

Stress, health and the benefit of social support

Margot Shields

Abstract

Objectives

This article describes stress exposure among Canadians aged 18 or older and analyzes short- and long-term associations with psychological distress and chronic conditions. The buffering role of emotional support is also explored.

Data sources

Data are from the household cross-sectional (1994/95) and longitudinal (1994/95 to 2000/01) components of Statistics Canada's National Population Health Survey. Supplemental data are from the 2000/01 Canadian Community Health Survey.

Analytical techniques

Exposure rates to stress were calculated by sex, age group and socio-economic characteristics. Multivariate analyses were used to examine associations between stress and mental and physical health in 1994/95, and between stress and changes in health by 2000/01, controlling for other possible confounders.

Main results

Women reported more stress than did men. For both sexes, stress levels were higher among the less educated, less affluent, and previously married. The level of psychological distress in 1994/95 and the prevalence of chronic conditions were related to stress, as were increases in distress over the next six years and the likelihood of having been diagnosed with chronic conditions.

Key words

life change events, life stress, chronic disease, mental health, longitudinal studies, health surveys

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Stress has become a common theme of modern life as individuals try to cope with incessant demands that, for many, are overwhelming. Pressures at home, at work and even during leisure time often seem relentless. At the same time, the decline in family size and increased geographic mobility have meant fewer support networks. Therefore, it is hardly surprising that most Canadians report at least some stress in their lives, and over a quarter describe their days as “quite,” if not “extremely,” stressful. For some, this stress may intensify until it poses a threat to mental health.¹⁻⁹ And, although the exact mechanisms are not fully understood, the emotions engendered by stress can alter the immune response and influence the onset and progression of physical illness.¹⁰⁻¹³ Another possibility is that stress may prompt negative changes in health behaviours as individuals attempt to cope.^{10,11,13}

But stress does not always lead to illness. An individual's reaction to a potentially stress-provoking situation determines its impact on health. Whether or not a stressor will help make someone sick depends on a complex set of factors that may include genetics, how the stress is perceived, and available resources.¹³⁻¹⁵ External resources such as

Measuring stress

This analysis considers three kinds of stress: recent negative life events, chronic strains, and childhood traumas.

To determine *recent negative life events*, the National Population Health Survey (NPHS) asked 10 “yes/no” questions: In the past 12 months,

- 1) . . . were you (or was anyone close to you—that is, your spouse or partner, children, relatives or close friends) beaten up or physically attacked?
- 2) . . . did you or someone in your family have an unwanted pregnancy?
- 3) . . . did you or someone in your family have an abortion or miscarriage?
- 4) . . . did you or someone in your family have a major financial crisis?
- 5) . . . did you or someone in your family fail school or a training program?
- 6) . . . did you (or your partner) experience a change of job for a worse one?
- 7) . . . were you (or your partner) demoted at work or did either of you take a cut in pay?
- 8) . . . did you have increased arguments with your partner?
- 9) Now, just you personally, did you go on welfare?
- 10) . . . did you have a child move back into the house?

A total score was calculated by summing the “yes” responses. Item 8 did not apply to respondents without a spouse/common-law partner, and item 10 did not apply to those without children. To have consistent ranges of scores for all sub-populations, scores were adjusted (prorated) so that all respondents had a potential maximum of 10. For example, if a single man without children answered “yes” to 4 of the 8 questions applicable to him, his initial score of 4 would be pro-rated by multiplying by 10 (the maximum) and dividing by 8 (the number of applicable items), resulting in a final score of 5.

Chronic strains were measured by asking respondents to reply “true” or “false” to 17 statements:

- 1) You are trying to take on too many things at once.
- 2) There is too much pressure on you to be like other people.
- 3) Too much is expected of you by others.
- 4) You don’t have enough money to buy the things you need.
- 5) Your partner doesn’t understand you.
- 6) Your partner doesn’t show enough affection.
- 7) Your partner is not committed enough to your relationship.
- 8) You find it is very difficult to find someone compatible with you.
- 9) One of your children seems very unhappy.
- 10) A child’s behaviour is a source of serious concern to you.
- 11) Your work around the home is not appreciated.
- 12) Your friends are a bad influence.

- 13) You would like to move but you cannot.
- 14) Your neighbourhood or community is too noisy or too polluted.
- 15) You have a parent, a child or partner who is in very bad health and may die.
- 16) Someone in your family has an alcohol or drug problem.
- 17) People are too critical of you or what you do.

Items 5 to 7 applied to those with a spouse/common-law partner; item 8, to single respondents; and items 9 and 10, to those with children. The maximum number of applicable items was 16. A total score was calculated by summing the “yes” responses and prorating the result (as described above) to be out of 16.

Childhood traumas were measured with 7 “yes/no” questions about events that happened when the respondent was a child or a teenager, before moving out of the house:

- 1) Did you spend two weeks or more in the hospital?
- 2) Did your parents get a divorce?
- 3) Did your father or mother not have a job for a long time when they wanted to be working?
- 4) Did something happen that scared you so much you thought about it for years after?
- 5) Were you sent away from home because you did something wrong?
- 6) Did either of your parents drink or use drugs so often that it caused problems for the family?
- 7) Were you ever physically abused by someone close to you?

The score for childhood traumas was calculated by summing the “yes” responses.

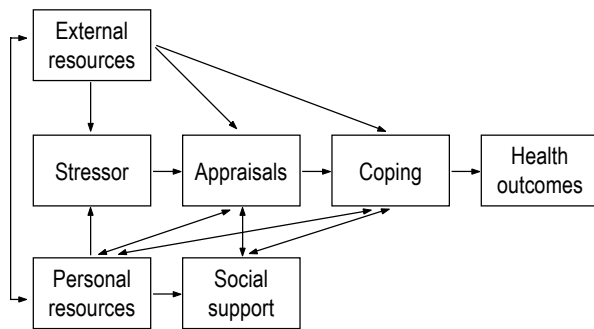
Total stress was calculated as the sum of the scores for recent negative life events, chronic strains, and childhood traumas.

To maximize the number of respondents for whom scores were calculated, some non-response was accepted. If no more than 25% of applicable items had missing values, a score was calculated and adjusted to compensate for the item non-response. For example, if the number of applicable items for a respondent’s stress score was 16, and this respondent had 4 “yes” responses, 8 “no” responses, and 4 items with non-response, the initial score of 4 would be adjusted by multiplying by 16 (the total number of applicable items) and dividing by 12 (the number of items for which there was a response), resulting in an overall score of 5.3. The adjustment for non-response was made before the adjustment for applicable items as described above.

To determine day-to-day stress, the 2000/01 Canadian Community Health Survey asked, “Thinking about the amount of stress in your life, would you say that most days are: not at all stressful? not very stressful? a bit stressful? quit a bit stressful? extremely stressful?”

money and education,¹⁶ personal resources such as a sense of control over one's life¹⁶⁻²¹ and emotional support,^{3,16-20} can mediate the impact of stress (Figure 1).^{15,16}

Figure 1
The stress process



Sources: References 15 and 16

Some resources may prevent an individual from experiencing stress in the first place. For example, highly educated people may never encounter the stress of job insecurity. Resources can also affect the perception of an event. A sense of mastery may help individuals place less importance on stressful situations. As well, resources can help in coping. People with a strong support network may receive advice that helps them resolve a situation before it can affect their health, or emotional reinforcement that mitigates its impact.

Using data from the National Population Health Survey (NPHS) and the Canadian Community Health Survey (CCHS), this article describes the stress levels of Canadian adults (see *Measuring stress*) and how stress levels vary by demographic and socio-economic characteristics (see *Definitions, Data sources, Analytical techniques and Limitations*). Based on 1994/95 cross-sectional data, associations between stress and psychological distress and chronic conditions are determined. With longitudinal data, stress in 1994/95 is studied in relation to changes in psychological distress and the incidence of chronic conditions by 2000/01. These relationships are examined using multivariate techniques to control for the influence of other variables that might affect the outcomes. The role emotional support plays in the relationship between

stress and mental and physical health is also considered. Because men and women report different levels and sources of stress, separate analyses are conducted for each sex.

Sources of stress

Stress can originate in a variety of situations, so to understand the full health impact, multiple sources must be considered²² (see *Stress leading to stress*). Three types of stress are examined in this analysis: recent negative life events, chronic strains and childhood traumas.

A life event is an acute change that requires a major adjustment in a short time.¹⁹ In the early days of stress research, all change was viewed as potentially stress-provoking. This has given way to the belief that negative changes, particularly unscheduled or uncontrolled events, are more predictive of health problems.^{18,23-26} Negative life events are usually measured over a fixed reference period; in the case of the NPHS, the period is one year.

Chronic strains, by contrast, are not discrete events. Often there is no clear beginning; these strains develop subtly and persist.^{19,27} Chronic strains may be related to social roles;^{18,26} for example, being in a relationship, being a parent, or working. They can also arise from not having a desired role, such as wanting a partner but not being able to find someone.²² Another class of chronic strains concerns ambient circumstances, such as time pressure, financial trouble and environmental problems.^{26,27}

Childhood traumas, such as parental divorce and parental substance abuse, may have occurred many years before, but can have a lingering impact.²⁸

A common experience

A substantial number of Canadians experience stress. In response to the 2000/01 CCHS, 26% of people aged 18 or older characterized their life as “quite stressful” or “extremely stressful,” and another 40% reported it to be “a bit stressful” (Chart 1).

In 1994/95, the NPHS found that the most common forms of stress were chronic strains, especially trying to do too many things at once,

Definitions

Four *age groups* were established for this analysis: 18 to 24, 25 to 44, 45 to 64, and 65 or older.

Household income was based on the number of people in the household and total household income from all sources in the 12 months before the 1994/95 interview.

Household income group	People in household	Total household income
Lowest	1 to 4	Less than \$10,000
	5 or more	Less than \$15,000
Lower-middle	1 or 2	\$10,000 to \$14,999
	3 or 4	\$10,000 to \$19,999
	5 or more	\$15,000 to \$29,999
Middle	1 or 2	\$15,000 to \$29,999
	3 or 4	\$20,000 to \$39,999
	5 or more	\$30,000 to \$59,999
Upper-middle	1 or 2	\$30,000 to \$59,999
	3 or 4	\$40,000 to \$79,999
	5 or more	\$60,000 to \$79,999
Highest	1 or 2	\$60,000 or more
	3 or more	\$80,000 or more

National Population Health Survey (NPHS) respondents were grouped into four *education* categories based on the highest level attained: less than secondary graduation, secondary graduation, some postsecondary, and postsecondary graduation.

Respondents were asked their current *marital status*. Those who indicated "now married," "common-law" or "living with a partner" were grouped as "married." Individuals who answered "single" were classified as "never married," and responses of "widowed," "separated" or "divorced" were categorized as "previously married."

Daily smokers were defined as those who indicated that they smoked cigarettes every day.

Leisure-time *physical activity* was based on total accumulated energy expenditure (EE), calculated from the reported frequency and duration of all of a respondent's leisure-time physical activities in the three months before the 1994/95 NPHS interview and the metabolic energy demand (MET value) of each activity, which was independently established.^{29,30}

$$EE = \sum (N_i * D_i * MET_i / 365 \text{ days}), \text{ where}$$

N_i = number of occasions of activity i in a year,

D_i = average duration in hours of activity i , and

MET_i = a constant value for metabolic energy cost of activity i .

For each respondent, daily EE was the sum of energy expenditures of all leisure-time activities, expressed as total kilocalories expended per kilogram of body weight per day (K/K/D). An EE of 3 or more K/K/D was defined as active leisure time; 1.5 to 2.9, moderately active; and less than 1.5, inactive.²⁹

Heavy drinking was measured by asking respondents the number of times in the past year they had five or more alcoholic drinks on one occasion. Those who answered 12 or more times were classified as heavy drinkers.

Weight was defined in terms of body mass index (BMI), which was calculated by dividing weight in kilograms by the square of height in metres. BMI is not calculated for pregnant women. BMI was grouped into two categories: obese (BMI 30 or more) and not obese (less than 30).

To measure *mastery*, respondents were asked to react to 7 statements, ranked on a five-point scale ranging from "strongly agree" (score 0) to "strongly disagree" (score 4):

- You have little control over the things that happen to you.
- There is really no way you can solve the problems you have.
- There is little you can do to change many of the important things in your life.
- You often feel helpless in dealing with problems of life.
- Sometimes you feel you are being pushed around in life.
- What happens in the future mostly depends on you. (Reverse scored.)
- You can do just about anything if you set your mind to it (Reverse scored.)

The responses were summed (ranging from 0 to 28), with higher scores indicating greater mastery (Cronbach's alpha = 0.76).

Four "yes/no" questions were used to measure perceived *emotional support*:

- Do you have someone you can talk to about your private feelings or concerns?
- Do you have someone you can really count on in a crisis situation?
- Do you have someone you can really count on to give you advice when you are making important personal decisions?
- Do you have someone who makes you feel loved and cared for?

The "yes" responses were summed (ranging from 0 to 4), with higher scores indicating greater perceived emotional support. Respondents were classified as having low emotional support if they answered "yes" to at least one of the four items.

Psychological distress was based on responses to the following questions: During the past month, about how often did you feel:

- ... so sad that nothing could cheer you up?
- ... nervous?
- ... restless or fidgety?
- ... hopeless?
- ... worthless?
- ... that everything was an effort?

Each question was answered on a five-point scale: all of the time (score 4), most of the time (3), some of the time (2), a little of the time (1) or none of the time (0). Responses were scored and summed; the possible range was 0 to 24, with a higher score indicating more distress (Cronbach's alpha = 0.77). For longitudinal analyses, the difference in distress scores was calculated as the score in 2000/01 minus the score in 1994/95.

To determine the presence of *chronic conditions*, respondents were asked if they had "any long-term health conditions that have lasted or are expected to last six months or more and that have been diagnosed by a health professional." The interviewer then read a checklist. Conditions considered in this analysis were: asthma, arthritis/rheumatism, back problems (excluding arthritis), high blood pressure, migraine, chronic bronchitis/emphysema, diabetes, heart disease, cancer, and stomach/intestinal ulcers. Respondents were classified as having "none" or "one or more" of these conditions in 1994/95. For longitudinal analyses, the incidence of each condition was determined over a six-year period. Respondents were classified as having one or more new chronic conditions if, in 2000/01, they reported at least one from the checklist that they had not reported in 1994/95.

which was cited by 44% of adults (Table 1, Chart 2). Financial problems affected 38%, and 31% felt that others expected too much of them. One person in five (21%) wanted to move, but felt that a move was not possible.

A third of previously married or never-married people reported difficulty finding someone compatible. And 30% of people with children were seriously concerned about a child's behaviour.

Stress leading to stress

Stress rarely occurs in isolation, and in some cases, stress in one milieu may create stressors in another.¹⁸ For instance, problems at work may cause tension at home, which may, in turn, exacerbate work problems. "Proliferation of stressors" refers to the development and spread of stress across all facets of a person's life.^{16,19,26}

Modest to sizeable correlations were observed between the various sources of stress measured by the National Population Health Survey in 1994/95. Women seemed to be especially vulnerable to "stress proliferation."

As well, stress in 1994/95 was associated with stress six years later. And for both sexes, childhood traumas were associated with chronic strains and recent negative life events, suggesting that stress that occurred decades earlier can have a long-lasting impact.

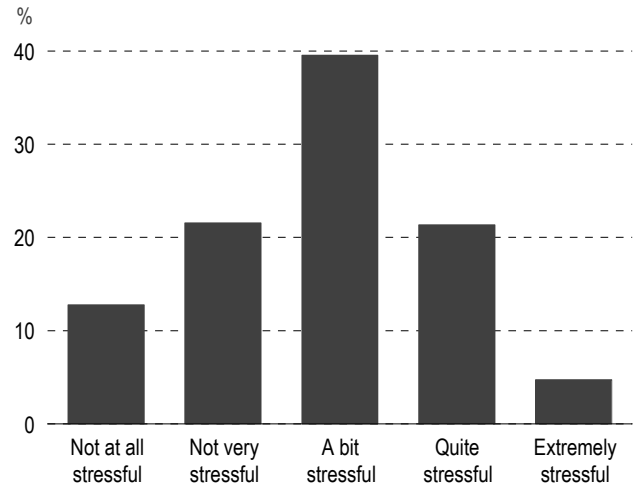
Correlations between sources of stress, by sex, household population aged 18 or older in 1994/95, Canada excluding territories

	Men	Women
Cross-sectional correlations, 1994/95		
Recent negative life events x chronic strains	0.38	0.43
Recent negative life events x childhood traumas	0.31	0.34
Chronic strains x childhood traumas	0.30	0.37
Longitudinal correlations, 1994/95 to 2000/01		
Recent negative life events 1994/95 x recent negative life events 2000/01	0.25	0.27
x chronic strains 2000/01	0.25	0.26
Chronic strains 1994/95 x recent negative life events 2000/01	0.22	0.27
x chronic strains 2000/01	0.37	0.49
Childhood traumas 1994/95 x recent negative life events 2000/01	0.20	0.25
x chronic strains 2000/01	0.18	0.29

Data sources: 1994/95 National Population Health Survey, cross-sectional sample, Health file; 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file (extreme)

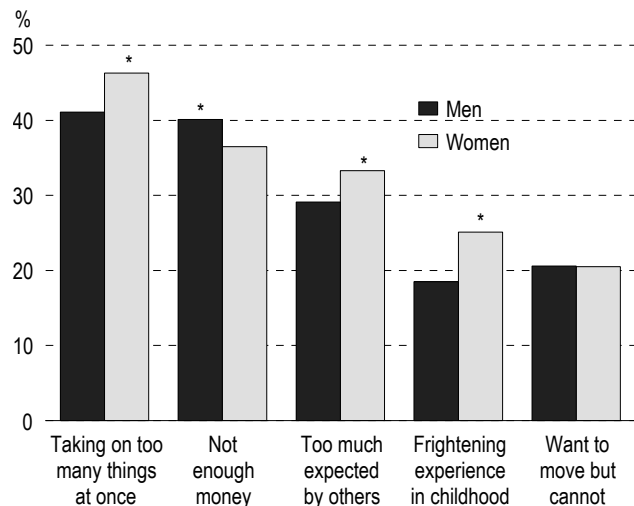
More dramatic stressors in the categories of recent negative life events and childhood traumas were less prevalent. Around 3% of adults reported that in the past year they or someone in their family had had an abortion or miscarriage, and 5% said

Chart 1
Percentage distribution of household population aged 18 or older, by day-to-day stress level, Canada, 2000/01



Data source: 2000/01 Canadian Community Health Survey, cycle 1.1

Chart 2
Five most common sources of stress, by sex, household population aged 18 or older, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

* Significantly higher than estimate for other sex ($p < 0.05$)

that they or someone close to them had been beaten up or physically attacked. A larger number—over 7%—had been physically abused by someone close to them when they were children.

When the various stressors in an adult's life were added up, the average in 1994/95 was 4.6 (Table 2). The range, however, was wide: from individuals reporting no stressors at all to those citing 29.

Women more stressed

Whether it was recent negative life events, chronic strains or childhood traumas, women were generally more likely than men to report stress. Not surprisingly, then, women's average stress score was higher (4.8 versus 4.3 for men), and a larger percentage had 10 or more stressors (Chart 3).

Women were more likely than men to report chronic strains in the realms of personal stress,

Data sources

National Population Health Survey

Since 1994/95, Statistics Canada's biennial National Population Health Survey (NPHS) has collected information about the health of the Canadian population. The survey covers household and institutional residents in all provinces and territories, except persons on Indian reserves, on Canadian Forces bases, and in some remote areas. This analysis is based only on household residents in the 10 provinces.

In 1994/95 (cycle 1), data were collected using two questionnaires: General and Health. With the General questionnaire, socio-demographic and some basic health information was collected from one knowledgeable household member for all members of sampled households. Additional, in-depth health information about one randomly selected household member was collected using the Health questionnaire. Because of the detailed nature of the Health questionnaire, this information had to be provided by the selected respondent. Proxy response was accepted only in special circumstances (for example, if a health problem prevented the selected respondents from providing their own information).

In cycle 1, a total of 20,725 households participated, meaning that at least the General questionnaire was completed for the randomly selected respondent—a response rate of 88.7%. The response rate to the Health questionnaire for the randomly selected respondents was 96.1%. Numbering 17,276, they formed the basis for the longitudinal panel. The response rates for the longitudinal panel in subsequent cycles were 93.6% in 1996/97, 88.9% in 1998/99, and 84.8% in 2000/01. The first three cycles had both longitudinal and cross-sectional components, but starting in 2000/01 (cycle 4), the NPHS became strictly longitudinal, and one questionnaire was used to collect all information from the longitudinal panel.

In 1994/95, the majority of interviews were conducted in person. In subsequent cycles, as long as respondents were willing and able, the interviews were conducted by telephone. More detailed

descriptions of the design, sample and interview procedures can be found in published reports.^{31,32}

The cross-sectional sample analyzed for this article consists of 15,690 respondents (6,954 men and 8,736 women) aged 18 or older and is based on the 1994/95 NPHS. It was necessary to use 1994/95 data for the cross-sectional analysis because the stress questions were not asked in any of the subsequent cycles for which a cross-sectional file was produced. (The stress questions were repeated in 2000/01, the cycle at which the NPHS became strictly longitudinal.) Because of the subjective nature of the stress questions, it was felt that another household member could not accurately report this information. Consequently, 433 men and 168 women whose Health questionnaire data were provided by proxy were excluded from the analyses.

The longitudinal analysis is based on 10,151 respondents (4,370 men and 5,781 women) aged 18 or older in 1994/95, for whom complete data were available for cycles 1 and 4. Respondents whose 1994/95 Health questionnaire data were provided by proxy were excluded (261 men and 102 women). Also excluded were longitudinal panel members who had died or been institutionalized by the 2000/01 interview (506 men and 544 women). Consequently, weighted estimates based on the longitudinal file are lower than those based on the 1994/95 cross-sectional file.

Canadian Community Health Survey

Recent estimates of day-to-day stress levels are from Statistics Canada's 2000/01 Canadian Community Health Survey (CCHS). The CCHS covers the household population aged 12 or older in all provinces and territories, except persons living on Indian reserves, on Canadian Forces bases, and in some remote areas. The responding sample was 131,535, and the response rate was 84.7%. The CCHS data in this article pertain to 118,105 respondents aged 18 or older in the provinces and territories, who answered the question about daily stress.

relationships, children, and family health. Most of these stressors involve significant others. It has been suggested that women are socialized to be more

responsive to others' well-being, so their higher stress rates may partially stem from their nurturing roles—the “cost of caring.”^{33,34}

Table 1
Percentage of household population aged 18 or older reporting stress, by source of stress and sex, Canada excluding territories, 1994/95

	Both sexes	Men	Women
	%		
Recent negative life events (past 12 months)			
You/Family member had major financial crisis	13.3	12.0	14.6*
You/Partner demoted at work or took pay cut	11.7	12.4*	11.0
Increased arguments with partner†	8.7	7.1	10.1*
Went on welfare	6.4	5.9	6.9
Child moved back into house‡	5.3	4.9	5.6
You/Partner changed job for worse one	5.1	5.8*	4.5
You/Someone close physically attacked	5.0	5.1	5.0
You/Family member failed school/training program	4.6	4.6	4.6
You/Family member had abortion/miscarriage	2.8	2.0	3.5*
You/Family member had unwanted pregnancy	2.0	1.5	2.4*
Chronic strains			
Personal stress			
Trying to take on too much at once	43.8	41.1	46.3*
Too much expected by others	31.3	29.1	33.3*
Too much pressure to be like others	16.0	15.0	16.9*
Work around home not appreciated	12.7	8.7	16.3*
People too critical of you	11.8	11.7	11.9
Financial problems			
Not enough money to buy things needed	38.2	40.1*	36.5
Relationship problems			
Very difficult to find someone compatible§	32.8	35.7*	30.4
Partner doesn't understand you†	13.8	11.7	15.8*
Partner doesn't show enough affection†	12.2	9.9	14.5*
Partner not committed enough to relationship†	6.0	5.0	7.0*
Child problems‡			
Child's behaviour is serious concern	29.6	29.5	29.7
Child seems very unhappy	16.3	14.1	18.1*
Environmental problems			
Want to move but can't	20.6	20.6	20.5
Neighbourhood/Community too noisy/polluted	9.8	9.6	10.1
Friends are bad influence	3.5	5.0*	2.1
Family health			
Family member has drinking/drug problem	14.0	12.4	15.4*
Parent/Child/Partner in very bad health, may die	11.4	10.3	12.3*
Childhood traumas			
Something scared you so much that you thought about it for years	22.0	18.5	25.1*
Spent two or more weeks in hospital	15.7	16.4	15.1
Parental drinking/drug use caused family problems	14.5	13.4	15.4*
Parent did not have job for long time	13.4	13.2	13.6
Parents divorced	10.7	9.9	11.5*
Physically abused by someone close	7.5	4.6	10.2*
Sent away from home because you did something wrong	2.5	2.7	2.4

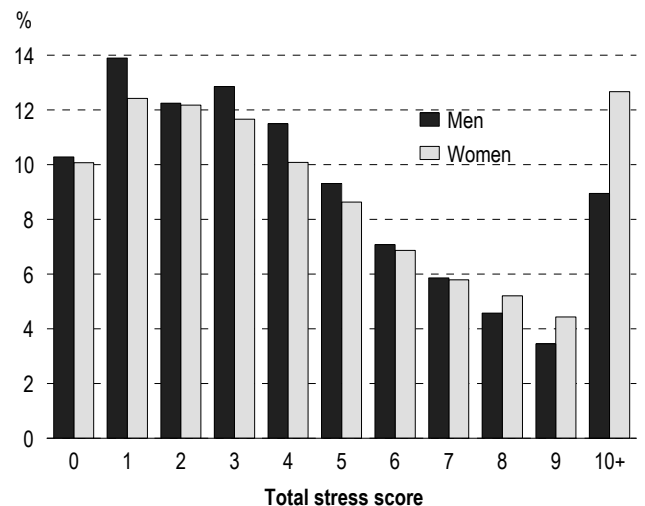
Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file
Note: Based on 6,954 male and 8,736 female respondents
 † Married respondents
 ‡ Respondents with children
 § Previously married and never-married respondents
 * Significantly higher than estimate for other sex ($p < 0.05$)

Table 2
Stress scores, by source of stress and sex, household population aged 18 or older, Canada excluding territories, 1994/95

	Both sexes	Men	Women
Total stress			
Average score	4.6	4.3	4.8*
Observed minimum	0	0	0
Observed maximum	28.7	25.7	28.7
Recent negative life events			
Average score	0.7	0.6	0.7*
Observed minimum	0	0	0
Observed maximum	7.8	7.8	7.8
Chronic strains			
Average score	3.0	2.9	3.2*
Observed minimum	0	0	0
Observed maximum	16.0	14.7	16.0
Childhood traumas			
Average score	0.9	0.8	0.9*
Observed minimum	0	0	0
Observed maximum	7.0	7.0	7.0

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file
Note: Based on 6,954 male and 8,736 female respondents
 * Significantly higher than estimates for men ($p < 0.05$)

Chart 3
Percentage distribution of household population aged 18 or older, by total stress scores and sex, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Women were also more likely than men to report four of the seven childhood traumas: an experience so frightening that they thought about it for years afterward, a parent with a drinking or drug problem, parental divorce, and physical abuse.

A few stressors affected a higher percentage of men than women. Men were more likely to report employment-related stress, such as a change of job for a worse one, a demotion or pay cut, and not having enough money. Larger proportions of previously married and never-married men than women found it difficult to find someone compatible. And although the numbers were small

for both sexes, men were more likely to report that their friends were a bad influence.

Decreases with age

Like many previous studies,^{28,34,37} analyses of 1994/95 NPHS data show that stress levels originating from each of the three sources—recent negative life events, chronic strains and childhood traumas—decline with age (Charts 4 to 6). It is possible that experience and maturity make people less likely to perceive events as stressful. While the inverse relationship between age and reporting childhood traumas could be due to recall problems,

Analytical techniques

The prevalence of day-to-day stress was determined based on the 2000/01 Canadian Community Health Survey. The data were weighted to represent the population of the provinces and the territories in 2000/01.

Descriptive statistics based on the 1994/95 National Population Health Survey (NPHS) cross-sectional file were used to profile stress levels by sex and age group. Relationships between stress and various health problems in 1994/95 were considered in a series of multivariate models that control for factors believed to play a role in the relationship between stress and health: demographic and socio-economic characteristics, health behaviours and psycho-social resources.^{10,11,16,18,20,21} Mental health was addressed by considering psychological distress levels. To study the relationship between stress and physical health, 10 chronic conditions were examined: asthma, arthritis, back problems, high blood pressure, migraine, chronic bronchitis/emphysema, diabetes, heart disease, cancer, and stomach/intestinal ulcers.

The NPHS longitudinal file was used to study changes in psychological distress and the incidence of chronic conditions between 1994/95 and 2000/01 in relation to stress in 1994/95. Each association was examined in multivariate regression models. Again, the factors believed to mediate the relationship between stress and health were accounted for in these models. In all the regression models, continuous measures were used for the stress, mastery, emotional support and psychological distress variables.^{35,36}

To test the emotional support buffering hypothesis, the regression models were of the following form:

$$H = \beta_0 + \beta_1(\text{str}) + \beta_2(\text{pes}) + \beta_3(\text{stress} \times \text{pes}) + (\text{other control variables})$$

where:

H = health outcome

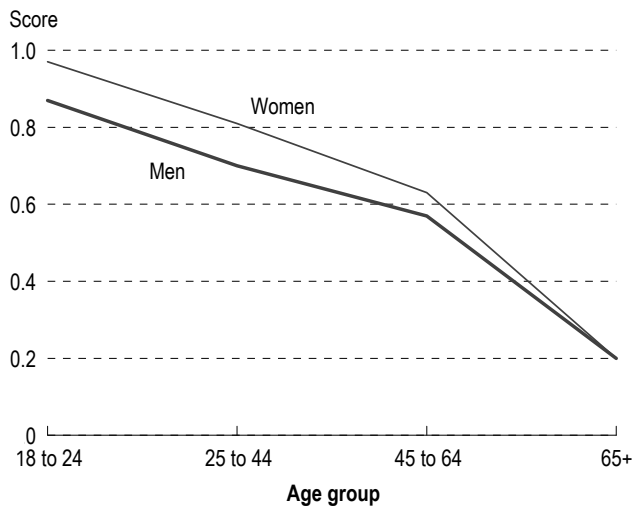
str = stress

pes = perceived emotional support

Evidence of buffering is indicated by a significant negative interaction between stress and emotional support. That is, if β_3 (the cross-product regression coefficient) is significantly less than zero, this indicates a benefit derived from emotional support (to the health outcome) for each increment in stress. The regression coefficients for the constituent variables (β_1 and β_2) estimate the effect of one of these variables when the other is zero. In this example, β_1 represents the effect of stress on the health outcome for people with zero emotional support, and β_2 represents the effect of emotional support for those with zero stress.³⁸ In reality, however, almost no one is totally devoid of emotional support or totally insulated from stress. Therefore, for this analysis, the stress and emotional support variables were centred. The mean for each variable was subtracted from the corresponding value on each individual record. In the revised data set, β_1 represents the effect of stress for those with an average amount of emotional support; β_2 represents the effect of emotional support for people with an average amount of stress.³⁹

The cross-sectional and longitudinal NPHS data were weighted to reflect the socio-demographic makeup of the population of the 10 provinces in 1994/95. Sample sizes and weighted distributions for all factors included in the regression models can be found in the Appendix (Tables A through E). To account for survey design effects, standard errors and coefficients of variation were estimated with the bootstrap technique.⁴⁰⁻⁴³ All significance tests were conducted using a p-value of 0.05, which was deemed appropriate because the number of incident cases of chronic conditions, the main focus of the analyses, was relatively small (Appendix Table E). However, significance levels of 0.01 and 0.001 are also shown in the tables, indicating the relationships between stress and health outcomes.

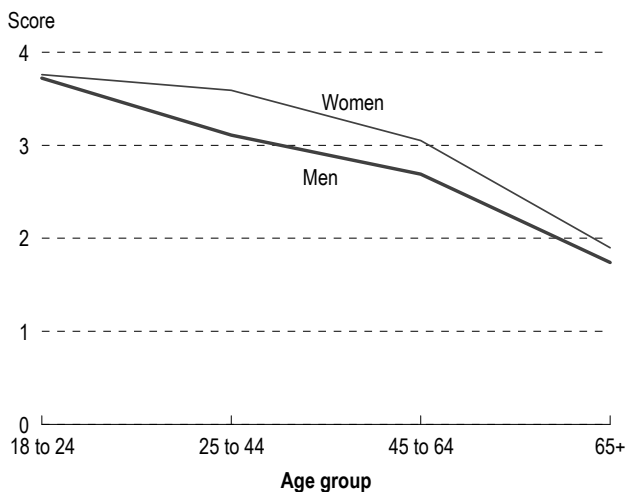
Chart 4
Average score for recent negative life events, by sex and age group, household population aged 18 or older, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Notes: Score decreases significantly as age increases ($p < 0.05$ adjusted for multiple comparisons), except no significant difference between age groups 18 to 24 and 25 to 44 for women; women's score significantly higher than men's for age group 25 to 44.

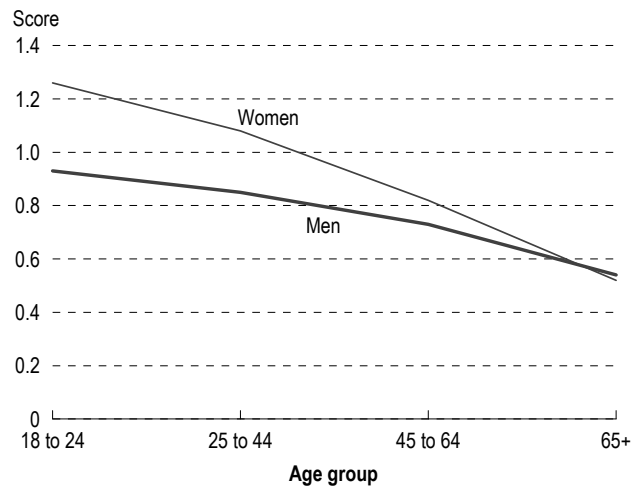
Chart 5
Average score for chronic strains, by sex and age group, household population aged 18 or older, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Notes: Score decreases significantly as age increases ($p < 0.05$ adjusted for multiple comparisons), except no significant difference between age groups 18 to 24 and 25 to 44 for women; women's score significantly higher than men's for age groups 25 to 44 and 45 to 64.

Chart 6
Average score for childhood traumas, by sex and age group, household population aged 18 or older, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Notes: Score decreases significantly as age increases ($p < 0.05$ adjusted for multiple comparisons), except no significant difference between age groups 18 to 24 and 25 to 44 for men; women's score significantly higher than men's for age groups 18 to 24, 25 to 44 and 45 to 64.

it might also signal a lessening of the impact of these events over time. Nonetheless, many of the situations that comprise the stress scales commonly occur in young and middle adulthood.³⁷

Inverse relationship with socio-economic status

Stress tends to be relatively high among people with low socio-economic status.^{34,44} The strength of this association, however, may be diluted by the low prevalence of stress at older ages, and the fact that a disproportionate percentage of the elderly have low incomes and relatively little formal education. When the effects of these potential confounders were taken into account, in 1994/95, men and women with lower household incomes generally reported higher levels of stress from each of the three sources (Table 3). The relationship between education and stress was less consistent. Postsecondary graduates tended to report less stress than did people with lower levels of education. However, men and women with some postsecondary schooling reported higher stress levels than did high school graduates (data not

shown). It has been suggested that starting but not completing college or university is itself a source of stress.⁴⁴

A number of studies have found that people who are not married are more likely than those who are to report negative life events and chronic strains.^{34,44} The results of analyses of NPHS data are similar for previously married individuals (widowed, separated, divorced), but not for the never-married. The chronic strain scores of never-married people were on a par with those of married people, and their scores for recent negative life events were actually lower. This may be because many items included among negative life events concern not only the respondents, but also their family. With fewer family members, never-married people may be less exposed to such stressors.

Response to stressors

The majority of people who experience stress continue to function effectively with no adverse health effects. But for some, stress is associated with mental health problems such as depression and psychological distress.¹⁻⁹ Stress has also been linked to the onset and progression of physical illnesses including infectious diseases such as colds and influenza; autoimmune diseases such as rheumatoid arthritis; and potentially fatal conditions such as coronary heart disease, insulin dependent diabetes, cancer, and HIV.^{10-12,45-47}

Previous studies have clearly established stress as a non-specific risk factor. It is important, therefore, to consider more than one health outcome. Stress can manifest itself in a variety of ways depending on the nature of the stress and the characteristics

Table 3

Regression coefficients relating selected characteristics to stress, by source of stress and sex, household population aged 18 or older, Canada excluding territories, 1994/95

	Total stress				Recent negative life events				Chronic strains				Childhood traumas			
	Men		Women		Men		Women		Men		Women		Men		Women	
	B	se	B	se	B	se	B	se	B	se	B	se	B	se	B	se
Age	-0.06*	0.004	-0.08*	0.004	-0.01*	0.001	-0.02*	0.001	-0.03*	0.003	-0.05*	0.003	-0.01*	0.001	-0.02*	0.001
Household income																
Low/Lower-middle	1.46*	0.197	1.34*	0.170	0.46*	0.055	0.40*	0.051	0.79*	0.135	0.74*	0.119	0.23*	0.059	0.22*	0.052
Middle	0.47*	0.126	0.41*	0.130	0.10*	0.038	0.13*	0.037	0.36*	0.092	0.28*	0.091	0.02	0.038	0.00	0.043
Upper-middle/High†	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Education																
Less than secondary graduation	0.36*	0.145	0.88*	0.159	0.01	0.040	0.03	0.047	0.26*	0.108	0.57*	0.110	0.11*	0.044	0.27*	0.049
Secondary graduation	0.33*	0.158	0.43*	0.170	0.05	0.047	-0.03	0.047	0.22	0.119	0.38*	0.121	0.07	0.050	0.08	0.050
Some post-secondary	0.64*	0.150	0.63*	0.148	0.15*	0.045	0.05	0.039	0.39*	0.104	0.36*	0.101	0.11*	0.043	0.21*	0.046
Postsecondary graduation†	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marital status																
Married†	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Previously married	0.76*	0.173	0.97*	0.138	0.14*	0.046	0.07*	0.037	0.51*	0.127	0.68*	0.100	0.09	0.052	0.20*	0.042
Never married	0.02	0.165	-0.31	0.166	-0.09*	0.043	-0.16*	0.048	0.18	0.114	-0.06	0.114	-0.07	0.047	-0.09	0.052
Intercept	6.03		7.47		1.06		1.30		3.87		4.61		1.09		1.56	
Model information																
R ²	0.10		0.12		0.07		0.07		0.08		0.09		0.02		0.06	
Sample size	6,872		8,669		6,886		8,687		6,889		8,684		6,884		8,680	
Dropped because of missing values	82		67		68		49		65		52		70		56	

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Note: "Missing" category for household income variable was included in each model to maximize sample size, but coefficients are not shown.

† Reference category

* $p < 0.05$

... Not applicable

of the person experiencing it.²³ In this analysis, various health outcomes are considered in a series of multivariate models that control for factors believed to play a pivotal role in the relationship between stress and health: demographic and socio-economic characteristics, health behaviours, and

psycho-social resources. The relationship between stress and mental health is addressed by examining psychological distress. To study associations with physical health, 10 chronic conditions are considered: asthma, arthritis/rheumatism, back problems, high blood pressure, migraine, chronic

Table 4

Regression coefficients relating selected characteristics in 1994/95 to psychological distress in 1994/95 and to change in psychological distress by 2000/01, by sex, household population aged 18 or older, Canada excluding territories

	Psychological distress level in 1994/95				Change in psychological distress level between 1994/95 and 2000/01			
	Men		Women		Men		Women	
	B	se	B	se	B	se	B	se
Distress level in 1994/95	...	...	...	...	-0.71***	0.033	-0.73***	0.026
Age	-0.02***	0.003	-0.01***	0.003	0.00	0.005	-0.01	0.005
Household income								
Low/Lower-middle	0.22	0.154	0.29	0.149	0.39	0.211	0.46*	0.199
Middle	-0.01	0.099	0.08	0.098	0.11	0.145	0.08	0.142
Upper-middle/High†	...	...	...	...	...	...	...	...
Education								
Less than secondary graduation	-0.20	0.129	0.09	0.128	0.21	0.170	0.36	0.186
Secondary graduation	-0.32**	0.123	-0.07	0.126	-0.05	0.171	0.25	0.212
Some postsecondary	-0.10	0.114	0.07	0.103	0.07	0.152	-0.23*	0.114
Postsecondary graduation†	...	...	...	...	...	...	...	...
Marital status								
Married†	...	...	...	...	...	...	...	...
Previously married	0.10	0.143	0.32*	0.134	-0.01	0.171	-0.18	0.151
Never married	0.38**	0.130	0.52***	0.142	0.01	0.169	0.02	0.168
Health behaviours								
Daily smoker	0.08	0.103	0.27*	0.118	0.28	0.145	0.25	0.147
Physically inactive	0.19*	0.093	0.26**	0.080	0.05	0.108	-0.12	0.125
Heavy drinker	0.10	0.096	0.14	0.211	-0.27	0.142	-0.18	0.245
Obese	-0.14	0.128	-0.16	0.126	-0.34*	0.146	0.23	0.208
Psycho-social resources								
Mastery	-0.20***	0.015	-0.26***	0.012	-0.04*	0.018	-0.04**	0.015
Emotional support	-0.06	0.073	-0.29**	0.100	-0.14	0.138	0.20*	0.094
Stress and emotional support interactions‡								
Total stress	0.29***	0.016	0.28***	0.014	0.06*	0.024	0.10***	0.019
x emotional support	-0.05**	0.017	-0.07***	0.017	0.01	0.031	-0.05*	0.019
Intercept	3.86		3.63		1.25		1.71	
Model information								
R ²	0.30		0.34		0.35		0.35	
Sample size	6,644		8,467		3,960		5,474	
Dropped because of missing values	310		269		410		307	

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file; 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file (extreme)

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but coefficients are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker."

† Reference category

‡ Beta coefficients are not presented because standardized regression coefficients for interaction terms and constituent variables are affected by changes in origin and so are not useful indicators of relative importance of variables in multiplicative regression model (see Analytical techniques) (Reference 39).

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable

bronchitis/emphysema, diabetes, heart disease, cancer, and stomach/intestinal ulcers.

Stress and mental health

For some people, stress can be associated with emotional upset.¹⁻⁹ In fact, analysis of 1994/95 NPHS data showed that psychological distress among men and women was related to the total amount of stress they reported (Table 4). As well, each source of stress—negative life events, chronic

strains and childhood traumas—was independently associated with increased psychological distress, even when demographic and socio-economic characteristics, health behaviours, and psycho-social resources were taken into account (Appendix Tables F and G). Chronic strains were the most powerful in explaining differences in psychological distress, perhaps because they represent prolonged, unresolved difficulties.^{23,48}

Table 5
Adjusted odds ratios relating source of stress to selected chronic conditions, by sex, household population aged 18 or older, Canada excluding territories, 1994/95

	Total stress		Recent negative life events		Chronic strains		Childhood traumas	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Asthma								
Men	1.07**	1.02, 1.12	1.19*	1.03, 1.37	1.08*	1.01, 1.15	1.11	0.97, 1.27
Women	1.09***	1.06, 1.13	1.19**	1.06, 1.33	1.09***	1.04, 1.15	1.27***	1.17, 1.37
Arthritis/Rheumatism								
Men	1.14***	1.10, 1.18	1.28***	1.16, 1.42	1.15***	1.09, 1.21	1.31***	1.19, 1.43
Women	1.09***	1.06, 1.11	1.17***	1.08, 1.27	1.09***	1.06, 1.13	1.24***	1.16, 1.32
Back problems								
Men	1.11***	1.08, 1.14	1.30***	1.19, 1.41	1.10***	1.06, 1.15	1.23***	1.15, 1.33
Women	1.12***	1.09, 1.14	1.26***	1.18, 1.36	1.13***	1.09, 1.17	1.27***	1.19, 1.34
High blood pressure								
Men	1.08***	1.04, 1.13	1.24***	1.10, 1.39	1.10***	1.04, 1.17	1.05	0.93, 1.18
Women	1.02	0.99, 1.05	1.02	0.91, 1.15	1.01	0.97, 1.06	1.09*	1.00, 1.17
Migraine								
Men	1.13***	1.08, 1.17	1.31***	1.14, 1.50	1.15***	1.08, 1.23	1.20**	1.07, 1.35
Women	1.12***	1.09, 1.15	1.25***	1.16, 1.34	1.13***	1.10, 1.17	1.30***	1.21, 1.39
Chronic bronchitis/ Emphysema								
Men	1.08**	1.03, 1.14	1.23*	1.02, 1.48	1.06	0.98, 1.14	1.29**	1.10, 1.50
Women	1.15***	1.11, 1.20	1.29***	1.11, 1.49	1.16***	1.10, 1.21	1.48***	1.33, 1.64
Diabetes								
Men	1.03	0.97, 1.10	1.05	0.82, 1.35	1.02	0.94, 1.10	1.12	0.94, 1.35
Women	1.10***	1.05, 1.15	1.41***	1.20, 1.66	1.09**	1.03, 1.16	1.20**	1.06, 1.37
Heart disease								
Men	1.10***	1.04, 1.16	1.11	0.93, 1.33	1.09*	1.01, 1.18	1.32***	1.13, 1.54
Women	1.07**	1.03, 1.11	1.14	0.97, 1.34	1.06*	1.00, 1.12	1.21**	1.07, 1.37
Cancer								
Men	0.97	0.86, 1.10	0.95	0.65, 1.39	0.88	0.72, 1.08	1.29*	1.04, 1.60
Women	1.02	0.96, 1.07	1.12	0.97, 1.28	0.97	0.90, 1.05	1.21*	1.01, 1.44
Stomach/Intestinal ulcers								
Men	1.13***	1.08, 1.19	1.28***	1.12, 1.47	1.16***	1.08, 1.24	1.21**	1.06, 1.39
Women	1.09***	1.05, 1.13	1.11	0.98, 1.26	1.10***	1.04, 1.16	1.28***	1.16, 1.41

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Notes: Presents results of 40 separate regression models for each sex (one for each chronic condition). Each regression includes same control variables as Appendix Tables J and K. Results for complete models are available on request. Because of rounding, some confidence intervals with 1.00 as lower limit are significant.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Not only was stress reported in 1994/95 associated with psychological distress at that time, but it was also related to increased distress by 2000/01. Even when their distress level at the beginning of the period was taken into account, for men, a negative life event reported in 1994/95 was significantly associated with an increase in psychological distress by 2000/01 (Appendix Table H). Among women, chronic strains and childhood traumas reported in 1994/95 had a similar

association with long-term psychological distress (Appendix Table I).

Stress and physical health

In 1994/95, people with elevated stress levels had high odds of reporting at least one of the 10 chronic conditions considered in this article (Appendix Tables J and K). For men, each additional stressor meant a 12% increase in the odds of reporting a chronic condition; for women, a 13% increase. Each

Table 6

Adjusted odds ratios relating source of stress in 1994/95 to incidence of selected chronic conditions by 2000/01, by sex, household population aged 18 or older in 1994/95, Canada excluding territories

	Total stress		Recent negative life events		Chronic strains		Childhood traumas	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Asthma								
Men	1.06	1.00, 1.13	1.05	0.80, 1.37	1.02	0.94, 1.11	1.40***	1.15, 1.71
Women	1.06**	1.02, 1.11	1.02	0.88, 1.17	1.11**	1.04, 1.19	1.11	0.98, 1.27
Arthritis/Rheumatism								
Men	1.08**	1.03, 1.13	1.21**	1.05, 1.39	1.09*	1.02, 1.17	1.14	1.00, 1.29
Women	1.10***	1.06, 1.13	1.10	0.99, 1.22	1.11***	1.06, 1.16	1.32***	1.19, 1.46
Back problems								
Men	1.09***	1.04, 1.14	1.07	0.92, 1.24	1.11***	1.04, 1.18	1.23**	1.09, 1.40
Women	1.08***	1.04, 1.12	1.10	0.97, 1.26	1.08**	1.03, 1.14	1.24***	1.14, 1.36
High blood pressure								
Men	1.00	0.94, 1.06	1.02	0.81, 1.30	1.00	0.92, 1.09	0.98	0.84, 1.14
Women	1.01	0.97, 1.05	1.04	0.92, 1.19	0.99	0.94, 1.05	1.06	0.94, 1.18
Migraine								
Men	1.06	0.99, 1.14	1.01	0.77, 1.31	1.10	1.00, 1.21	1.10	0.92, 1.31
Women	1.10***	1.06, 1.13	1.22**	1.08, 1.39	1.13***	1.07, 1.18	1.12	1.00, 1.25
Chronic bronchitis/ Emphysema								
Men	1.12*	1.00, 1.24	1.37*	1.01, 1.86	1.16*	1.00, 1.35	0.97	0.75, 1.24
Women	1.13***	1.05, 1.20	1.13	0.92, 1.37	1.19***	1.09, 1.30	1.21	0.96, 1.52
Diabetes								
Men	1.05	0.97, 1.12	1.10	0.83, 1.44	1.01	0.91, 1.13	1.22	0.97, 1.54
Women	1.06	0.99, 1.14	1.43***	1.18, 1.74	1.03	0.94, 1.13	1.08	0.86, 1.35
Heart disease								
Men	1.10*	1.02, 1.19	1.26	0.99, 1.60	1.12*	1.02, 1.24	1.07	0.87, 1.30
Women	1.07	0.99, 1.15	1.15	0.90, 1.48	1.06	0.96, 1.18	1.17*	1.00, 1.37
Cancer								
Men	1.07	0.93, 1.25	1.11	0.71, 1.71	1.11	0.90, 1.37	1.00	0.71, 1.41
Women	1.07	0.99, 1.15	1.20	0.92, 1.56	1.08	0.97, 1.19	1.10	0.86, 1.41
Stomach/Intestinal ulcers								
Men	1.13**	1.05, 1.22	1.26*	1.00, 1.58	1.13*	1.02, 1.26	1.39***	1.15, 1.67
Women	1.11***	1.05, 1.18	1.18	0.96, 1.45	1.15***	1.06, 1.25	1.24*	1.04, 1.48

Data source: 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file (extreme)

Notes: Presents results of 40 separate regression models for each sex (one for each chronic condition). Each regression includes same control variables as Appendix Tables L and M and is based on respondents who did not report the specific chronic condition in 1994/95. Results for complete models are available on request. Because of rounding, some confidence intervals with 1.00 as lower limit are significant.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

source of stress was independently associated with reporting at least one chronic condition. Stress was also associated with reporting specific conditions—in some instances, only among men, in others, only among women, but in other cases, for both (Table 5). For example, whether it was recent negative life events, chronic strains or childhood traumas, men and women who reported those stressors had elevated odds of also reporting arthritis/rheumatism, back problems and migraine. Men and women with higher levels of total stress had higher odds of reporting asthma, arthritis/rheumatism, back problems, migraine, chronic bronchitis/emphysema, heart disease, and stomach/intestinal ulcers.

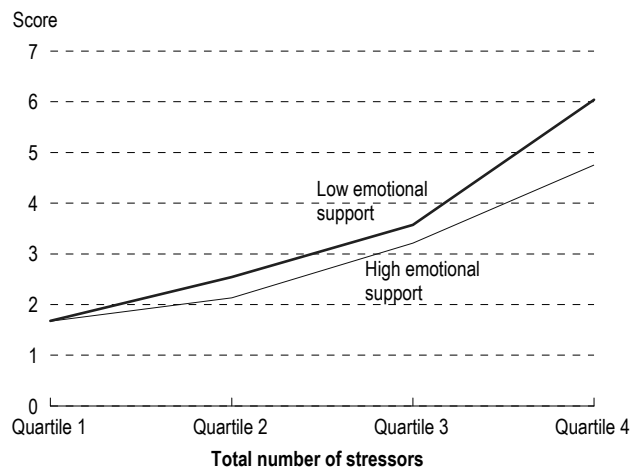
While these cross-sectional data suggest a link between exposure to stress in 1994/95 and health problems at that time, such data cannot indicate if the stress led to physical illness, or vice versa. However, longitudinal analyses indicate that, to some extent, stress precedes illness. For both sexes, total stress in 1994/95 was associated with developing at least 1 of the 10 conditions by 2000/01, even when the number of chronic conditions at the beginning of the period and other potentially influential factors were taken into account (Appendix Tables L and M).

As well, the various sources of stress reported in 1994/95 were associated with the incidence of specific chronic conditions over the next six years (Table 6). Chronic strains were associated with high odds of developing arthritis/rheumatism, back problems, chronic bronchitis/emphysema, and stomach/intestinal ulcers for both sexes, as well as heart disease for men, and asthma and migraine for women. Childhood traumas were related to new cases of back problems and stomach/intestinal ulcers among both sexes, to asthma among men, and to arthritis/rheumatism and heart disease among women. The long-term health effects of negative life events were less wide-ranging. For men, this type of stress increased the odds of arthritis/rheumatism, chronic bronchitis/emphysema, and stomach/intestinal ulcers by 2000/01; for women, such events increased the odds of migraine and diabetes.

Emotional support buffer

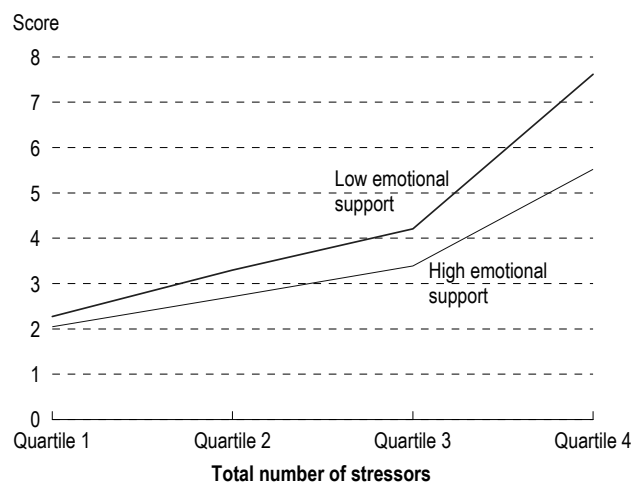
Emotional support is a feeling of being able to turn to others for affection, assistance and advice.^{19,21} The buffering hypothesis proposes that such support moderates the psychological effects of stress.^{35,36,49-51} In fact, perception of the availability

Chart 7
Psychological distress score, by emotional support and total number of stressors, men aged 18 or older, household population, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file
Note: For men in fourth quartile of stressors, psychological distress higher for those with low emotional support ($p < 0.05$).

Chart 8
Psychological distress score, by emotional support and total number of stressors, women aged 18 or older, household population, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file
Note: For women in third and fourth quartiles of stressors, psychological distress higher for those with low emotional support ($p < 0.05$).

of support may be more important than actual support received.^{19,49,52-56}

Consistent with previous studies,^{17,50,56-59} evidence of emotional support buffering against psychological distress emerged in 1994/95 NPHS data. People reporting few stressors had low levels of psychological distress, regardless of how much emotional support they believed they had (Charts 7 and 8). But among those exposed to a large number of stressors, levels of psychological distress in 1994/95 were lower if they had emotional support. And as stress rose, the protective effect of emotional support became stronger, as indicated by the negative interaction between stress and social support for both sexes (Table 4).

Longitudinal analysis showed no evidence of emotional support buffering against an increase in psychological distress by 2000/01 among men, although there was for women (Table 4). Previous longitudinal research has revealed scant evidence of emotional support buffering for mental health over time.^{1,8,9,49,57,59,64}

No indication of emotional support buffering against reporting at least one chronic condition, in either the short- or long-term (Appendix Tables J to M), emerged in the analysis of NPHS data, although for a few specific conditions there did seem to be a weak effect (data not shown).

Limitations

Although the National Population Health Survey (NPHS) measured stress in a variety of ways, the items that constituted these measures were not comprehensive. The lower stress exposure rates observed for the elderly may reflect stress inventory lists that over-represent situations likely to affect younger people and omit stressful events that typically occur later in life.^{25,37}

Apparent associations between stress and health may result from both stress and health being associated with another factor not included in this analysis. Self-reported data raise the risk of “negative affectivity bias,” meaning that individuals with a pessimistic or neurotic temperament may be predisposed to report both stress and poor health.^{25,60-63} Longitudinal analysis that controls for initial level of health (number of chronic conditions) reduces the possibility that a third factor is involved. But this, in turn, may yield overly conservative estimates of the associations between stress and health if the health problems observed at baseline were due to stress that had occurred previously.⁶⁰⁻⁶²

Some members selected for the longitudinal panel in 1994/95 did not respond in 2000/01, and so were excluded from the longitudinal analysis. Total stress scores in 1994/95 were higher for these dropouts than for continuers (5.0 versus 4.5). To compensate for dropouts, adjustments to survey weights were applied to the continuers, although some bias may still exist.³¹ Respondents who had died or were institutionalized by 2000/01 were necessarily excluded. Their 1994/95 stress scores were relatively low (3.0 for the institutionalized and 3.2 for those who died), which is in line with the lower stress observed among the elderly.

Respondents whose 1994/95 Health questionnaire data were provided by proxy were excluded (see *Methods*). This may have weakened some associations, because by definition, these people tended to be less healthy. The Health questionnaire could be answered by proxy only if the selected respondent could not answer because of special circumstances, often a medical problem.

Cases for which the 1994/95 General questionnaire had been answered by proxy were included in the analysis. However, the degree to which they are inaccurate because of reporting error is unknown. For example, the incidence of chronic conditions may have been affected.⁶⁵ In fact, even self-reported data about chronic conditions may be flawed, since no independent source verified whether respondents who reported a chronic condition had actually received a professional diagnosis.

Most 1994/95 interviews were conducted in person; in subsequent cycles, most were conducted by telephone. To some extent, differences in psychological distress levels between cycles may reflect this change in collection methodology. Obtaining information about psychiatric symptoms by telephone rather than face-to-face may result in fewer problems being reported,⁶⁶ although some studies have found no significant differences.^{67,68}

The measure of perceived emotional support was based on only four “yes/no” questions. The narrow range of possible scores may have reduced the likelihood of finding evidence of emotional support buffering.^{16,35,36,58,69,70}

Concluding remarks

Stress is an unavoidable part of life. Stress-provoking situations may be major upheavals that require rapid adjustment, or they may be daily hassles that cause frustration and tension. Stress may also stem from events that occurred years ago, but are still not resolved.

According to the 1994/95 National Population Health Survey, the most common stressors were chronic strains—trying to do too much at once, not having enough money, and ongoing problems in relationships and with children. Major life events were also frequent: over the course of a year, substantial numbers of people experienced a financial crisis, were demoted, received a pay cut or went on welfare. And a considerable number of adults reported childhood traumas such as parental divorce or having been abused by someone who was close to them.

While almost all Canadians reported stress, some were far more stressed than others. In general, women reported more stress and reacted to a wider range of stressors than did men. For both sexes, stress decreased with age. Stress tended to be relatively low among people with higher levels of income and education.

Stress was related to psychological distress and a number of health problems in the short-term, and even more importantly, in the long-term. High stress in 1994/95 was associated with an increase in psychological distress by 2000/01, and high odds of developing a number of chronic conditions: arthritis/rheumatism, back problems, chronic bronchitis/emphysema, and stomach/intestinal ulcers for both sexes, as well as heart disease for men, and asthma and migraine for women. These relationships suggest that, at least in some cases, stress is a precursor of poor health. And of the various sources of stress, chronic strains seemed to be the most potent. A stressful event in the preceding year had a less consistent effect on an individual's chances of eventually getting sick than did prolonged anxieties and frustrations.

Emotional support may moderate the association between stress and psychological upset, in the short-term for both sexes, and in the long-term for women. There was, however, little evidence of an emotional support buffer between stress and physical illness. ●

References

- Dalgard OS, Bjork S, Tambs K. Social support, negative life events and mental health. *British Journal of Psychiatry* 1995; 166(1): 29-34.
- DeMarco RR. The epidemiology of major depression: implications of occurrence, recurrence, and stress in a Canadian community sample. *Canadian Journal of Psychiatry* 2000; 45(1): 67-74.
- Ensel WM, Lin N. The life stress paradigm and psychological distress. *Journal of Health and Social Behavior* 1991; 32(4): 321-41.
- Kessler RC, Kessler RC, Neale MC, et al. The prediction of major depression in women: toward an integrated etiologic model. *American Journal of Psychiatry* 1993; 150(8): 1139-48.
- Kessler RC. The effects of stressful life events on depression. *Annual Review of Psychology* 1997; 48: 191-214.
- Reinherz HZ, Giaconia RM, Hauf AM, et al. Major depression in the transition to adulthood: risks and impairments. *Journal of Abnormal Psychology* 1999; 108(3): 500-10.
- Riise T, Lund A. Prognostic factors in major depression: a long-term follow-up study of 323 patients. *Journal of Affective Disorders* 2001; 65(3): 297-306.
- Williams AW, Ware JE, Donald CA. A model of mental health, life events, and social supports applicable to a general population. *Journal of Health and Social Behavior* 1981; 22(4): 324-36.
- Ystgaard M, Tambs K, Dalgard OS. Life stress, social support and psychological distress in late adolescence: a longitudinal study. *Social Psychiatry and Psychiatric Epidemiology* 1999; 34(1): 12-9.
- Cohen S, Herbert TB. Health psychology: psychological factors and physical disease from the perspective of human psychoneuroimmunology. *Annual Review of Psychology* 1996; 47: 113-42.
- Kiecolt-Glaser JK, McGuire L, Robles TF, et al. Psychoneuroimmunology: psychological influences on immune function and health. *Journal of Consulting and Clinical Psychology* 2002; 70(3): 537-47.
- McEwen BS, Stellar E. Stress and the individual. Mechanisms leading to disease. *Archives of Internal Medicine* 1993; 153(18): 2093-101.
- Steptoe A. [Invited review.] The links between stress and illness. *Journal of Psychosomatic Research* 1991; 35(6): 633-44.

- 14 Aneshenel CS. Outcomes of the stress process. In: Horwitz AV, Scheid TL, editors. *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems*. Cambridge University Press UK, 1999: 211-27.
- 15 Pearlin LI, Lieberman MA, Menaghan EG, et al. The stress process. *Journal of Health and Social Behavior* 1981; 22(4): 337-56.
- 16 Taylor SE, Aspinwall LG. Mediating and moderating processes in psychosocial stress: appraisal, coping, resistance, and vulnerability. In: Kaplan H, ed. *Psychological Stress, Perspective on Structure, Theory, Life-Course, and Methods*. San Diego: Academic, 1996: 71-110.
- 17 Chou KL, Chi I. Stressful life events and depressive symptoms: social support and sense of control as mediators or moderators? *International Journal of Aging and Human Development* 2001; 52(2): 155-71.
- 18 Pearlin LI. Stress and mental health: a conceptual overview. In: Horwitz AV, Scheid TL, eds. *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems*. Cambridge University Press UK, 1999: 161-75.
- 19 Thoits PA. Stress, coping, and social support processes: where are we? What next? *Journal of Health and Social Behavior* 1995; Spec No: 53-79.
- 20 Thoits PA. Sociological approaches to mental illness. In: Horwitz AV, Scheid TL, eds. *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems*. Cambridge University Press UK, 1999: 121-38.
- 21 Turner RJ, Lloyd DA, Roszell P. Personal resources and the social distribution of depression. *American Journal of Community Psychology* 1999; 27(5): 643-72.
- 22 Wheaton B. The nature of stressors. In: Horwitz AV, Scheid TL, eds. *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems*. Cambridge University Press UK, 1999: 176-97.
- 23 Aneshenel CS. Social stress: Theory and research. *Annual Review of Sociology* 1992; 18: 15-38.
- 24 Blazer D, Hughes D, George LK. Stressful life events and the onset of a generalized anxiety syndrome. *American Journal of Psychiatry* 1987; 144(9): 1178-83.
- 25 Herbert TB, Cohen S. Measurement issues in research on psychosocial stress. In: Kaplan H, ed. *Psychological Stress, Perspective on Structure, Theory, Life-Course, and Methods*. San Diego: Academic, 1996: 295-332.
- 26 Pearlin LI. The sociological study of stress. *Journal of Health and Social Behavior* 1989; 30(3): 241-56.
- 27 Wheaton B. *Chronic Stress: Models and Measurement*. Paper presented at the Society for Social Problems meetings in Cincinnati, Ohio, 1991.
- 28 Turner RJ, Lloyd DA. Lifetime traumas and mental health: the significance of cumulative adversity. *Journal of Health and Social Behavior* 1995; 36(4): 360-76.
- 29 Statistics Canada. Appendix F: Derived variables. *National Population Health Survey: 1994-95 Public Use Microdata File* (Catalogue 82F0001XCB) Ottawa: Minister of Industry 1995; 17-20.
- 30 Stephens T, Craig CL, Ferris BF. Adult physical activity in Canada: findings from the Canada Fitness Survey. *Canadian Journal of Public Health* 1986; 77(4): 285-90.
- 31 Swain L, Catlin G, Beaudet MP. The National Population Health Survey—its longitudinal nature. *Health Reports* (Statistics Canada, Catalogue 82-003) 1999; 10(4): 69-82.
- 32 Tambay J-L, Catlin G. Sample design of the National Population Health Survey. *Health Reports* (Statistics Canada, Catalogue 82-003) 1995; 7(1): 29-38.
- 33 Turner RJ, Avison WR. Gender and depression: assessing exposure and vulnerability to life events in a chronically strained population. *Journal of Nervous and Mental Disease* 1989; 177(8): 443-55.
- 34 Turner RJ, Wheaton B, Lloyd DA. The epidemiology of social stress. *American Sociological Review* 1995; 60(1): 104-25.
- 35 Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychological Bulletin* 1985; 98(2): 310-57.
- 36 Kessler RC, McLeod JD. Social support and mental health in community samples. In: Cohen S, Syme SL, eds. *Social Support and Health*. New York: Academic, 1985: 219-40.
- 37 Pearlin LI, Skaff MM. Stress and the life course: a paradigmatic alliance. *The Gerontologist* 1996; 36(2): 239-47.
- 38 Cleary PD, Kessler RC. The estimation and interpretation of modifier effects. *Journal of Health and Social Behavior* 1982; 23(2): 159-69.
- 39 Finney JW, Mitchell RE, Cronkite RC, et al. Methodological issues in estimating main and interactive effects: examples from coping/social support and stress field. *Journal of Health and Social Behavior* 1984; 25(1): 85-98.
- 40 Rao JNK, Wu CFJ, Yue K. Some recent work on resampling methods for complex surveys. *Survey Methodology* (Statistics Canada, Catalogue 12-001) 1992; 18(2): 209-17.
- 41 Rust KF, Rao JNK. Variance estimation for complex surveys using replication techniques. *Statistical Methods in Medical Research* 1996; 5: 281-310.
- 42 Yeo D, Mantel H, Liu TP. Bootstrap variance estimation for the National Population Health Survey. *American Statistical Association: Proceedings of the Survey Research Methods Section*, Baltimore, 1999.
- 43 Turner RJ, Lloyd DA. The stress process and the social distribution of depression. *Journal of Health and Social Behavior* 1999; 40(4): 374-404.
- 44 Turner RJ, Marino F. Social support and social structure: a descriptive epidemiology. *Journal of Health and Social Behavior* 1994; 35(3): 193-212.
- 45 Greenwood DC, Muir KR, Packham CJ, et al. Coronary heart disease: a review of the role of psychosocial stress and social support. *Journal of Public Health Medicine* 1996; 18(2): 221-31.
- 46 Herrmann M, Scholmerich J, Straub RH. Stress and rheumatic diseases. *Rheumatic Diseases Clinics of North America* 2000; 26(4): 737-63.
- 47 Rosengren A, Orth-Gomer K, Wedel H, et al. Stressful life events, social support, and mortality in men born in 1933. *British Medical Journal* 1993; 307(6912): 1102-5.
- 48 Avison WR, Turner RJ. Stressful life events and depressive symptoms: disaggregating the effects of acute stressors and chronic strains. *Journal of Health and Social Behavior* 1988; 29(3): 253-64.

- 49 Olstad R, Sexton H, Sogaard AJ. The Finnmark Study. A prospective population study of the social support buffer hypothesis, specific stressors and mental distress. *Social Psychiatry and Psychiatric Epidemiology* 2001; 36(12): 582-9.
- 50 Cohen S, Hoberma HM. Positive events and social supports as buffers of life change stress. *Journal of Applied Social Psychology* 1983; 13(2): 99-125.
- 51 Kawachi I, Berkman LF. Social ties and mental health. *Journal of Urban Health* 2001; 78(3): 458-67.
- 52 George LK, Blazer DG, Hughes DC, et al. Social support and the outcome of major depression. *British Journal of Psychiatry* 1989; 154: 478-85.
- 53 House JS, Kahn RL. Measures and concepts of social support In: Cohen S, Syme SL, eds. *Social Support and Health*. New York: Academic, 1985: 83-108.
- 54 Lin N, Ye X, Ensel WM. Social support and depressed mood: a structural analysis. *Journal of Health and Social Behavior* 1999; 40(4): 344-59.
- 55 Turner RJ. Social support and coping. In: Horwitz AV, Scheid TL, eds. *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems*. Cambridge University Press UK, 1999: 198-210.
- 56 Wethington E, Kessler RC. Perceived support, received support, and adjustment to stressful life events. *Journal of Health and Social Behavior* 1986; 27(1): 78-89.
- 57 Cohen S, Sherrod DR, Clark MS. Social skills and the stress-protective role of social support. *Journal of Personality and Social Psychology* 1986; 50(5): 963-73.
- 58 Krause N. Social support, stress, and well-being among older adults. *Journal of Gerontology* 1986; 41(4): 512-9.
- 59 Turner RJ. Social support as a contingency in psychological well-being. *Journal of Health and Social Behavior* 1981; 22(4): 357-67.
- 60 Frese M. Social support as a moderator of the relationship between work stressors and psychological dysfunctioning: a longitudinal study with objective measures. *Journal of Occupational Health Psychology* 1999; 4(3): 179-92.
- 61 Ingledeu DK, Hardy L, Cooper CL. Do resources bolster coping and does coping buffer stress? An organizational study with longitudinal aspect and control for negative affectivity. *Journal of Occupational Health Psychology* 1997; 2(2): 118-33.
- 62 Kasl SV. Stress and health. *Annual Review of Public Health* 1984; 5: 319-41.
- 63 Kendler KS, Karkowski LM, Prescott CA. Causal relationship between stressful life events and the onset of major depression. *American Journal of Psychiatry* 1999; 156(6): 837-41.
- 64 Kessler RC, Kendler KS, Heath A, et al. Perceived support and adjustment to stress in a general population sample of female twins. *Psychological Medicine* 1994; 24(2): 317-34.
- 65 Shields M. Proxy reporting in the National Population Health Survey. *Health Reports* (Statistics Canada, Catalogue 82-003) 2000; 12(1): 21-39.
- 66 Henson R, Roth A, Cannell CF. Personal versus telephone interviews: the effects of telephone reinterviews on reporting of psychiatric symptoms. In: *National Center for Health Services Research Report Series: Field Experiments in Health Reporting, 1971-1977*. Ann Arbor, Mich: University of Michigan, Survey Research Center, Institute for Social Research, 1977: 205-12.
- 67 Aneshensel CS, Yokopenic PA. Tests for the comparability of a causal model of depression under two conditions of interviewing. *Journal of Personality and Social Psychology* 1985; 49(5): 1337-48.
- 68 Wells KB, Burnam MA, Leake B, et al. Agreement between face-to-face and telephone-administered versions of the depression section of the NIMH Diagnostic Interview Schedule. *Journal of Psychiatric Research* 1988; 22: 207-20.
- 69 Cohen S, Merelstein R, Kamarck T, et al. Measuring the functional components of social support. In: Sarason IG, Sarason BR, eds. *Social Support: Theory, Research and Applications* 1985; 73-94.
- 70 Thoits PA. Conceptual, methodological, and theoretical problems in studying social support as a buffer against life stress. *Journal of Health and Social Behavior* 1982; 23(2): 145-59.

Appendix

Table A

Distribution of selected characteristics, by sex, household population aged 18 or older in 1994/95, Canada excluding territories

	1994/95 cross-sectional file						Longitudinal file					
	Men			Women			Men			Women		
	Sample size	Estimated population		Sample size	Estimated population		Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%		'000	%		'000	%
Total	6,954	9,742	100.0	8,736	10,598	100.0	4,370	8,988	100.0	5,781	9,788	100.0
Age group												
18-24	857	1,204	12.4	965	1,184	11.2	545	1,191	13.2	652	1,099	11.2
25-44	2,977	4,511	46.3	3,591	4,708	44.4	1,960	4,380	48.7	2,478	4,609	47.1
45-64	1,974	2,770	28.4	2,316	2,925	27.6	1,306	2,581	28.7	1,639	2,794	28.5
65+	1,146	1,258	12.9	1,864	1,782	16.8	559	837	9.3	1,012	1,285	13.1
Household income												
Low/Lower-middle	1,229	1,401	14.4	2,246	2,119	20.0	674	1,146	12.8	1,343	1,775	18.1
Middle	2,003	2,643	27.1	2,547	3,068	29.0	1,227	2,358	26.2	1,681	2,779	28.4
Upper-middle/High	3,441	5,219	53.6	3,589	4,948	46.7	2,284	5,038	56.1	2,541	4,824	49.3
Missing	281	480	4.9	354	462	4.4	185	446	5.0	216	410	4.2
Education												
Less than secondary graduation	2,063	2,419	24.8	2,561	2,765	26.1	1,165	2,054	22.9	1,523	2,306	23.6
Secondary graduation	1,034	1,475	15.1	1,387	1,812	17.1	653	1,374	15.3	906	1,715	17.5
Some postsecondary	1,713	2,472	25.4	2,230	2,728	25.7	1,107	2,357	26.2	1,527	2,617	26.7
Postsecondary graduation	2,130	3,350	34.4	2,549	3,282	31.0	1,436	3,183	35.4	1,818	3,136	32.0
Missing	14	F	F	9	F	F	9	F	F	7	F	F
Marital status												
Married	4,246	6,604	67.8	4,824	6,734	63.5	2,785	6,200	69.0	3,296	6,427	65.7
Previously married	925	821	8.4	2,318	1,987	18.8	487	612	6.8	1,438	1,720	17.6
Never married	1,781	2,316	23.8	1,592	1,874	17.7	1,097	2,175	24.2	1,047	1,640	16.8
Missing	2	F	F	2	F	F	1	F	F	0	F	F
Daily smoker												
Yes	2,105	2,766	28.4	2,254	2,564	24.2	1,281	2,469	27.5	1,460	2,318	23.7
No	4,846	6,968	71.5	6,478	8,025	75.7	3,086	6,508	72.4	4,318	7,458	76.2
Missing	3	F	F	4	F	F	3	F	F	3	F	F
Physically inactive												
Yes	3,984	5,524	56.7	5,524	6,803	64.2	2,484	5,015	55.8	3,644	6,277	64.1
No	2,941	4,180	42.9	3,191	3,766	35.5 ^{E1}	1,866	3,938	43.8	2,125	3,495	35.7
Missing	29	38 ^{E1}	0.4 ^{E1}	21	29 ^{E1}	0.3 ^{E1}	20	36 ^{E2}	0.4 ^{E2}	12	F	F
Heavy drinker												
Yes	1,549	1,897	19.5	474	477	4.5	971	1,795	20.0	294	425	4.3
No	5,265	7,679	78.8	8,176	10,004	94.4	3,323	7,052	78.5	5,439	9,269	94.7
Missing	140	166	1.7	86	117	1.1	76	142	1.6	48	94 ^{E1}	1.0 ^{E1}
Obese												
Yes	1,000	1,234	12.7	1,235	1,355	12.8	601	1,132	12.6	824	1,268	13.0
No	5,920	8,448	86.7	7,185	8,819	83.2	3,745	7,793	86.7	4,743	8,122	83.0
Missing/Not applicable	34	60 ^{E1}	0.6 ^{E1}	316	425	4.0	24	64 ^{E1}	0.7 ^{E1}	214	398	4.1

Data sources: 1994/95 National Population Health Survey, cross-sectional sample, Health file; 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file (extreme)

Note: Because of rounding, detail may not add to totals.

E1 Coefficient of variation between 16.6% and 25.0%

E2 Coefficient of variation between 25.1% and 33.3%

F Coefficient of variation greater than 33.3%

Table B

Average scores for stress and psycho-social variables, by sex, household population aged 18 or older in 1994/95, Canada excluding territories

	1994/95 cross-sectional file						Longitudinal file					
	Men			Women			Men			Women		
	Sample responding	Miss-ing	Weighted average	Sample responding	Miss-ing	Weighted average	Sample responding	Miss-ing	Weighted average	Sample responding	Miss-ing	Weighted average
Stress 1994/95												
Total stress	6,883	71	4.3	8,675	61	4.8	4,330	40	4.4	5,754	27	4.8
Recent negative life events	6,898	56	0.6	8,696	40	0.7	4,335	35	0.6	5,762	19	0.7
Chronic strains	6,900	54	2.9	8,690	46	3.2	4,339	31	2.9	5,760	21	3.2
Childhood traumas	6,896	58	0.8	8,689	47	0.9	4,337	33	0.8	5,759	22	0.9
Mastery 1994/95	6,851	103	19.9	8,622	114	19.4	4,319	51	20.1	5,720	61	19.5
Emotional support 1994/95	6,849	105	3.7	8,654	82	3.8	4,311	59	3.7	5,740	41	3.8

Data sources: 1994/95 National Population Health Survey, cross-sectional sample, Health file; 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file (extreme)

Table C

Average psychological distress scores, by sex, household population aged 18 or older in 1994/95, Canada excluding territories

	Men			Women		
	Sample responding	Missing	Weighted average	Sample responding	Missing	Weighted average
Psychological distress 1994/95	6,859	95	3.1	8,648	88	3.7
Change in psychological distress by 2000/01	4,063	307	-0.9	5,566	215	-1.0

Data sources: 1994/95 National Population Health Survey, cross-sectional sample, Health file; 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file (extreme)

Table D
Distribution of chronic condition prevalence, by sex, household population aged 18 or older, Canada excluding territories, 1994/95

	Men			Women		
	Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%
Total - 1994/95 cross-sectional file	6,954	9,742	100.0	8,736	10,598	100.0
Total number of chronic conditions						
None	4,069	5,991	61.5	4,404	5,772	54.5
One or more	2,875	3,737	38.4	4,324	4,820	45.5
Missing	10	F	F	8	F	F
Asthma						
Yes	337	512	5.3	580	638	6.0
No	6,607	9,216	94.6	8,148	9,953	93.9
Missing	10	F	F	8	F	F
Arthritis/Rheumatism						
Yes	916	1,031	10.6	1,881	1,857	17.5
No	6,028	8,697	89.3	6,847	8,735	82.4
Missing	10	F	F	8	F	F
Back problems						
Yes	1,141	1,484	15.2	1,422	1,611	15.2
No	5,803	8,245	84.6	7,306	8,981	84.7
Missing	10	F	F	8	F	F
High blood pressure						
Yes	670	817	8.4	1,153	1,174	11.1
No	6,274	8,912	91.5	7,575	9,417	88.9
Missing	10	F	F	8	F	F
Migraine						
Yes	298	417	4.3	967	1,142	10.8
No	6,646	9,311	95.6	7,761	9,449	89.2
Missing	10	F	F	8	F	F
Chronic bronchitis/Emphysema						
Yes	227	265	2.7	371	411	3.9
No	6,717	9,463	97.1	8,357	10,180	96.1
Missing	10	F	F	8	F	F
Diabetes						
Yes	249	340	3.5	335	341	3.2
No	6,695	9,389	96.4	8,393	10,250	96.7
Missing	10	F	F	8	F	F
Heart disease						
Yes	365	421	4.3	458	413	3.9
No	6,579	9,307	95.5	8,270	10,179	96.0
Missing	10	F	F	8	F	F
Cancer						
Yes	93	108	1.1	219	240	2.3
No	6,851	9,620	98.7	8,509	10,351	97.7
Missing	10	F	F	8	F	F
Stomach/Intestinal ulcers						
Yes	289	336	3.4	369	407	3.8
No	6,655	9,393	96.4	8,359	10,184	96.1
Missing	10	F	F	8	F	F

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Note: Because of rounding, detail may not add to totals.

F Coefficient of variation greater than 33.3%

Table E
Distribution of chronic condition incidence, by sex, household population aged 18 or older, Canada excluding territories

	Men			Women		
	Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%
Total - longitudinal file	4,370	8,988	100.0	5,781	9,788	100.0
Total number of chronic conditions diagnosed between 1994/95 and 2000/01						
None	2,960	6,181	68.8	3,531	6,109	62.4
One or more	1,372	2,729	30.4	2,210	3,619	37.0
Missing	38	78 ^{E1}	0.9 ^{E1}	40	60 ^{E1}	0.6 ^{E1}
Asthma[†]						
Yes	135	295	3.5	248	416	4.5
No	4,029	8,209	96.4	5,174	8,800	95.4
Missing	5	F	F	3	F	F
Arthritis/Rheumatism[†]						
Yes	375	739	9.1	652	1,097	13.3
No	3,480	7,404	90.8	3,999	7,134	86.6
Missing	7	F	F	7	F	F
Back problems[†]						
Yes	364	755	9.9	576	968	11.6
No	3,296	6,850	90.0	4,305	7,376	88.3
Missing	4	F	F	4	F	F
High blood pressure[†]						
Yes	331	629	7.6	568	857	9.7
No	3,626	7,642	92.0	4,503	7,934	90.1
Missing	22	38 ^{E2}	0.5 ^{E2}	7	F	F
Migraine[†]						
Yes	127	259	3.0	351	695	8.0
No	4,041	8,301	96.9	4,781	8,012	92.0
Missing	4	F	F	3	F	F
Chronic bronchitis/Emphysema[†]						
Yes	67	131	1.5	129	195	2.1
No	4,188	8,649	98.4	5,436	9,256	97.9
Missing	6	F	F	3	F	F
Diabetes[†]						
Yes	124	228	2.6	149	243	2.5
No	4,108	8,482	97.3	5,457	9,298	97.4
Missing	5	F	F	4	F	F
Heart disease[†]						
Yes	174	375	4.3	196	302	3.2
No	4,010	8,321	95.6	5,354	9,186	96.7
Missing	5	F	F	7	F	F
Cancer[†]						
Yes	86	141	1.6	107	178	1.9
No	4,235	8,767	98.3	5,548	9,414	98.0
Missing	7	F	F	7	F	F
Stomach/Intestinal ulcers[†]						
Yes	94	181	2.1	159	261	2.8
No	4,091	8,506	97.7	5,381	9,167	97.1
Missing	9	F	F	7	F	F

Data source: 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file (extreme)

Note: Because of rounding, detail may not add to totals.

[†] Incidence rates, population counts and sample counts for specific chronic conditions are based on those who did not report the condition in 1994/95.

E1 Coefficient of variation between 16.6% and 25.0%

E2 Coefficient of variation between 25.1% and 33.3%

F Coefficient of variation greater than 33.3%

Table F

Regression coefficients relating selected characteristics to psychological distress, men aged 18 or older, household population, Canada excluding territories, 1994/95

	Recent negative life events		Chronic strains		Childhood traumas		All three stress scales		Total stress	
	B	se	B	se	B	se	B	se	B	se
Age	-0.03***	0.003	-0.02***	0.003	-0.03***	0.003	-0.02***	0.003	-0.02***	0.003
Household income										
Low/Lower-middle	0.26	0.160	0.34*	0.155	0.38*	0.162	0.25	0.153	0.22	0.154
Middle	0.03	0.104	-0.01	0.098	0.06	0.103	-0.02	0.098	-0.01	0.099
Upper-middle/High†	...	...	...	...	...	...	...	...	...	...
Education										
Less than secondary graduation	-0.19	0.134	-0.22	0.134	-0.24	0.132	-0.20	0.131	-0.20	0.129
Secondary graduation	-0.31*	0.130	-0.32*	0.126	-0.32*	0.131	-0.31*	0.123	-0.32**	0.123
Some postsecondary	-0.02	0.119	-0.08	0.117	0.00	0.119	-0.10	0.114	-0.10	0.114
Postsecondary graduation†	...	...	...	...	...	...	...	...	...	...
Marital status										
Married†	...	...	...	...	...	...	...	...	...	...
Previously married	0.18	0.149	0.09	0.143	0.20	0.146	0.09	0.141	0.10	0.143
Never married	0.37**	0.134	0.31*	0.131	0.36**	0.133	0.36**	0.130	0.38**	0.130
Health behaviours										
Daily smoker	0.25*	0.107	0.19	0.103	0.26*	0.106	0.10	0.102	0.08	0.103
Physically inactive	0.11	0.092	0.12	0.096	0.13	0.092	0.17	0.094	0.19*	0.093
Heavy drinker	0.16	0.103	0.16	0.098	0.18	0.100	0.11	0.097	0.10	0.096
Obese	-0.08	0.134	-0.12	0.125	-0.11	0.133	-0.14	0.126	-0.14	0.128
Psycho-social resources										
Mastery	-0.25***	0.015	-0.20***	0.015	-0.26***	0.016	-0.19***	0.015	-0.20***	0.015
Emotional support	-0.29***	0.074	-0.03	0.070	-0.29***	0.077	-0.03	0.068	-0.06	0.073
Stress and emotional support interactions‡										
Recent negative life events	0.51***	0.048					0.25***	0.050		
x emotional support	-0.06	0.073					0.11	0.069		
Chronic strains			0.38***	0.023			0.33***	0.023		
x emotional support			-0.09***	0.026			-0.10**	0.032		
Childhood traumas					0.42***	0.043	0.22***	0.044		
x emotional support					-0.14*	0.058	-0.05	0.066		
Total stress									0.29***	0.016
x emotional support									-0.05**	0.017
Intercept	4.25		3.94		4.34		3.84		3.86	
Model information										
R ²	0.24		0.29		0.24		0.31		0.30	
Sample size	6,650		6,650		6,652		6,644		6,644	
Dropped because of missing values	304		304		302		310		310	

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but coefficients are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker."

† Reference category

‡ Beta coefficients are not presented because standardized regression coefficients for interaction terms and constituent variables are affected by changes in origin and so are not useful indicators of relative importance of variables in multiplicative regression model (see Analytical techniques) (Reference 39).

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable

Table G

Regression coefficients relating selected characteristics to psychological distress, women aged 18 or older, household population, Canada excluding territories, 1994/95

	Recent negative life events		Chronic strains		Childhood traumas		All three stress scales		Total stress	
	B	se	B	se	B	se	B	se	B	se
Age	-0.03***	0.003	-0.02***	0.003	-0.03***	0.003	-0.01***	0.003	-0.01***	0.003
Household income										
Low/Lower-middle	0.31*	0.154	0.40**	0.149	0.44**	0.161	0.29*	0.148	0.29	0.149
Middle	0.05	0.099	0.10	0.098	0.12	0.102	0.08	0.097	0.08	0.098
Upper-middle/High†	...	...	...	...	...	...	...	...	...	...
Education										
Less than secondary graduation	0.16	0.134	0.11	0.131	0.05	0.134	0.10	0.128	0.09	0.128
Secondary graduation	-0.02	0.132	-0.09	0.128	-0.08	0.132	-0.07	0.127	-0.07	0.126
Some postsecondary	0.19	0.106	0.11	0.105	0.12	0.109	0.08	0.102	0.07	0.103
Postsecondary graduation†	...	...	...	...	...	...	...	...	...	...
Marital status										
Married†	...	...	...	...	...	...	...	...	...	...
Previously married	0.49***	0.139	0.33*	0.137	0.43**	0.138	0.32*	0.134	0.32*	0.134
Never married	0.51***	0.147	0.45**	0.143	0.45**	0.145	0.52***	0.142	0.52***	0.142
Health behaviours										
Daily smoker	0.54***	0.126	0.41***	0.120	0.52***	0.127	0.27*	0.118	0.27*	0.118
Physically inactive	0.25**	0.085	0.21*	0.082	0.26**	0.084	0.26**	0.081	0.26**	0.080
Heavy drinker	0.27	0.219	0.31	0.216	0.33	0.223	0.14	0.211	0.14	0.211
Obese	-0.07	0.130	-0.13	0.127	-0.04	0.129	-0.16	0.126	-0.16	0.126
Psycho-social resources										
Mastery	-0.32***	0.013	-0.27***	0.013	-0.33***	0.013	-0.26***	0.013	-0.26***	0.012
Emotional support	-0.59***	0.109	-0.29***	0.099	-0.54***	0.099	-0.28**	0.098	-0.29**	0.100
Stress and emotional support interactions‡										
Recent negative life events	0.59***	0.053					0.31***	0.053		
x emotional support	-0.14	0.078					-0.01	0.086		
Chronic strains			0.36***	0.021			0.29***	0.022		
x emotional support			-0.10***	0.028			-0.07*	0.032		
Childhood traumas					0.46***	0.041	0.25***	0.041		
x emotional support					-0.26***	0.069	-0.13	0.075		
Total stress									0.28***	0.014
x emotional support									-0.07*	0.017
Intercept	4.12		3.85		4.15		3.63		3.63	
Model information										
R ²	0.30		0.33		0.30		0.34		0.34	
Sample size	8,476		8,473		8,472		8,467		8,467	
Dropped because of missing values	260		263		264		269		269	

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but coefficients are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker."

† Reference category

‡ Beta coefficients are not presented because standardized regression coefficients for interaction terms and constituent variables are affected by changes in origin and so are not useful indicators of relative importance of variables in multiplicative regression model (see Analytical techniques) (Reference 39).

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable

Table H

Regression coefficients relating selected characteristics in 1994/95 to change in psychological distress by 2000/01, men aged 18 or older in 1994/95, household population, Canada excluding territories

	Recent negative life events		Chronic strains		Childhood traumas		All three stress scales		Total stress	
	B	se	B	se	B	se	B	se	B	se
Distress level in 1994/95	-0.69***	0.031	-0.70***	0.032	-0.69***	0.032	-0.71***	0.032	-0.71***	0.033
Age	-0.01	0.005	-0.01	0.005	-0.01	0.005	0.00	0.005	0.00	0.005
Household income										
Low/Lower-middle	0.38	0.210	0.40	0.213	0.39	0.209	0.38	0.210	0.39	0.211
Middle	0.12	0.146	0.11	0.144	0.13	0.147	0.12	0.145	0.11	0.145
Upper-middle/High†	...	...	...	...	...	...	...	...	...	...
Education										
Less than secondary graduation	0.23	0.168	0.21	0.170	0.21	0.170	0.21	0.170	0.21	0.170
Secondary graduation	-0.04	0.170	-0.04	0.171	-0.04	0.170	-0.05	0.171	-0.05	0.171
Some postsecondary	0.07	0.153	0.08	0.153	0.09	0.153	0.06	0.152	0.07	0.152
Postsecondary graduation†	...	...	...	...	...	...	...	...	...	...
Marital status										
Married†	...	...	...	...	...	...	...	...	...	...
Previously married	0.00	0.171	0.00	0.170	0.02	0.172	0.00	0.172	-0.01	0.171
Never married	0.02	0.165	0.00	0.168	0.01	0.164	0.02	0.168	0.01	0.169
Health behaviours										
Daily smoker	0.30*	0.143	0.31*	0.142	0.31*	0.143	0.28	0.145	0.28	0.145
Physically inactive	0.03	0.108	0.03	0.108	0.05	0.109	0.05	0.109	0.05	0.108
Heavy drinker	-0.27	0.142	-0.27	0.142	-0.27	0.142	-0.28*	0.140	-0.27	0.142
Obese	-0.33*	0.147	-0.33*	0.147	-0.33*	0.146	-0.33*	0.144	-0.34*	0.146
Psycho-social resources										
Mastery	-0.05**	0.017	-0.04*	0.018	-0.05**	0.017	-0.04*	0.018	-0.04*	0.018
Emotional support	-0.16	0.115	-0.13	0.140	-0.15	0.114	-0.13	0.139	-0.14	0.138
Stress and emotional support interactions‡										
Recent negative life events	0.15*	0.062					0.11	0.063		
x emotional support	0.09	0.085					0.11	0.080		
Chronic strains			0.06	0.033			0.04	0.032		
x emotional support			0.01	0.042			0.00	0.038		
Childhood traumas					0.11	0.059	0.07	0.059		
x emotional support					0.00	0.078	-0.03	0.066		
Total stress									0.06*	0.024
x emotional support									0.01	0.031
Intercept	1.23		1.25		1.24		1.23		1.25	
Model information										
R ²	0.35		0.35		0.35		0.35		0.35	
Sample size	3,961		3,965		3,964		3,960		3,960	
Dropped because of missing values	409		405		406		410		410	

Data source: 1994/95 National Population Health Survey, longitudinal sample, Health file (extreme)

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but coefficients are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker."

† Reference category

‡ Beta coefficients are not presented because standardized regression coefficients for interaction terms and constituent variables are affected by changes in origin and so are not useful indicators of relative importance of variables in multiplicative regression model (see Analytical techniques) (Reference 39).

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable

Table 1

Regression coefficients relating selected characteristics in 1994/95 to change in psychological distress by 2000/01, women aged 18 or older in 1994/95, household population, Canada excluding territories

	Recent negative life events		Chronic strains		Childhood traumas		All three stress scales		Total stress	
	B	se	B	se	B	se	B	se	B	se
Distress level in 1994/95	-0.70***	0.025	-0.72***	0.025	-0.71***	0.025	-0.73***	0.025	-0.73***	0.026
Age	-0.01*	0.005	-0.01	0.005	-0.01	0.005	-0.01	0.005	-0.01	0.005
Household income										
Low/Lower-middle	0.47*	0.203	0.49*	0.200	0.50*	0.198	0.49*	0.199	0.46*	0.199
Middle	0.07	0.143	0.08	0.142	0.10	0.143	0.10	0.142	0.08	0.142
Upper-middle/High†	...	...	...	...	...	...	...	...	...	...
Education										
Less than secondary graduation	0.38*	0.186	0.37*	0.186	0.32	0.182	0.32	0.183	0.36	0.186
Secondary graduation	0.27	0.216	0.24	0.213	0.24	0.213	0.24	0.214	0.25	0.212
Some postsecondary	-0.18	0.115	-0.21	0.114	-0.24*	0.114	-0.25*	0.114	-0.23*	0.114
Postsecondary graduation†	...	...	...	...	...	...	...	...	...	...
Marital status										
Married†	...	...	...	...	...	...	...	...	...	...
Previously married	-0.14	0.151	-0.17	0.151	-0.19	0.151	-0.20	0.152	-0.18	0.151
Never married	-0.02	0.169	-0.01	0.170	0.01	0.164	0.03	0.165	0.02	0.168
Health behaviours										
Daily smoker	0.35*	0.148	0.31*	0.145	0.28	0.149	0.24	0.147	0.25	0.147
Physically inactive	-0.13	0.127	-0.13	0.126	-0.11	0.124	-0.11	0.124	-0.12	0.125
Heavy drinker	-0.10	0.245	-0.11	0.241	-0.16	0.250	-0.18	0.249	-0.18	0.245
Obese	0.28	0.211	0.24	0.209	0.27	0.206	0.24	0.206	0.23	0.208
Psycho-social resources										
Mastery	-0.06***	0.015	-0.04**	0.015	-0.05***	0.015	-0.05**	0.015	-0.04**	0.015
Emotional support	0.04	0.106	0.20*	0.093	0.07	0.107	0.19*	0.093	0.20*	0.094
Stress and emotional support interactions‡										
Recent negative life events	0.11	0.057					0.00	0.061		
x emotional support	-0.09	0.087					-0.01	0.096		
Chronic strains			0.11***	0.026			0.09**	0.028		
x emotional support			-0.07*	0.028			-0.05	0.038		
Childhood traumas					0.28***	0.064	0.23***	0.068		
x emotional support					-0.13	0.079	-0.06	0.097		
Total stress									0.10***	0.019
x emotional support									-0.05*	0.019
Intercept	1.78		1.76		1.74		1.71		1.71	
Model information										
R ²	0.35		0.35		0.35		0.36		0.35	
Sample size	5,478		5,477		5,476		5,474		5,474	
Dropped because of missing values	303		304		305		307		307	

Data source: 1994/95 National Population Health Survey, longitudinal sample, Health file (extreme)

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but coefficients are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker."

† Reference category

‡ Beta coefficients are not presented because standardized regression coefficients for interaction terms and constituent variables are affected by changes in origin and so are not useful indicators of relative importance of variables in multiplicative regression model (see Analytical techniques) (Reference 39).

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable

Table J

Adjusted odds ratios relating selected characteristics to one or more chronic conditions, men aged 18 or older, household population, Canada excluding territories, 1994/95

	Recent negative life events		Chronic strains		Childhood traumas		All three stress scales		Total stress	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Age	1.05***	1.04, 1.06	1.05***	1.05, 1.06	1.05***	1.04, 1.06	1.05***	1.05, 1.06	1.05***	1.05, 1.06
Household income										
Low/Lower-middle	1.18	0.95, 1.48	1.24	0.99, 1.55	1.24	0.99, 1.55	1.17	0.94, 1.47	1.19	0.95, 1.49
Middle	0.95	0.80, 1.13	0.95	0.80, 1.13	0.97	0.82, 1.15	0.94	0.79, 1.12	0.94	0.79, 1.12
Upper-middle/High†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Education										
Less than secondary graduation	1.22*	1.02, 1.46	1.19*	1.00, 1.42	1.18	0.99, 1.41	1.21*	1.02, 1.44	1.21*	1.01, 1.44
Secondary graduation	1.09	0.86, 1.37	1.07	0.84, 1.36	1.08	0.85, 1.36	1.08	0.85, 1.37	1.07	0.85, 1.36
Some postsecondary	1.44***	1.18, 1.75	1.43***	1.18, 1.74	1.46***	1.20, 1.77	1.41***	1.16, 1.71	1.41***	1.16, 1.71
Postsecondary graduation†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Marital status										
Married†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Previously married	0.86	0.69, 1.07	0.84	0.68, 1.04	0.86	0.70, 1.07	0.83	0.67, 1.03	0.83	0.66, 1.03
Never married	0.85	0.71, 1.02	0.83*	0.69, 1.00	0.85	0.71, 1.02	0.85	0.71, 1.01	0.84	0.70, 1.01
Health behaviours										
Daily smoker	1.10	0.93, 1.30	1.11	0.94, 1.32	1.11	0.94, 1.32	1.04	0.88, 1.24	1.05	0.89, 1.25
Physically inactive	0.92	0.79, 1.07	0.90	0.78, 1.05	0.93	0.80, 1.08	0.94	0.81, 1.09	0.93	0.81, 1.08
Heavy drinker	1.14	0.94, 1.38	1.15	0.95, 1.40	1.14	0.94, 1.39	1.12	0.92, 1.37	1.13	0.93, 1.38
Obese	1.39**	1.14, 1.68	1.37**	1.13, 1.67	1.37**	1.13, 1.66	1.36**	1.12, 1.65	1.36**	1.12, 1.65
Psycho-social resources										
Mastery	0.97**	0.96, 0.99	0.98	0.96, 1.00	0.97***	0.95, 0.99	0.99	0.97, 1.01	0.99	0.97, 1.01
Emotional support	1.01	0.92, 1.11	1.05	0.95, 1.16	1.01	0.93, 1.11	1.05	0.95, 1.16	1.06	0.96, 1.17
Stress and emotional support interactions										
Recent negative life events	1.28***	1.19, 1.38					1.18***	1.09, 1.28		
x emotional support	1.00	0.93, 1.07					1.01	0.93, 1.10		
Chronic strains			1.12***	1.09, 1.16			1.09***	1.05, 1.12		
x emotional support			1.00	0.97, 1.03			1.01	0.97, 1.04		
Childhood traumas					1.23***	1.15, 1.32	1.15***	1.07, 1.23		
x emotional support					0.98	0.92, 1.04	0.98	0.91, 1.05		
Total stress									1.12***	1.09, 1.14
x emotional support									1.00	0.98, 1.02
Model information										
Sample size	6,654		6,654		6,655		6,647		6,647	
With one or more chronic conditions	2,745		2,742		2,742		2,739		2,739	
Dropped because of missing values	300		300		299		307		307	

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but odds ratios are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker." Because of rounding, some confidence intervals with 1.00 as lower/upper limit are significant.

† Reference category

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable

Table K

Adjusted odds ratios relating selected characteristics to one or more chronic conditions, women aged 18 or older, household population, Canada excluding territories, 1994/95

	Recent negative life events		Chronic strains		Childhood traumas		All three stress scales		Total stress	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Age	1.04***	1.04, 1.05	1.05***	1.04, 1.05	1.05***	1.04, 1.05	1.05***	1.05, 1.06	1.05***	1.05, 1.06
Household income										
Low/Lower-middle	1.02	0.85, 1.22	1.09	0.91, 1.31	1.08	0.90, 1.30	1.01	0.84, 1.22	1.03	0.85, 1.24
Middle	0.98	0.84, 1.14	1.00	0.86, 1.16	1.01	0.87, 1.17	0.99	0.85, 1.16	0.99	0.85, 1.15
Upper-middle/High†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Education										
Less than secondary graduation	1.18	0.98, 1.43	1.14	0.94, 1.38	1.11	0.92, 1.34	1.13	0.93, 1.37	1.14	0.94, 1.38
Secondary graduation	0.81*	0.67, 0.98	0.78*	0.65, 0.94	0.79*	0.65, 0.96	0.80*	0.66, 0.97	0.79*	0.66, 0.96
Some postsecondary	1.10	0.94, 1.29	1.07	0.91, 1.25	1.05	0.89, 1.23	1.04	0.88, 1.23	1.05	0.89, 1.23
Postsecondary graduation†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Marital status										
Married†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Previously married	1.21*	1.03, 1.41	1.14	0.98, 1.33	1.17*	1.00, 1.36	1.13	0.96, 1.32	1.12	0.96, 1.31
Never married	1.04	0.85, 1.26	1.00	0.82, 1.22	1.02	0.84, 1.24	1.04	0.86, 1.28	1.03	0.85, 1.26
Health behaviours										
Daily smoker	1.19*	1.03, 1.38	1.17*	1.02, 1.36	1.14	0.98, 1.32	1.05	0.90, 1.21	1.07	0.92, 1.24
Physically inactive	0.97	0.85, 1.11	0.95	0.83, 1.08	0.98	0.86, 1.12	0.98	0.86, 1.13	0.97	0.85, 1.11
Heavy drinker	1.05	0.80, 1.38	1.09	0.83, 1.44	1.05	0.79, 1.39	0.97	0.73, 1.29	1.00	0.76, 1.33
Obese	1.53***	1.27, 1.83	1.51***	1.26, 1.82	1.55***	1.29, 1.86	1.50***	1.25, 1.80	1.49***	1.24, 1.80
Psycho-social resources										
Mastery	0.95***	0.94, 0.97	0.96***	0.95, 0.98	0.95***	0.94, 0.97	0.97***	0.95, 0.99	0.97*	0.96, 0.99
Emotional support	0.95	0.86, 1.05	1.00	0.89, 1.13	0.96	0.86, 1.07	1.01	0.90, 1.13	1.03	0.91, 1.15
Stress and emotional support interactions										
Recent negative life events	1.33***	1.24, 1.42					1.19***	1.11, 1.27		
x emotional support	0.97	0.89, 1.04					0.99	0.91, 1.09		
Chronic strains			1.13***	1.10, 1.16			1.07***	1.04, 1.10		
x emotional support			0.99	0.96, 1.02			1.00	0.96, 1.03		
Childhood traumas					1.35***	1.28, 1.42	1.26***	1.20, 1.33		
x emotional support					0.95	0.89, 1.02	0.97	0.89, 1.06		
Total stress									1.13***	1.11, 1.15
x emotional support									0.99	0.97, 1.01
Model information										
Sample size	8,484		8,481		8,480		8,475		8,475	
With one or more chronic conditions	4,187		4,184		4,184		4,180		4,180	
Dropped because of missing values	252		255		256		261		261	

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but odds ratios are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker."

† Reference category

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable

Table L

Adjusted odds ratios relating selected characteristics in 1994/95 to incidence of one or more chronic conditions by 2000/01, men aged 18 or older in 1994/95, household population, Canada excluding territories

	Recent negative life events		Chronic strains		Childhood traumas		All three stress scales		Total stress	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Number of chronic conditions in 1994/95	1.08	0.98, 1.19	1.07	0.96, 1.18	1.07	0.97, 1.18	1.04	0.95, 1.15	1.05	0.95, 1.16
Age	1.03***	1.02, 1.04	1.03***	1.03, 1.04	1.03***	1.02, 1.04	1.03***	1.03, 1.04	1.03***	1.03, 1.04
Household income										
Low/Lower-middle	1.09	0.82, 1.44	1.11	0.84, 1.47	1.10	0.83, 1.45	1.09	0.82, 1.45	1.09	0.82, 1.44
Middle	0.96	0.76, 1.22	0.95	0.75, 1.20	0.97	0.77, 1.23	0.95	0.75, 1.21	0.95	0.75, 1.21
Upper-middle/High†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Education										
Less than secondary graduation	1.12	0.87, 1.44	1.10	0.85, 1.43	1.09	0.84, 1.42	1.10	0.85, 1.42	1.10	0.85, 1.43
Secondary graduation	0.99	0.75, 1.32	0.99	0.75, 1.32	0.98	0.74, 1.31	0.99	0.75, 1.32	0.99	0.75, 1.32
Some postsecondary	1.07	0.85, 1.35	1.07	0.85, 1.35	1.07	0.85, 1.35	1.05	0.84, 1.33	1.06	0.84, 1.33
Postsecondary graduation†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Marital status										
Married†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Previously married	0.78	0.59, 1.02	0.77	0.58, 1.00	0.77	0.58, 1.01	0.76*	0.58, 1.00	0.76*	0.58, 1.00
Never married	0.83	0.64, 1.07	0.83	0.64, 1.07	0.83	0.64, 1.07	0.84	0.65, 1.08	0.83	0.64, 1.07
Health behaviours										
Daily smoker	1.06	0.87, 1.30	1.07	0.88, 1.31	1.07	0.87, 1.30	1.03	0.84, 1.26	1.04	0.85, 1.27
Physically inactive	1.04	0.86, 1.26	1.04	0.86, 1.26	1.06	0.87, 1.28	1.07	0.88, 1.29	1.06	0.87, 1.28
Heavy drinker	1.03	0.81, 1.32	1.02	0.80, 1.30	1.02	0.80, 1.30	1.02	0.80, 1.31	1.02	0.80, 1.30
Obese	1.72***	1.32, 2.22	1.72***	1.33, 2.23	1.71***	1.32, 2.22	1.70***	1.31, 2.21	1.72***	1.32, 2.22
Psycho-social resources										
Mastery	0.99	0.97, 1.02	1.00	0.98, 1.03	0.99	0.97, 1.02	1.00	0.98, 1.03	1.00	0.98, 1.03
Emotional support	1.01	0.90, 1.15	1.06	0.92, 1.21	1.01	0.89, 1.14	1.06	0.92, 1.21	1.05	0.92, 1.21
Stress and emotional support interactions										
Recent negative life events	1.11*	1.00, 1.22					1.05	0.94, 1.16		
x emotional support	0.96	0.87, 1.05					0.96	0.86, 1.06		
Chronic strains			1.07*	1.02, 1.11			1.05*	1.01, 1.10		
x emotional support			0.98	0.95, 1.02			0.98	0.94, 1.03		
Childhood traumas					1.15***	1.06, 1.25	1.12*	1.02, 1.22		
x emotional support					1.02	0.93, 1.12	1.06	0.95, 1.17		
Total stress									1.06***	1.03, 1.10
x emotional support									0.99	0.97, 1.02
Model information										
Sample size	4,186		4,190		4,188		4,184		4,184	
With one or more new chronic conditions	1,325		1,326		1,325		1,324		1,324	
Dropped because of missing values	184		180		182		186		186	

Data source: 1994/95 National Population Health Survey, longitudinal sample, Health file (extreme)

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but odds ratios are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker." Because of rounding, some confidence intervals with 1.00 as lower/upper limit are significant.

† Reference category

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable

Table M

Adjusted odds ratios relating selected characteristics in 1994/95 to incidence of one or more chronic conditions by 2000/01, women aged 18 or older in 1994/95, household population, Canada excluding territories

	Recent negative life events		Chronic strains		Childhood traumas		All three stress scales		Total stress	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Number of chronic conditions in 1994/95	0.97	0.90, 1.04	0.96	0.89, 1.03	0.95	0.88, 1.02	0.94	0.87, 1.01	0.94	0.87, 1.01
Age	1.03***	1.02, 1.03	1.03***	1.02, 1.04	1.03***	1.02, 1.04	1.03***	1.03, 1.04	1.03***	1.03, 1.04
Household income										
Low/Lower-middle	1.13	0.91, 1.40	1.15	0.93, 1.42	1.17	0.94, 1.44	1.13	0.91, 1.40	1.13	0.91, 1.40
Middle	0.91	0.76, 1.09	0.91	0.76, 1.09	0.93	0.78, 1.11	0.92	0.77, 1.10	0.91	0.76, 1.09
Upper-middle/High†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Education										
Less than secondary graduation	1.27	0.99, 1.63	1.24	0.96, 1.59	1.21	0.95, 1.55	1.21	0.94, 1.56	1.23	0.96, 1.58
Secondary graduation	1.01	0.80, 1.27	0.98	0.78, 1.24	0.99	0.78, 1.24	0.98	0.78, 1.24	0.98	0.78, 1.24
Some postsecondary	1.17	0.95, 1.44	1.14	0.93, 1.41	1.13	0.92, 1.39	1.11	0.91, 1.37	1.12	0.91, 1.38
Postsecondary graduation†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Marital status										
Married†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Previously married	1.05	0.86, 1.29	1.02	0.83, 1.25	1.02	0.83, 1.26	1.00	0.81, 1.23	1.01	0.82, 1.24
Never married	1.07	0.85, 1.34	1.06	0.84, 1.33	1.07	0.86, 1.34	1.09	0.86, 1.37	1.08	0.86, 1.36
Health behaviours										
Daily smoker	1.19	1.00, 1.42	1.16	0.97, 1.39	1.15	0.96, 1.38	1.10	0.91, 1.31	1.10	0.92, 1.32
Physically inactive	0.89	0.77, 1.03	0.88	0.76, 1.02	0.90	0.77, 1.04	0.89	0.77, 1.03	0.89	0.77, 1.03
Heavy drinker	0.86	0.59, 1.27	0.86	0.59, 1.27	0.85	0.58, 1.26	0.82	0.55, 1.22	0.83	0.56, 1.23
Obese	1.27*	1.04, 1.55	1.26*	1.03, 1.54	1.28*	1.05, 1.56	1.26*	1.03, 1.54	1.25*	1.02, 1.53
Psycho-social resources										
Mastery	0.98	0.96, 1.00	0.99	0.97, 1.01	0.98	0.97, 1.00	0.99	0.98, 1.01	1.00	0.98, 1.02
Emotional support	1.06	0.93, 1.20	1.10	0.94, 1.28	1.05	0.92, 1.20	1.10	0.94, 1.28	1.11	0.95, 1.29
Stress and emotional support interactions										
Recent negative life events	1.13***	1.05, 1.22					1.05	0.97, 1.14		
x emotional support	0.96	0.88, 1.05					0.96	0.85, 1.07		
Chronic strains			1.08***	1.05, 1.12			1.06**	1.02, 1.10		
x emotional support			0.99	0.95, 1.02			1.00	0.96, 1.04		
Childhood traumas					1.20***	1.13, 1.28	1.16***	1.08, 1.24		
x emotional support					0.98	0.90, 1.06	1.01	0.91, 1.11		
Total stress									1.08***	1.05, 1.10
x emotional support									0.99	0.97, 1.02
Model information										
Sample size	5,612		5,611		5,610		5,608		5,608	
With one or more new chronic conditions	2,152		2,152		2,152		2,151		2,151	
Dropped because of missing values	169		170		171		173		173	

Data source: 1994/95 National Population Health Survey, longitudinal sample, Health file (extreme)

Notes: "Missing" categories for household income and obese variables were included in models to maximize sample size, but odds ratios are not shown. When not noted, reference category is absence of characteristic; for example, reference category for "daily smoker" is "not daily smoker."

† Reference category

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

... Not applicable