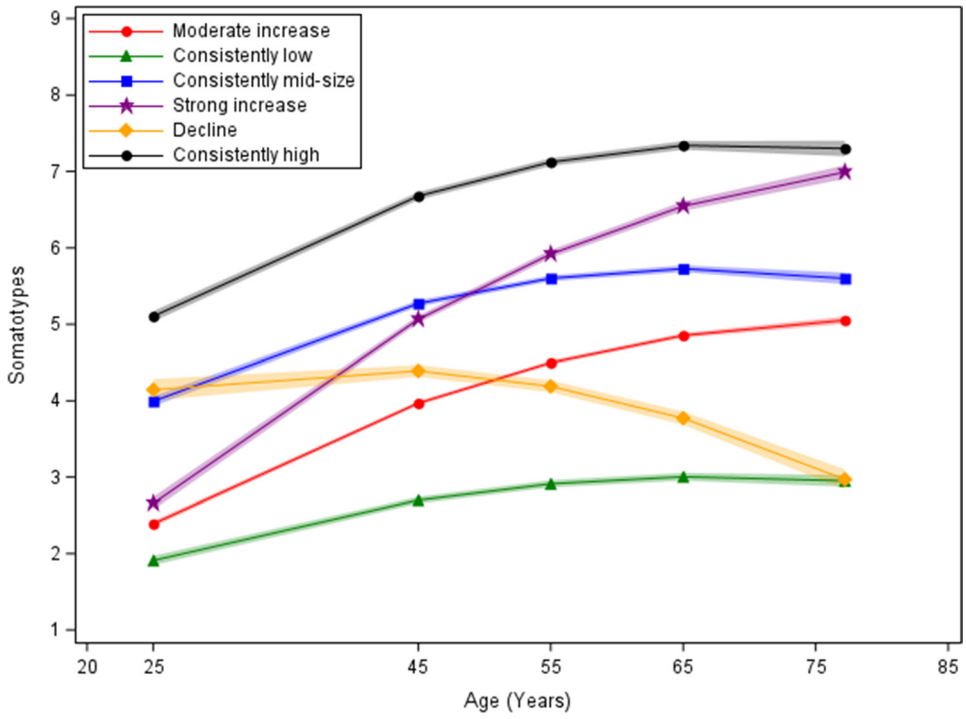

Figure 2 Trajectories of body size across the life course among participants in the Canadian Longitudinal Study on Aging (n=11 830). Note: moderate increase: 37.4%; consistently low: 9.7%; consistently mid-size: 24.7%; strong increase: 14.7%; decline: 4.9%; consistently high: 8.6%. Caption: There are six distinct trajectories of body size across the life course among participants in the Canadian Longitudinal Study on Ageing. These trajectories include moderate increase, consistently low, consistently mid-size, strong increase, decline and consistently high. The proportion of people in each trajectory are as follows: moderate increase: 37.4%; consistently low: 9.7%; consistently mid-size: 24.7%; strong increase: 14.7%; decline: 4.9%; consistently high: 8.6%.

inspection. Trajectory shapes and names were similar across males and females (online supplemental figures 1 and 2). The mean posterior probabilities for each group were 0.88, 0.78, 0.84, 0.88, 0.75 and 0.78, respectively, and BIC were high suggesting good model fit and discrimination (online supplemental table 2). Characteristics of the participants by body size trajectory group can be found in table 1. The proportion of males and females among each trajectory group was relatively similar, with the exception of the moderate increase (female: 39.4% vs male: 60.6%) and consistently low (female: 36.8% vs male 63.2%) groups, which were more frequent among males. The consistently high body size trajectory was less likely to include older adults; whereas, the decline trajectory had a higher proportion of older adults.

Minimally adjusted models for the association between ACEs with body size trajectories can be found in online supplemental table 3, and fully adjusted models can be

Table 2 Association between adverse childhood experiences and body size trajectories across the life course among participants in the Canadian Longitudinal Study on Aging (CLSA)

	Body size trajectory classes* n=10 912				
	Consistently low Adjusted† OR (95% CI)	Consistently mid-size Adjusted† OR (95% CI)	Consistently high Adjusted† OR (95% CI)	Strong increase Adjusted† OR (95% CI)	Decline Adjusted† OR (95% CI)
Adverse childhood experiences‡					
1	0.94 (0.78 to 1.12)	1.01 (0.89 to 1.15)	0.93 (0.77 to 1.13)	1.09 (0.93 to 1.28)	0.83 (0.64 to 1.09)
2	0.76 (0.62 to 0.93)	1.10 (0.96 to 1.27)	0.95 (0.77 to 1.34)	1.11 (0.94 to 1.33)	1.02 (0.77 to 1.34)
3	0.82 (0.64 to 1.04)	1.05 (1.01 to 1.50)	1.03 (0.81 to 1.32)	1.23 (1.01 to 1.50)	1.07 (0.78 to 1.48)
4–8	1.02 (0.81 to 1.30)	1.01 (0.84 to 1.20)	1.36 (1.08 to 1.73)	1.49 (1.21 to 1.83)	0.94 (1.08 to 1.73)

*Reference group: moderate increase.
†Adjusted for age, sex, household income, education and racial background.
‡Reference group: no adverse childhood experiences.

found in table 2. Minimally adjusted and models adjusted for all covariates were relatively similar. High ACE exposure was strongly associated with higher odds of consistently high (fully adjusted OR: 1.36; 95% CI: 1.08 to 1.73) and strong increase (fully adjusted OR: 1.49; 95% CI: 1.21 to 1.83) trajectories, compared with the moderate-increase group. There was less evidence of an association between high ACE exposure and the consistently low (fully adjusted OR: 1.02; 95% CI: 0.81 to 1.30), consistently mid-size (fully adjusted OR: 1.01; 95% CI: 0.84 to 1.20) and decline (fully adjusted OR: 0.94; 95% CI: 1.08 to 1.73) trajectories.

Effect modification by sex

When trajectories were created by sex, among both males and females, the most suitable model included six groups, and the trajectory shapes and names were the same as the overall sample (online supplemental figures 1 and 2). The Wald test for interaction between was statistically significant for both the minimally adjusted and fully adjusted model for the association between ACEs and body size trajectories ($p<0.0001$). Among females, there was a strong association for those who reported 4–8 ACEs with the consistently high trajectory (OR: 1.70; 95% CI: 1.24 to 2.34), compared with the moderate-increase group but no association for males (OR: 0.99; 95% CI: 0.69 to 1.41). The association was higher for females who reported 4–8 ACEs, compared with 0, with the strong-increase group (OR: 1.68; 95% CI: 1.26 to 2.26) compared with males (OR: 1.27; 95% CI: 0.95 to 1.69). Fully adjusted stratified results can be found in table 3, and minimally adjusted models can be found in online supplemental table 4.

Sensitivity analysis

The sensitivity analysis by ACE type revealed similar findings, whereby those who reported more ACEs had increased odds of group membership to the consistently high and strong-increase trajectories compared with the reference group (moderate-increase trajectory), for both family dysfunction and maltreatment ACEs. All results can be found in online supplemental table 5.

DISCUSSION

This is the first Canadian study to describe trajectories of perceived body size throughout the life course extending into older adulthood. Six distinct trajectories of body size across the life course were identified. Further, we found that exposure to a high number of ACEs in childhood was associated with trajectories that were characterised by the largest body sizes, including both the high body size across the life course (consistently high trajectory) and the trajectory which was defined as a smaller body size in early adulthood but steep increase to the highest body size in the 40s–50s (strong-increase trajectory). Exposure to adversity during this period in early life, which is known as 'toxic stress', may lead to physiological changes, including changes to neurological, endocrine or immune systems, leading to different patterns of obesity.[31 32] Beyond physiological changes, mechanisms to cope or overcome challenges associated with adversity

Table 3 Association between adverse childhood experiences and body size trajectories across the life course among participants in the Canadian Longitudinal Study on Aging (CLSA) by sex

	Body size trajectory classes*				
	Consistently low Adjusted† OR (95% CI)	Consistently mid-size Adjusted† OR (95% CI)	Consistently high Adjusted† OR (95% CI)	Strong increase Adjusted† OR (95% CI)	Decline Adjusted† OR (95% CI)
Females					
ACEs‡					
1	1.08 (0.85 to 1.36)	1.00 (0.83 to 1.20)	0.84 (0.61 to 1.15)	1.30 (1.01 to 1.68)	0.84 (0.61 to 1.15)
2	0.84 (0.65 to 1.10)	1.10 (0.90 to 1.34)	0.82 (0.58 to 1.16)	1.01 (0.76 to 1.35)	0.90 (0.61 to 1.33)
3	0.81 (0.59 to 1.11)	1.08 (0.85 to 1.35)	1.04 (0.72 to 1.50)	1.31 (0.96 to 1.78)	0.85 (0.53 to 1.36)
4–8	1.11 (0.82 to 1.49)	1.12 (0.89 to 1.42)	1.70 (1.24 to 2.34)	1.68 (1.26 to 2.26)	0.88 (0.54 to 1.41)
Males					
ACEs‡					
1	0.76 (0.57 to 1.01)	1.00 (0.84 to 1.20)	0.97 (0.76 to 1.25)	0.98 (0.79 to 1.20)	0.99 (0.69 to 1.42)
2	1.13 (0.93 to 1.37)	1.19 (0.95 to 1.49)	1.06 (0.81 to 1.39)	1.16 (0.79 to 1.70)	1.06 (0.81 to 1.39)
3	0.85 (0.59 to 1.24)	1.04 (0.82 to 1.31)	1.02 (0.74 to 1.42)	1.18 (0.91 to 1.55)	1.32 (0.85 to 2.06)
4–8	0.93 (0.62 to 1.39)	0.86 (0.65 to 1.12)	0.99 (0.69 to 1.41)	1.27 (0.95 to 1.69)	0.96 (0.56 to 1.67)

*Reference group: moderate increase.
†Adjusted for age, household income, education and racial background.
‡Reference group: no adverse childhood experiences.
ACEs, adverse childhood experiences.

may also influence lifestyle behaviours, including poor eating habits or decreased physical activity, which may also impact body size throughout the life course.[3] It is possible there is no single pathway following exposure to adversity, but continued research is needed to identify if different pathways may lead to distinct patterns of obesity throughout the life course.

Similar to the findings in our studies, females have been found to have worse health outcomes following exposure to ACEs.[20 33 34] In this study, there was a stronger association among females who reported 4–8 ACEs with membership in the trajectories characterised by consistently high or a strong increase in body size throughout the life course, compared with males. Although these differences may be related to a higher prevalence of ACEs reported by females, it is important to further consider both sex and gender differences in this association, as the biological embedding of stress from ACEs may vary leading to differential health outcomes among males and females.[35]

With regard to defining life course body size trajectories, in previous research, three or four trajectories of weight or body size have typically been identified. In this study, six distinct groups were identified, which may be related to the large sample size of the current study. It is also possible the age distribution of the sample, including people up to age 93, influenced the number of trajectories, as other studies do not include people among the oldest old.[18] Exploring characteristics of the trajectories showed less older adults to be in the consistently high body size trajectory; whereas, the decline trajectory had a higher proportion of older adults. It is possible this is a result of a survivor or cohort effect or declining health with age. Increased weight or body size across the life course is linked to an increase in risk of disease.[10 11 18] Further exploration is needed to identify other potential factors that may lead to various patterns of weight across the life course, including genetics, environmental or social factors. It will also be important to characterise trajectories beginning in early life, to determine if exposure to ACEs or other factors may alter the trajectory of growth and development.

With respect to the association between ACEs and obesity, there have been several systematic reviews that have explored the association between ACEs and obesity in adulthood;[3–5 36] however, few have explored how ACEs influence different patterns of body size or have not considered different dimensions of ACEs.[15–17] Using a trajectory or life course approach provides a more cumulative assessment of body size, which can identify people who may be at a consistently high or low weight throughout the life course, or those who may have a rapid decline in weight. This suggests that exposure to ACEs has a prolonged effect, and not only increases the risk of obesity in later life but also influences declines in weight, which could lead to worse health outcomes, especially in older adults.[10 11 37 38] The findings of this paper provide suggestive evidence supporting life course epidemiology models such as sensitive period model, whereby ACEs occur during a critical development period that is a time of rapid change, altering development and body size, or a chain of risk model, where ACEs leads to other exposures or experiences later in life which then leads differential body size trajectories.[39 40]

This current study builds on existing literature evaluating the association between ACEs and obesity in adulthood, and more specifically, the association with trajectories of weight throughout adulthood. A strength of this study is the large population-based sample, with adults extending to 93 years of age. The large sample size allowed for six distinct trajectories to be identified, with more than 5% of the sample in each trajectory, and for sex differences in trajectories to be explored. This study may be limited by recall bias as both ACEs and recalled body size were recalled by participants during adulthood, which could have led to misclassification of both the exposure and outcome. More specifically, the use of body size pictograms is a measure of perceived body size throughout adulthood and although we did not have measured weight or BMI during different life stages, it has been found that recalled body size is a reliable method of recalling past weight.[8] Given the diverse age range of the sample, it is possible a participant's current age led to differential recall of past body sizes. Future research should consider understanding the reliability and validity of using pictograms at various ages to recall past body size throughout the life course. It was also a limitation that the first timepoint for recalled body size was at age 25, and we did not have access to recalled measures beginning in early life. It is also possible that there is non-differential misclassification of our outcome variable, body size trajectories, related to the LCGMM approach used to classify participants into trajectories. This could lead to an underestimation of the true association. Another limitation is of the CLSA, which is a highly educated sample with a large proportion of people of white racial background. This sample is not truly representative of the Canadian population, but the findings can be generalised to people who share similar characteristics of those who are included in the study. Given the large proportion of people who were of white racial background, we could not further explore differences in racial background, which is a limitation of this study. Future research may consider exploring how racial background may modify trajectories, and the association between ACEs and body size trajectories. Sampling weights were not available for this current study, as a subset of the larger CLSA cohort was used given changes to data collection related to the COVID-19 pandemic. Sampling weights for this sample have not yet been created. Finally, data were not available on health behaviours, stress and mental health prior to the start of the study or earlier in life, and therefore, could not be explored in this current study.

This study builds on current literature on ACEs and obesity and overcomes limitations of previous studies of ACEs and BMI trajectories including small sample

sizes, limited assessment of childhood adversities (eg, no childhood maltreatment), limited exploration of sex differences, or age assessments that did not extend into late adulthood. Exposure to ACEs was associated with consistently high body size throughout the life course suggesting a chain of risk, which is concerning given the complications associated with obesity. This is important from a prevention and intervention perspective to help to see where targeted interventions can be created for people who may be at risk of a consistently high weight throughout the life course, or for those who may have rapid decline of weight, as these are risk factors for worse health outcomes later in life.

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