Adolescent self-concept and health into adulthood

- *Girls' self-concept tends to be lower than that of boys.*

- *A weak self-concept in 1994/95 was predictive of depression among girls, physical inactivity among boys, and obesity among both sexes.*

- *A strong self-concept in adolescence had a positive long-term effect on girls' self-perceived health.*

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Abstract

Objectives
This article examines factors associated with adolescent self-concept and the impact of adolescent self-concept on psychological and physical health and health behaviour in young adulthood.

Data source
The 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.

Analytical techniques
Scores on self-concept indicators in 1994/95 were compared between the sexes and age groups (12 to 15 versus 16 to 19). Multivariate analyses were used to examine cross-sectional and longitudinal associations between adolescent self-concept and depression, self-perceived health, physical activity and obesity, controlling for other possible confounders.

Main results
Self-concept tends to be low among girls compared with boys. Cross-sectionally, adolescent self-concept was associated with household income and emotional support. For girls and for young adolescents, a weak self-concept in 1994/95 was related to the incidence of depression over the next six years; it was also predictive of physical inactivity among boys, and obesity among both sexes. A strong self-concept had a positive long-term effect on girls' self-perceived health.

Key words
self-esteem, mastery, perceived health, health behaviour, cross-sectional studies, longitudinal studies

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Adolescence, the transitional period between childhood and adulthood, is marked by changes in the body, mind and social relationships. As teenagers confront these challenging years, they establish a self-concept; that is, some sense of who they are.[1,2] Two important elements of self-concept[3-5] are self-esteem, an assessment of one's own worth, and mastery, the extent to which one feels in control of important aspects of one's life.[3-5] (see *Measuring self-concept*).

Numerous studies have revealed that self-esteem and mastery are buffers against a variety of stressors.[6-9] As well, a positive self-concept has been associated with self-care,[10-12] compliance with medical advice,[13,14] and involvement in activities.[15] Thus, a positive self-concept during adolescence can influence not only mental, but also physical health.[16]

Most research on the health implications of adolescent self-concept is based on cross-sectional data, thus ignoring the continuing effects of early self-concept.[17] To better grasp the long-term implications, longitudinal research that uses several measures is preferable,[18] yet few such analyses have been undertaken.[19,20] As a result, despite a considerable

Measuring self-concept

The National Population Health Survey (NPHS) contains questions about two *self-concept* indicators: self-esteem and mastery. Self-esteem is a global measure of individuals' self-worth,[5,21,22] while mastery pertains to individuals' perception of their ability to control their environment.[5] Because the two indicators are closely correlated, most research has been undertaken using only one at a time. High self-esteem tends to be found among people who perceive that they have control over their lives and are not subject to the whims of others.[23] Mastery questions in the NPHS are based on general self-efficacy items developed by Pearlin et al.,[5] which have a strong relationship with self-esteem.[24-26] In this analysis, the Pearson correlation coefficient of the two measures was 0.47, and they appeared to cancel each other when they were entered separately in one model. To overcome this problem and to grasp the full impact of self-esteem and mastery together, for this analysis, self-esteem and mastery were integrated into the single variable, self-concept.

To measure *self-esteem*, respondents were asked to reply to six statements on a five-point scale: strongly disagree (score 0), disagree (1), neither agree nor disagree (2), agree (3) or strongly agree (4). Higher scores indicate greater self-esteem.

• You feel that you have a number of good qualities.
• You feel that you're a person of worth at least equal to others.
• You are able to do things at least as well as most other people.
• You take a positive attitude toward yourself.
• On the whole, you are satisfied with yourself.
• All in all, you're inclined to feel you're a failure. (Reverse scored.)

To measure *mastery*, respondents were asked to reply to seven items on a five-point scale ranging from strongly agree (score 0) to strongly disagree (score 4). Higher scores indicate greater mastery.

• You have little control over the things that happen to you.
• There is really no way you can solve some of 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 to you in the future mostly depends on you. (Reverse scored.)
• You can do just about anything you really set your mind to. (Reverse scored.)

Because the means and standard deviations of the distributions of the 6 self-esteem and 7 mastery items varied, standard scores, or Z scores, were calculated. The sum of the 13 Z scores was used to measure self-concept.

body of literature dealing with adolescent self-concept, relatively little is known about its long-term impact, particularly on health.

This article focuses on associations between adolescent self-concept and health and health behaviour; specifically, depression, self-perceived health, physical activity and obesity (see *Health outcomes*). Data from the first four cycles of the National Population Health Survey (NPHS) make it possible to follow respondents who were aged 12 to 19 in 1994/95 to 2000/01 when they were aged 18 to 25 (see *Definitions, Methods* and *Limitations*).

Lower among girls

According to the 1994/95 NPHS, and consistent with the findings of other research,[22,27-33] adolescent girls' self-concept tended to be weaker than that of boys (Table 1). Experts have attributed this difference to the varying experiences of boys and girls during early adolescence, when children begin to conform to gender-role stereotypes.[34]

In middle childhood, both sexes seem to feel equally good about their appearance. But the physical development that occurs during puberty is generally more negative for girls. For boys, puberty entails maturational changes that are generally regarded as positive. But for girls, puberty brings menstruation and its associated symptoms, such as a gain in body fat and possible dissatisfaction with body image.[35-38] Some research has found that girls' perceptions of their attractiveness tend to decline as their grade level rises, although no such drop was evident for boys.[39]

Table 1

Self-esteem, mastery and self-concept scores, by sex and age group, household population aged 12 to 19, Canada excluding territories, 1994/95

	Total	Boys	Girls	12 to 15	16 to 19
	Average score				
Self-esteem	19.35	19.69	19.00[†]	19.33	19.38
Mastery	19.40	19.69	19.11[†]	18.98	19.71[‡]
Self-concept[§]	0.00	0.02	-0.02[†]	-0.01	0.01

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file
Note: Based on 1,684 respondents (833 male and 851 female; 750 aged 12 to 15 and 934 aged 16 to 19).
† Significantly different from boys (p < 0.05)
‡ Significantly different from 12 to 15 (p < 0.05)
§ Sum of Z scores of 13 self-esteem and mastery measures. Because of the use of Z scores, the mean of 0 is expected, and the distribution is normal.

Definitions

Two *age groups* in 1994/95 were established for this analysis: 12 to 15 and 16 to 19. For multiple regressions, age was treated as a continuous variable.

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

For the multivariate regression models, household income was regrouped into three categories: lowest/lower-middle, middle, and upper-middle/highest.

Living arrangements in 1994/95 were classified as living with one parent, living with both parents, or other.

Four "yes/no" questions were used to measure *emotional support* in 1994/95: Do you have someone...
- you can talk to about your private feelings or concerns?
- you can really count on in a crisis situation?
- you can really count on to give you advice when you are making important personal decisions?
- who makes you feel loved and cared for?

The "yes" responses were summed (potential range of 0 to 4), with higher scores indicating more perceived emotional support.

Getting older—getting better?

Previous research has revealed that self-concept tends to rise through the adolescent years.[40-44] According to the 1994/95 NPHS, 16- to 19-year-olds had a higher sense of mastery than did 12- to 15-year-olds. This difference may be related to the dramatic physiological and social changes that occur in young adolescence. Physiologically, they include accelerating hormone production, growth spurts and voice changes, to name a few. Socially, early adolescence coincides with the transition from elementary school to junior high or middle school, which presents new challenges and requires numerous adjustments.[45] These changes, especially at ages 12 and 13, may generate greater disturbances in self-concept than at any other point in the life cycle.[38,46]

However, according to the 1994/95 NPHS, the general tendency for self-concept to rise as adolescents age applied only to boys (Table 2). Among girls, increasing age had no significant effect on self-concept, possibly a reflection of the body image problems that girls may experience during this phase of their lives.

Income, living arrangements and emotional support

Household income is related to self-concept among adolescents, but most strongly at ages 16 to 19. Some insight into this finding may be found in theories of social class and self-esteem.[40,47] At younger ages, social class is ascribed, so it is a weak determinant of self-esteem. In older adolescence, social class becomes more consequential for self-concept because it is associated with more meaningful achieved status.

Earlier studies have repeatedly suggested that families play a vital role in the development of self-concept.[48-55] However, the only "family" variable available from the NPHS was living arrangements (with both, one or no parents), and it was not associated with adolescent self-concept. Information was not collected about other factors that might affect adolescent self-concept, such as parenting style (authoritarian, neglectful or indulgent, for instance), affective ties and family functioning.

Nonetheless, NPHS data are available on emotional support, much of which is provided by family members. And indeed, whether they were boys or girls, younger or older, adolescents' self-concept was positively associated with their level of perceived emotional support.

Risk of depression among girls

A robust self-concept may help individuals meet the day-to-day challenges of the difficult teenage years. But just as important, the strength of an adolescent's self-concept during this time may have long-term implications.

Self-concept has been found to be protective against stress.[6-9] Researchers have argued that people with a strong self-concept may have coping strategies that are more problem-focused and less emotion-focused than the techniques employed by people whose self-

Health outcomes

Using the methodology of Kessler et al,[56] the National Population Health Survey (NPHS) measures a *major depressive episode (MDE)* with a subset of questions from the Composite International Diagnostic Interview. These questions cover a cluster of symptoms for a depressive disorder, which are listed in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R).*[57]

The question (Q) numbers refer to those in the mental health section of the NPHS. There are three possible paths: "yes" to Q2, then answer Q3 to Q13; "no" to Q2, "yes" to Q16, then answer Q17 to Q26; and "no" to Q2 and "no" to Q16.

Q2	During the past 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row? (yes - go to Q3; no - go to Q16)
Q16	During the past 12 months, was there ever a time lasting two weeks or more when you lost interest in most things like hobbies, work, or activities that usually give you pleasure? (yes - go to Q17; no - end)

For the next few questions, please think of the two-week period during the past 12 months when:

Q3	these feelings were worst.
Q17	you had the most complete loss of interest in things. During that time how long did these feelings usually last? (all day long; most of the day; about half of the day; less than half the day)
Q4 or Q18	How often did you feel this way during those two weeks? (every day; almost every day; less often)
Q5	During those two weeks did you lose interest in most things? (yes/no)
Q6 or Q19	Did you feel tired out or low on energy all of the time? (yes/no)
Q7 or Q20	Did you gain weight, lose weight, or stay about the same? (gained; lost; stayed about the same; was on a diet)
Q8 or Q21	About how much did you gain/lose?
Q9 or Q22	Did you have more trouble falling asleep than you usually do? (yes/no)
Q10 or Q23	How often did that happen? (every night; nearly every night; less often)
Q11 or Q24	Did you have a lot more trouble concentrating than usual? (yes/no)
Q12 or Q25	At these times, people sometimes feel down on themselves, no good, or worthless. Did you feel this way? (yes/no)
Q13 or Q26	Did you think a lot about death—either your own, someone else's, or death in general? (yes/no)

A value of 1 was assigned to any "yes" answer to the "yes/no" questions. For Q8 and Q21, a score of 1 was assigned if the change in weight was at least 10 pounds (4.5 kilograms). For Q10 and Q23, a score of 1 was given to respondents who reported having trouble falling asleep every night or nearly every night. Those who replied "yes" to Q2, and whose symptoms lasted all day or most of the day, and had occurred every day or almost every day, had a maximum possible score of 8. For those who responded "yes" to Q16, and whose symptoms lasted all day or most of the day, and

had occurred every day or almost every day, the maximum possible was 7. Respondents who replied "no" to Q2 and Q16 scored 0.[58]

Scores were totaled, and the results were transformed into a probability estimate of a diagnosis of MDE. For this analysis, if the estimate was 0.9 or more (90% likelihood of a positive diagnosis), the respondent was considered to have experienced an MDE in the previous 12 months. Respondents were classified as having experienced a new MDE if their scores indicated a depressive episode before their 1996/97, 1998/99 and/or 2000/01 interview, but not in the 12 months before their 1994/95 interview.

Self-perceived health reflects respondents' global evaluation of their overall health. They were asked, "In general, would you say your health is: excellent, very good, good, fair or poor?" For this analysis, self-perceived health was treated as a continuous variable, with scores ranging from poor (1) to excellent (5).

Physical activity was based on total accumulated energy expenditure (EE) during leisure time. EE was calculated from the reported frequency and duration of all of a respondent's leisure-time physical activities in the three months before the interview and the metabolic energy demand (MET value) of each activity, which was independently established.[59,60]

$EE = \sum(N_i * D_i * MET_i / 365 \text{ days})$, 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/KD was defined as high; 1.5 to 2.9, moderate; and less than 1.5, low.[59] Respondents with high or moderate EE were considered physically active; those with low EE, inactive.

Based on their body mass index or BMI (calculated by dividing weight in kilograms by height in metres squared), respondents were grouped into two categories: *obese* (BMI 30 or more) and *not obese* (BMI less than 30). BMI was not calculated for pregnant women. The age- and sex-specific cut-offs defined by Cole et al.[61] were used to determine if an adolescent was obese in 1994/95:

Age (years)	*Obese* is BMI greater than or equal to:	
	Boys	Girls
12.0	26.02	26.67
12.5	26.43	27.24
13.0	26.84	27.76
13.5	27.25	28.20
14.0	27.63	28.57
14.5	27.98	28.87
15.0	28.30	29.11
15.5	28.60	29.29
16.0	28.88	29.43
16.5	29.14	29.56
17.0	29.41	29.69
17.5	29.70	29.84
18+	30.00	30.00

Mid-year age points were chosen as the age criteria (for example, 13.5 for 13-year-olds). Based on these cut-offs, a 13-year-old girl who was 160 cm (5 feet, 3 inches) tall would be considered obese if she weighed at least 72.2 kg (161 pounds).

Table 2

Regression coefficients relating selected characteristics to self-concept, by sex and age group, household population aged 12 to 19, Canada excluding territories, 1994/95

	Total			Boys			Girls			12 to 15			16 to 19		
	B	se	beta	B	se	beta	B	se	beta	B	se	beta	B	se	beta
Age	0.01*	0.003	0.08*	0.01*	0.004	0.10*	0.00	0.004	0.04	…	…	…	…	…	…
Female	-0.05*	0.013	-0.13*	…	…	…	…	…	…	-0.04*	0.018	-0.12*	-0.05*	0.017	-0.15*
Household income															
Lowest/Lower-middle	-0.06*	0.023	-0.14*	-0.07*	0.021	-0.16*	-0.05	0.043	-0.11	-0.05*	0.022	-0.09*	-0.07*	0.033	-0.16*
Middle	-0.03*	0.011	-0.07*	-0.01	0.016	-0.03	-0.04*	0.020	-0.11*	-0.01	0.018	-0.04	-0.03*	0.014	-0.09*
Upper-middle/Highest†	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Living arrangements															
With one parent	0.00	0.016	0.01	0.01	0.019	0.02	-0.01	0.030	-0.01	0.01	0.022	0.03	-0.01	0.023	-0.01
Other	0.00	0.020	0.00	-0.03	0.025	-0.05	0.02	0.029	0.05	0.01	0.031	0.02	0.00	0.026	0.00
With both parents†	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
Emotional support	0.08*	0.015	0.23*	0.06*	0.014	0.20*	0.10*	0.026	0.27*	0.07*	0.021	0.20*	0.08*	0.022	0.25*
Intercept	-0.36			-0.31			-0.44			-0.23			-0.25		
Model information															
R^2	0.09			0.08			0.10			0.07			0.11		
Adjusted R^2	0.09			0.07			0.09			0.05			0.10		
Degrees of freedom	9			8			8			8			8		
	1,500			734			758			575			917		
Dropped because of missing values	174			90			84			166			8		

Data source: 1994/95 National Population Health Survey, cross-sectional sample, Health file
Note: "Missing" categories for household income and living arrangements were included in each model to maximize sample size, but the coefficients are not shown.
† Reference category
* $p < 0.05$
... Not applicable

Table 3

Adjusted odds ratios relating incidence of a major depressive episode between 1994/95 and 2000/01 to selected characteristics in 1994/95, by sex and age group, household population aged 12 to 19 with no depressive symptoms in 1994/95, Canada excluding territories

	Total		Boys		Girls		12 to 15		16 to 19	
Characteristics, 1994/95	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	1.02	0.91, 1.15	1.01	0.85, 1.21	1.03	0.87, 1.22	…	…	…	…
Female	2.20*	1.28, 3.79	…	…	…	…	2.65*	1.12, 6.23	2.40*	1.13, 5.14
Household income										
Lowest/Lower-middle	1.36	0.65, 2.81	1.28	0.36, 4.48	1.41	0.61, 3.25	2.82*	1.04, 7.64	0.90	0.33, 2.43
Middle	0.85	0.44, 1.64	1.10	0.36, 3.40	0.79	0.37, 1.71	0.39	0.13, 1.18	1.36	0.58, 3.20
Upper-middle/Highest†	1.00	…	1.00	…	1.00	…	1.00	…	1.00	…
Emotional support	0.93	0.60, 1.45	1.51	0.69, 3.27	0.65	0.35, 1.19	0.91	0.55, 1.51	1.03	0.52, 2.05
Self-concept	0.12*	0.02, 0.74	0.21	0.01, 2.90	0.08*	0.01, 0.83	0.02*	0.00, 0.28	0.41	0.03, 5.58
Model information										
Sample size	890		424		466		375		515	
Sample with depression	118		37		81		52		66	
Dropped because of missing values	122		61		61		121		1	

Data source: 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file
Note: A "missing" category for household income was included in each model to maximize sample size, but the odds ratios are not shown.
† Reference category
* $p < 0.05$
... Not applicable

Methods

Data source

The data for this article are from Statistics Canada's National Population Health Survey (NPHS), weighted to represent the population of the 10 provinces. The biennial NPHS, which began in 1994/95, 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. The NPHS has both cross-sectional and longitudinal components.

Cross-sectional sample

The 1994/95 (cycle 1) cross-sectional sample consists of longitudinal respondents and other members of their households, as well as individuals selected as part of supplemental samples, or buy-ins, in some provinces. The 1994/95 non-institutional sample for the 10 provinces consisted of 27,263 households, of which 88.7% agreed to participate. After application of a screening rule to maintain the representativeness of the sample,[62] 20,725 households remained in scope. In 18,342 of these households, the selected person was aged 12 or older. Their response rate to the in-depth health questions was 96.1%, or 17,626 respondents.

The data are stored in two files. The General file contains socio-demographic and some basic health information for each member of participating households. The Health file contains in-depth health information, which was collected for one randomly selected household member, as well as the information in the General file pertaining to that individual. Because of the detailed nature of the data in the Health file, this information had to be provided by the selected respondent; proxy response was accepted only under special circumstances (for example, a health problem prevented the selected respondent from providing information). In 1994/95, in each household, one knowledgeable person provided information about all household members for the General file. As well, one household member, not necessarily the same person, was randomly selected to provide in-depth health information about himself or herself for the Health file. In 1994/95, the majority of interviews were conducted in person.

Longitudinal sample

Of the 17,626 randomly selected respondents in 1994/95, 14,786 were eligible members of the longitudinal panel, along with 468 persons for whom only general information was collected. An additional 2,022 of the 2,383 randomly selected respondents younger than 12 were also eligible. Thus, the longitudinal sample is composed of the 17,276 respondents who were selected in cycle 1

and had completed at least the General component of the questionnaire. The response rates were 93.6% in the first cycle, 92.8% in the second, 88.9% in the third, and 84.8% in the fourth. The first three cycles had cross-sectional and longitudinal components, but starting in 2000/01 (cycle 4), the NPHS became strictly longitudinal. In 2000/01, one questionnaire was used. More detailed descriptions of the NPHS design, sample and interview procedures can be found in published reports.[62,63]

The cross-sectional sample used for this article consists of 1,684 respondents (833 boys and 851 girls) aged 12 to 19 in 1994/95 (Appendix Table A). Respondents whose Health questionnaire data were provided by proxy were excluded from the analyses because information on self-concept and on some other variables was not available. The longitudinal analyses were based on 1,089 respondents aged 12 to 19 in 1994/95 for whom complete data were available for all four cycles: 511 boys and 578 girls (Appendix Table A).

Analytical techniques

The 1994/95 NPHS cross-sectional file was used to measure levels of self-esteem, mastery and self-concept among 12- to 19-year-olds, by sex and age group. The 1994/95 cross-sectional file was also used to examine associations between self-concept and household income, living arrangements and emotional support.

The longitudinal file was used to examine the six-year incidence of depression and changes in self- perceived health, physical activity and obesity between 1994/95 and 2000/01 in relation to self-concept scores in 1994/95, by sex and age group. Multiple logistic regression models were created for dichotomized dependent variables (depression, physical inactivity and obesity) and multiple linear regression models were constructed for the continuous dependent variables (self-perceived health). Based on a review of the literature, selected factors believed to mediate the relationship between self-concept and health were accounted for in these models: household income and emotional support.

In the regression models, continuous measures were used for self-concept, perceived emotional support, and health status variables. Other research suggests that collapsing these constructs into dichotomous variables reduces the sensitivity of these measures.[64,65]

To account for survey design effects, standard errors and coefficients of variation were estimated with the bootstrap technique.[66-68] The statistical significance threshold was set at $p < 0.05$.

concept is weak.[69] Thus, depression stemming from stress may be averted by a strong self-concept, whereas a low self-concept increases the probability of being depressed.[5,70-73]

According to the results of the analysis of longitudinal NPHS data, a weak self-concept was predictive of depression among girls (Table 3). Those whose self-concept was weak, but who did not report symptoms of depression in 1994/95, were more likely to experience a depressive episode at some point in the next six years than were those with a stronger self-concept. By contrast, boys' self-concept in 1994/95 was not significantly related to depression over that period.

Girls' self-perceived health

Self-perceived health has been found to be a reliable and valid measure of health status and a sensitive predictor of morbidity and mortality.[74-76] Regardless of sex or age group, adolescents' level of self-perceived health in 1994/95 was the strongest predictor of their self-perceived health status six years later in 2000/01. Yet even when self-perceived health in 1994/95 was taken into account, for girls, a strong self-concept at that time had a positive impact on self-perceived health in 2000/01 (Table 4). For boys, on the other hand, self-concept in 1994/95 was not significantly related to self-perceived health six years later.

For both sexes, however, emotional support in 1994/95 had a positive effect on self-rated health in 2000/01. Clearly, internal (self-concept) and external (emotional support) psychological resources during adolescence can have an impact on future self-perceived health.

Inactivity and obesity

A strong self-concept and physical activity tend to go together,[15,77,78] although the direction of the relationship is unclear. Some previous research suggests that a strong self-concept may be the result of physical activity.[79-81] Alternatively, a positive self-concept may provide the motivation that such activity requires.

The results of this analysis suggest that for boys, a strong self-concept is not merely a result of physical activity, but also a predictor of future physical activity. Among boys who were at least moderately active in 1994/95, a high self-concept significantly lowered their odds of being inactive in 2000/01 (Table 5).

Table 4

Regression coefficients relating self-perceived health in 2000/01 to selected characteristics in 1994/95, by sex and age group, household population aged 12 to 19 in 1994/95, Canada excluding territories

Characteristics, 1994/95	Total			Boys			Girls			12 to 15			16 to 19		
	B	se	beta	B	se	beta	B	se	beta	B	se	beta	B	se	beta
Age	0.04*	0.018	0.10*	0.04	0.025	0.11	0.04	0.025	0.09	...	...	...	...	...	...
Female	-0.14*	0.065	-0.09*	...	...	...	...	...	...	-0.12	0.091	-0.07	-0.14	0.092	-0.09
Household income															
Lowest/Lower-middle	-0.15	0.094	-0.07	-0.28*	0.134	-0.13*	0.03	0.130	0.02	-0.11	0.160	-0.04	-0.13	0.118	-0.06
Middle	-0.06	0.071	-0.03	-0.17	0.106	-0.09	0.05	0.102	0.03	-0.16	0.114	-0.09	0.01	0.095	0.01
Upper-middle/Highest	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Emotional support	0.17*	0.051	0.11*	0.14*	0.070	0.10*	0.21*	0.074	0.12*	0.23*	0.076	0.14*	0.14	0.076	0.09
Self-perceived health	0.28*	0.045	0.28*	0.33*	0.068	0.32*	0.22*	0.054	0.23*	0.28*	0.066	0.29*	0.29*	0.062	0.29*
Self-concept	0.49*	0.244	0.08*	0.24	0.367	0.04	0.80*	0.317	0.14*	0.62	0.378	0.10	0.42	0.326	0.07
Intercept	1.58			1.52			1.50			1.93			2.36		
Model information															
R^2	0.16			0.17			0.14			0.16			0.14		
Adjusted R^2	0.15			0.16			0.13			0.15			0.13		
Degrees of freedom	8			7			7			7			7		
	950			438			505			385			558		
Dropped because of missing values	130			65			65			124			6		

Data source: 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file
Note: A "missing" category for household income was included in each model to maximize sample size, but the coefficients are not shown.
* p < 0.05
... Not applicable

Table 5
Adjusted odds ratios relating inactivity in 2000/01 to selected characteristics in 1994/95, by sex and age group, active/moderately active household population aged 12 to 19 in 1994/95, Canada excluding territories

Characteristics, 1994/95	Total		Boys		Girls		12 to 15		16 to 19	
	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	1.00	0.90, 1.12	1.00	0.87, 1.16	1.01	0.86, 1.20	…	…	…	…
Female	1.83*	1.17, 2.85	...	…		…	2.14*	1.11, 4.12	1.56	0.84, 2.90
Household income										
Lowest/Lower-middle	1.65	0.88, 3.08	1.83	0.78, 4.32	1.55	0.68, 3.50	1.45	0.59, 3.61	1.88	0.80, 4.42
Middle	0.87	0.51, 1.50	1.15	0.57, 2.32	0.69	0.31, 1.54	0.60	0.26, 1.36	1.28	0.62, 2.65
Upper-middle/Highest†	1.00	…	1.00	…	1.00	…	1.00	…	1.00	…
Emotional support	1.16	0.77, 1.74	1.54	0.91, 2.59	0.58	0.26, 1.31	0.91	0.51, 1.64	1.47	0.83, 2.61
Self-concept	0.05*	0.01, 0.28	0.03*	0.00, 0.27	0.10	0.01, 1.08	0.07*	0.01, 0.72	0.05*	0.01, 0.47
Model information										
Sample size	579		313		266		271		308	
Sample inactive in 2000/01	229		109		120		113		116	
Dropped because of missing values	93		56		37		84		9	

Data source: 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file
Note: A "missing" category for household income was included in each model to maximize sample size, but the odds ratios are not shown.
† Reference category
* p < 0.05
... Not applicable

Table 6
Adjusted odds ratios relating obesity in 2000/01 to selected characteristics in 1994/95, by sex and age group, non-obese household population aged 12 to 19 in 1994/95, Canada excluding territories

Characteristics, 1994/95	Total		Boys		Girls		12 to 15		16 to 19	
	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	0.89, 1.23	0.99	0.79, 1.23	1.17	0.92, 1.48	…	…	…	…
Female	0.41*	0.19, 0.88	...	…		…	0.15*	0.04, 0.55	0.65	0.27, 1.60
Household income										
Lowest/Lower-middle	1.58	0.65, 3.84	2.33	0.74, 7.33	0.86	0.23, 3.21	1.81	0.39, 8.40	1.40	0.48, 4.09
Middle	1.55	0.70, 3.46	2.93*	1.08, 7.96	0.49	0.13, 1.78	1.81	0.51, 6.45	1.57	0.56, 4.38
Upper-middle/Highest†	1.00	…	1.00	…	1.00	…	1.00	…	1.00	…
Emotional support	1.43	0.78, 2.62	1.36	0.73, 2.55	2.86	0.52, 15.59	0.98	0.41, 2.36	1.78	0.75, 4.20
Self-concept	0.05*	0.01, 0.36	0.04*	0.00, 0.88	0.06*	0.01, 0.46	0.04	0.00, 1.89	0.06*	0.01, 0.55
Model information										
Sample size	895		433		462		366		529	
Sample obese in 2000/01	62		35		27		20		42	
Dropped because of missing values	143		61		82		127		16	

Data source: 1994/95 to 2000/01 National Population Health Survey, longitudinal sample, Health file
Note: A "missing" category for household income was included in each model to maximize sample size, but the odds ratios are not shown.
† Reference category
* p < 0.05
... Not applicable

Limitations

Because the National Population Health Survey (NPHS) is a general health survey, information about factors related to self-concept is limited. The only environmental variables available were living arrangements and household income; factors such as community belonging, family and parental support, and peer group influences, which previous studies have shown to have significant effects on self-esteem and mastery,[54] could not be examined. Similarly, the NPHS does not collect information on individual characteristics relevant to adolescent self-concept, such as school performance, popularity and athletic ability.[82]

In examining longitudinal results, the stability of self-concept over time may be more important than its level. For example, a decline in self-concept may be more important than a consistently low level. However, self-esteem and mastery questions were not asked in cycles 2 and 3 of the NPHS (self-concept information was available only for 1994/95 and 2000/01). Thus, it was not possible to construct a longitudinal model of the stability of self-concept.

NPHS data are subject to the problems inherent in self-reporting. For instance, recall errors may affect variables such as depression and physical activity. As well, some response bias may be involved in the substantial gender gap in self-concept, in that girls are inclined to be more modest than boys in describing their positive qualities.[33] Self-reported data tend to underestimate the prevalence of overweight and obesity,[83,84] but there was no independent measurement of height and weight for the calculation of body mass index.

A measure of total energy expenditure rather than only that pertaining to leisure time would be more useful, as some individuals (notably men) may expend considerable amounts of energy in non-leisure time (at work, for instance).

The small sample size prevented a full analysis of some issues, and may have resulted in a failure to achieve statistically significant findings that would have emerged had the sample been larger.

People with a strong self-concept are more likely to be active, and they also tend to engage in self-care and avoid risky behaviour.[10,12,85] This may explain the relationship between adolescent self-concept and obesity in young adulthood that emerged in the analysis of longitudinal NPHS data. Both boys and girls with strong self-concepts and who were not obese in 1994/95 had significantly lower odds of being obese six years later than did their counterparts whose self-concept was weak (Table 6).

Concluding remarks

According to the National Population Health Survey, the strength of self-concept in the teenage years had an impact on depression, self-perceived health, physical activity, and obesity in young adulthood. However, the lingering effects of self-concept differed for boys and girls and for younger and older adolescents.

Among girls, self-concept was relatively weak, and they were particularly susceptible to its effects. A weak self-concept in adolescence tended to put girls at risk of depression, poor self-perceived health and obesity in young adulthood. For boys, a weak self-concept was associated with subsequent obesity and becoming inactive. These negative effects, specifically on health behaviour, may persist beyond young

adulthood into later life when individuals are more prone to chronic illness. Thus, the impact of adolescent self-concept has the potential to be felt much longer than the six years covered by this analysis.

A strong self-concept, especially among girls, appears to be a key factor in developing good mental and physical health. Equally important is the positive impact of emotional support for all adolescents—boys and girls, younger and older.

The results of this analysis have implications for families and for professionals who work with teenagers. While parents, educators and practitioners are undoubtedly aware of the immediate effects of adolescent self-concept, they may be less cognizant of the longer term. Moreover, given such consequences, health promotion policies and health education programs might benefit from including mechanisms to enhance adolescent self-esteem and mastery.

The findings of the cross-sectional analysis would suggest the maximization of emotional support resources during adolescence as an intervention strategy, with special attention to the groups most likely to have a weak self-concept: girls and adolescents in lower-income households. ■

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Appendix

Table A

Distribution of selected characteristics, population aged 12 to 19, Canada excluding territories, 1994/95

	Sample size	Estimated population	
		'000	%
1994/95 cross-sectional file			
Total	**1,684**	**3,022**	**100.0**
Boys	833	1,552	51.4
Girls	851	1,470	48.6
Age group			
12 to 15	750	1,487	49.2
16 to 19	934	1,535	50.8
Household income			
Lowest/Lower-middle	367	544	18.0
Middle	490	964	31.9
Upper-middle/Highest	750	1,359	45.0
Missing	77	155	5.1
Living arrangements			
With one parent	318	441	14.6
Other	277	427	14.1
With both parents	1,075	2,125	70.3
Missing	14	30	1.0
1994/95 to 2000/01 longitudinal file			
Total	**1,089**	**3,085**	**100.0**
Boys	511	1,567	50.8
Girls	578	1,518	49.2
Age group			
12 to 15	517	1,583	51.3
16 to 19	572	1,502	48.7
Household income			
Lowest/Lower-middle	213	530	17.2
Middle	334	1,021	33.1
Upper-middle/Highest	490	1,361	44.1
Missing	52	174	5.6
Living arrangements			
With one parent	199	450	14.6
Other	154	381	12.4
With both parents	723	2,216	71.8
Missing	13	38	1.3

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