

Multiple-risk behaviour in adolescents and young adults

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Abstract

Objectives

This article examines the prevalence of four risk behaviours among teenagers and young adults: smoking, binge drinking, sex with multiple partners, and sex without a condom.

Data source

The data are from a Health Canada-sponsored supplement to the 1994/95 National Population Health Survey. The analysis is based on 905 respondents aged 15 to 19 and 1,055 respondents aged 20 to 24.

Analytical techniques

Prevalence estimates of the four risk behaviours were calculated for males and females in each age group. An index of multiple-risk behaviour was derived by summing the four risk behaviours. Hierarchical multiple regression was used to examine how sets of variables are related to multiple-risk behaviour.

Main results

Multiple-risk behaviour was higher among young people who had never married, who were not students, and who did not live with a parent. Feeling distressed was positively linked with multiple-risk behaviour, while regular attendance at religious services was negatively linked with such conduct.

Key words

risk behaviour, adolescence, smoking, drinking behaviour, sexual partners, condoms

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Youth is a time for experimentation, even—and maybe especially—if the activities involve an element of risk. A sense of invincibility, combined with bravado, may increase the appeal of behaviour that is frowned upon by older adults. But not all young people are equally likely to indulge in activities that might jeopardize their health and safety. The circumstances of some teenagers and young adults seem to deter them from taking risks, while the situations of others act to facilitate involvement in potentially hazardous practices.

Risk behaviours, which generally first emerge during adolescence, have important implications for individual psychological and physical health, both in the short- and long-term. Risk behaviour that is tried out during adolescence is not necessarily abandoned in adulthood. As well, some practices, such as driving while intoxicated, present health hazards to others. Because these activities entail substantial economic and social costs to the health and well-being of individuals and also to society, it is important to understand on a national level the extent of young people's involvement in them.

While most young people will experiment with at least one potentially hazardous behaviour, a minority will engage in several. Individuals who engage in multiple-risk behaviour are of special concern,

because they are most likely to develop immediate and longer-term health problems. However, relatively little is known about the prevalence of multiple-risk behaviour during adolescence and early adulthood.

Methods

Data source

The analysis in this article is based on the household component of a Health Canada-sponsored supplement to Statistics Canada's 1994/95 National Population Health Survey (NPHS) for the 10 provinces. An institutional component of the survey, which covered residents of long-term health care facilities, was excluded from the analysis.

The household component of the NPHS sample consisted of 27,263 households, of which 88.7% agreed to participate in the survey. After the application of a screening rule to keep the sample representative,¹ 20,725 households remained in scope.

One knowledgeable person in every participating household provided general socio-demographic and health information about each household member. In total, data pertaining to 58,439 individuals were collected. (The data base containing these data is called the General file.) In addition, one randomly selected person in each of the 20,725 participating households was chosen to provide in-depth information about his or her own health. In 18,342 of these households, the selected person was aged 12 or older. The response rate to these in-depth health questions was 96.1% or 17,626 respondents. (The data base containing in-depth health information as well as data from the General file pertaining to these respondents is called the Health file.)

Of the 17,626 randomly selected respondents aged 12 and older, 14,786 were eligible members of the NPHS longitudinal panel. These respondents were also eligible for the Health Canada supplement. The response rate to the Health Canada-sponsored questions was 90.6%. (The data base containing information from the Health Canada supplement as well as data from the General and Health files pertaining to these respondents is called the Supplementary file.)

The analysis of risk behaviour among young adults in this article is based on the supplemental Health Canada-sponsored questions. The data reported here pertain to 905 respondents aged 15 to 19 (431 males and 474 females) and 1,055 respondents aged 20 to 24 (489 males and 566 females).

Data on 1994 motor vehicle accident fatalities are from the Canadian Vital Statistics Data Base. Information on 1996 impaired driving charges is from the Canadian Centre for Justice Statistics at Statistics Canada.

Analytical techniques

Four commonly studied risk behaviours were selected from the NPHS Supplementary file: smoking, binge drinking, sex with multiple partners, and sex without a condom (see *Risk behaviours and Limitations*). Each behaviour was dichotomized as either risk absent (0) or risk present (1). An index of *multiple-risk behaviour* was derived by summing the values for the four behaviours. Scores ranged from 0 (no risk behaviour) to 4 (four risk behaviours). Only respondents with complete data for all four risk behaviours received a score on the multiple-risk index. Scores on this variable were missing for 3.2% of the respondents (4.2% of males and 2.3% of females).

Hierarchical multiple regression was used to examine how sets of variables were related to the index of multiple-risk behaviour. A number of variables that might facilitate or reduce risk behaviour were chosen (see *Appendix A, Independent variables*). After partialling out the socio-demographic variables of cohort in Step 1 and household income in Step 2, social role variables (marital status, student status, employment status, and whether individuals lived with at least one parent) were entered in Step 3. A set of personal risk factors (distress, unhappiness, and low self-esteem), which typically increase the likelihood of engaging in risk behaviour, were entered in Step 4. A set of personal protective factors (sense of mastery, social support, and religious attendance), which typically reduce the likelihood of engaging in risk behaviour, were entered in Step 5. At each step, an F test assesses the significance in the proportion of variance in multiple-risk behaviour accounted for by the variables in that step. The change in the multiple R² indicates the amount of variance explained by the variables in that step. Regression coefficients are reported for each variable within the full (non-hierarchical) model and are tested to determine if the variable is a significant predictor of multiple-risk behaviour, controlling for all other independent variables. One-tailed tests of significance are used because the hypotheses are directional.

Given the higher prevalence of multiple-risk behaviour among males, hierarchical regressions were calculated separately for males and females. Standard errors were estimated using the jackknife procedure to take into account the complexity of the sample design. Listwise deletion was used, omitting respondents with information missing for one or more variables. Because of missing data, 113 males (12.3%) and 95 females (9.1%) were excluded from the analysis.

This article uses the 1994/95 National Population Health Survey (NPHS) to examine the prevalence of four risk behaviours among males and females aged 15 to 19 and aged 20 to 24 (see *Methods*). The four risk behaviours are smoking, binge drinking, sex with multiple partners, and sex without a condom.

Risk behaviours

Risk for *smoking* was determined by responses to a single NPHS question: "At the present time, do you smoke cigarettes daily, occasionally or not at all?" A value of 0 was assigned to respondents who indicated not smoking at all. A value of 1 was assigned to those who indicated smoking occasionally or daily. No data were missing.

Two questions were used to form an indicator of *binge drinking*. First, respondents were asked, "During the past 12 months, have you had a drink of beer, wine, liquor, or any other alcoholic beverage?" A value of 0 was assigned to those who had not had a drink in 12 months. Respondents who had had a drink were asked, "How many times in the past 12 months have you had five or more drinks on one occasion?" A value of 0 was assigned to those who reported no occasions of binge drinking. A value of 1 was assigned to respondents who indicated binge drinking at least once in the past 12 months. Data were missing for 22 respondents (1.1% of the sample).

Sex with multiple partners was determined by responses to one question: "How many sexual partners have you had within the past 12 months?" Respondents who indicated one or no sexual partner were assigned a value of 0. Those who indicated two or more sexual partners were assigned a value of 1. Data were missing for 41 respondents (2.1%).

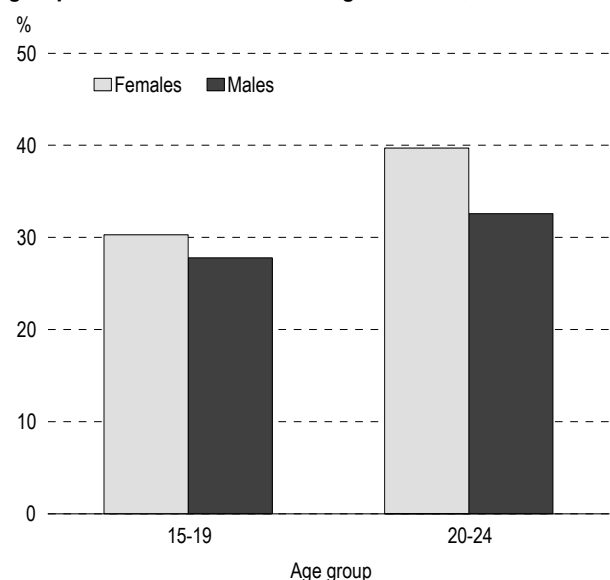
Sex without a condom was determined by responses to two questions. First, a value of 0 was assigned to respondents who had not had any sexual partners in the past 12 months and to those who reported that they had one sexual partner *and* that they were married, living common-law, divorced or widowed (these individuals were not asked about condom use). Second, all other respondents were asked, "In the past year, when you had sexual intercourse, did you/your partner use a condom?" (Each time; Some, but not all, of the time; Never). A value of 0 was assigned to respondents indicating they used a condom each time. A value of 1 was assigned to those indicating that they never or only sometimes used a condom. Data were missing for 41 respondents (2.1%).

With these indicators, it is possible to form an index that reflects multiple-risk behaviour. The multiple-risk-behaviour index moves away from the more common and limited single-variable approach that focuses on only one domain of behaviour. In so doing, it reflects some of the complexity of risk behaviour due to the co-occurrence of these individual behaviours.²⁻⁴ Hierarchical multiple regressions were used to determine how much of the variance in the multiple-risk index can be explained by a set of socio-demographic, role-related, and personal variables. The independent variables were selected because they either tend to increase the likelihood of engaging in multiple-risk behaviour, or are protective factors that decrease its likelihood.

Smoking

A substantial share of young people are daily or occasional smokers. As have previous surveys conducted in Canada and other western countries,^{5,6} the 1994/95 NPHS showed that in their late teens and early twenties, females have higher rates of daily or occasional smoking than males (Chart 1). At ages 15 to 19, the smoking rate among females was 30%, compared with 28% for males. Rates were higher

Chart 1
Prevalence of smoking among 15- to 24-year-olds, by age group and sex, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, Supplementary file

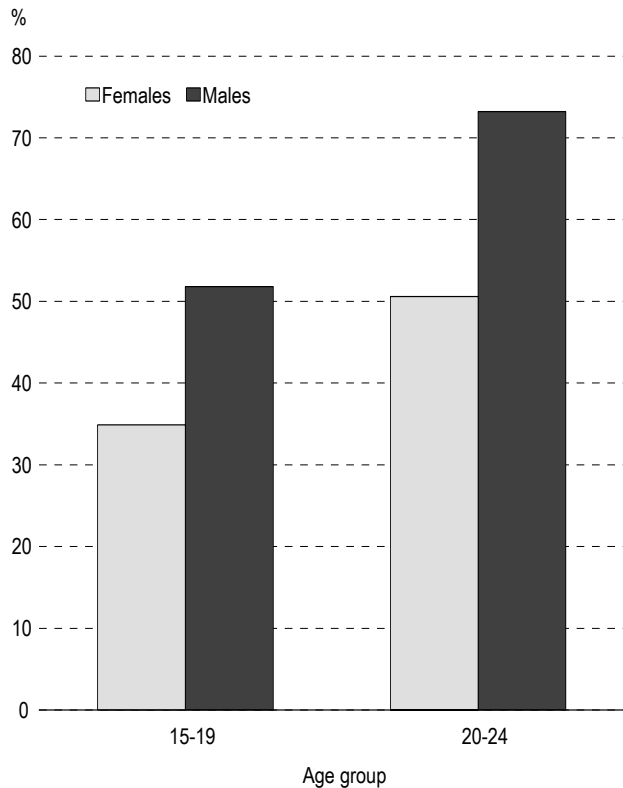
at ages 20 to 24: 40% for females versus 33% for males.

Binge drinking

Binge drinking is even more common than smoking among teenagers and young adults. In fact, binge drinking is “the most ubiquitous problem behaviour during adolescence and young adulthood.”⁷ However, unlike smoking, binge drinking tends to be more prevalent among young men than young women.

At ages 15 to 19, 52% of males and 35% of females reported consuming five or more alcoholic drinks on a single occasion in the previous year (Chart 2). By ages 20 to 24, the majority of both sexes reported at least one such episode: 73% of males and 51% of females. Moreover, if only those who reported consuming alcohol in the past year are considered, the proportions increase

Chart 2
Prevalence of binge drinking in past year among 15- to 24-year-olds, by age group and sex, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, Supplementary file

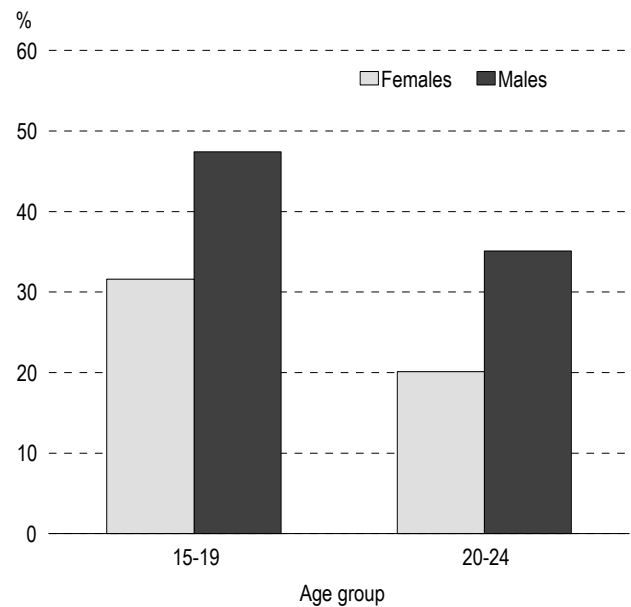
considerably. At ages 15 to 19, 71% of males and 50% of females reported binge drinking; among young adult drinkers, the corresponding figures were 81% and 61%.

Multiple sex partners

The prevalence of sexual activity among young people was similar for males and females. At ages 15 to 19, 44% of males and 43% of females had had at least one sex partner in the past year. The figures among young adults were higher, but again, not much different for males (78%) and females (81%).

There was, however, a considerable gender difference in having multiple partners. At ages 15 to 19, 21% of males reported having at least two sex partners in the past year, compared with just 13% of females. Among young adults, the disparity persisted: 27% of males versus 16% of females. The higher prevalence of multiple partners among young adults than teenagers is in part due to the generally higher rates of sexual activity among young adults.

Chart 3
Percentage of sexually active† 15- to 24-year-olds with at least two sex partners in past year, by age group and sex, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, Supplementary file
† At least one sex partner in past year

Considering only those who were sexually active, teenagers were more likely than young adults to have multiple partners (Chart 3). Among sexually active males, 47% of 15- to 19-year-olds reported at least two sex partners, whereas at ages 20 to 24, the percentage was just 35%. Among sexually active females, the corresponding percentages were 32% and 20%.

Condom use

Condom use during sexual intercourse is a means of preventing unplanned pregnancies and infection from sexually transmitted diseases.

Not using condoms is reported more frequently by young women than young men. Among sexually active 15- to 19-year-olds (excluding those with a single sex partner *and* who were married, in a common-law relationship, divorced, or widowed) 51% of females, but just 29% of males, reported having had sex without a condom in the past year. At ages 20 to 24, higher proportions reported not using condoms, but the difference between males and females was narrower: 53% and 44% (Chart 4).

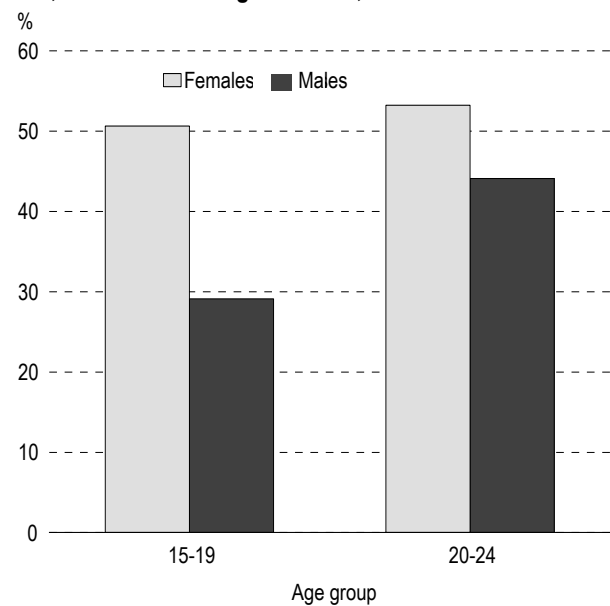
These figures suggest that a substantial number of young people may be putting themselves at risk, particularly since many of them may have more than one sex partner. Indeed, 21% of sexually active 20- to 24-year-old males reported multiple sex partners and condom non-use in the past year (Chart 5).

Multiple-risk behaviour

The majority of teenagers and young adults engage in at least one of the four potentially harmful activities, and a considerable percentage are involved in two or more (Chart 6). The prevalence of multiple-risk behaviour rises with age and is more common among males than females.

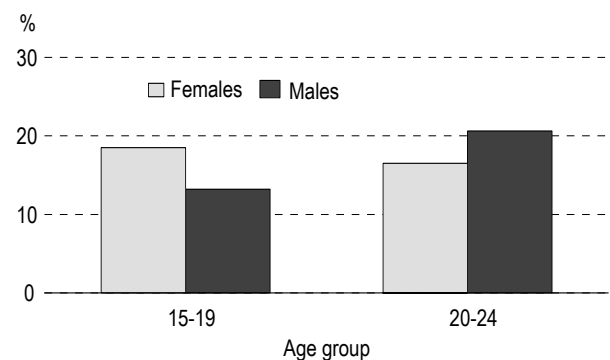
According to the 1994/95 NPHS, 20- to 24-year-old males were most at risk—22% of them reported engaging in at least three of these risk behaviours in the previous year. A smaller percentage of females in this age range (17%) reported the same level of risk. On the other hand, 19% of males and 31% of females aged 20 to 24 reported none of these activities.

Chart 4
Percentage of sexually active† 15- to 24-year-olds who never or sometimes used a condom in past year, by age group and sex, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, Supplementary file
Note: Excluded from calculations are married, common-law, divorced, or widowed individuals with a single sex partner.
† At least one sex partner in past year

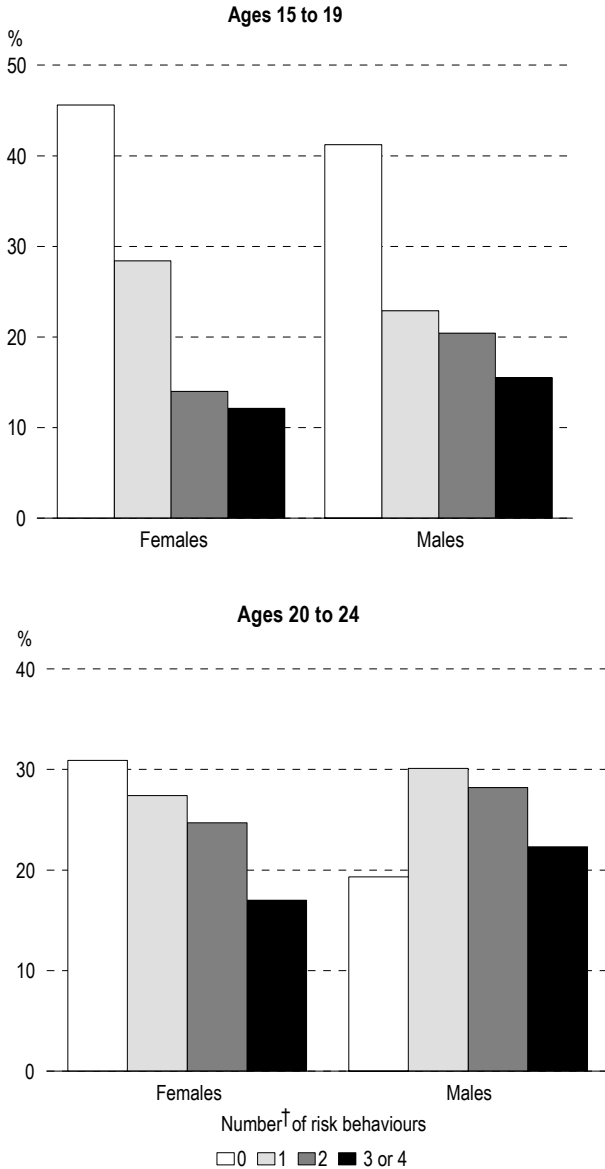
Chart 5
Percentage of sexually active† 15- to 24-year-olds with at least two sex partners plus condom non-use in past year, by age group and sex, Canada excluding territories, 1994/95



Data source: 1994/95 National Population Health Survey, Supplementary file
Note: Excluded from calculations are married, common-law, divorced, or widowed individuals with a single sex partner.
† At least one sex partner in past year

Among teenagers, multiple-risk behaviour was less common. Over 40% had not engaged in any of these activities in the previous year. Even so, 16% of males and 12% of females reported at least three of these behaviours.

Chart 6
Percentage distribution of number of risk behaviours among 15- to 24-year-olds, by age group and sex, Canada, 1994/95



Data source: 1994/95 National Population Health Survey, Supplementary file
 † Sum of four behaviours: daily or occasional smoking; at least one episode of binge drinking in past year; two or more sex partners in past year; never or sometimes using condom

Patterns

The risk behaviour of young people tends to fall into specific patterns. For instance, among all females aged 15 to 24 who engaged in a single risk behaviour, nearly half reported binge drinking, and about a third, smoking. Among single-risk males, binge drinking was, by far, the most typical risk behaviour, reported by 80% (Table 1).

Given this pattern for single risks, it is not surprising that the most common two-risk combination for both sexes was smoking and binge drinking. However, among males, almost as many reported binge drinking and one of the sexual risk behaviours.

Deterrents and facilitators

Not all 15- to 24-year-olds are equally likely to engage in multiple-risk behaviour. A number of demographic, socioeconomic and personal characteristics tend to be associated with such behaviour. Some of these factors are positively associated with it, while others seem to be deterrents.

Table 1
Patterns of risk behaviour among 15- to 24-year-olds, Canada excluding territories, 1994/95

Pattern of risk behaviour	% of total		% within category	
	Females	Males	Females	Males
Total	100	100		
No risk behaviour	39	32	100	100
One risk behaviour	28	26	100	100
Smoking			33	--
Binge drinking			48	80
Sexual (multiple partners or condom non-use)			19†	--
Two risk behaviours	19	24	100	100
Smoking + binge drinking			45	49
Binge drinking + a sexual risk behaviour			32	46
All other combinations			23†	--
Three risk behaviours	9	14	100	100
Smoking + binge drinking + a sexual risk behaviour			80	74
Both sexual risk behaviours + smoking or binge drinking			--	26†
Four risk behaviours	5†	5†	100	100

Data source: 1994/95 National Population Health Survey, Supplementary file
 † Estimate subject to high sampling variability
 -- Sample too small to permit reliable estimate

When each age group was considered alone, 20- to 24-year-olds engaged in higher levels of multiple-risk behaviour than did 15- to 19-year-olds (Tables 2 and 3). The age difference, however, was no longer statistically significant when all other variables were controlled, primarily because several social role variables (namely, never having been married, being a student and living with parents) were associated with being in the younger age group (see significant correlations between cohort and these three variables in Appendix B) and were stronger predictors of multiple-risk behaviour than was age.

The assumption of adult roles (for example, marriage) has generally been found to diminish involvement in potentially hazardous activities.^{2,8}

Table 2
Regression results predicting multiple-risk behaviour from socio-demographic, social role, and personal variables, females aged 15 to 24, Canada excluding territories, 1994/95

Variable	b	se	beta	R ² change	Adjusted R ²
Cohort†	.079	.125	.034	.020***	.019***
Income‡	-.028	.020	-.063	.014***	.031***
Social roles				.111***	.139***
Never married	.838***	.152	.280***		
Student	-.592***	.123	-.248***		
Employed	.067	.094	.028		
Lives with parent(s)	-.461**	.143	-.195***		
Personal risk factors				.030***	.167***
Distress	.057***	.015	.182***		
Unhappy	-.024	.095	-.012		
Self-esteem	.018	.017	.051		
Personal protective factors				.047***	.212***
Mastery	-.016	.012	-.053		
Social support	.110	.082	.044		
Religious attendance	-.573***	.103	-.209***		
Intercept	.634				
Total R²	.22***				

Data source: 1994/95 National Population Health Survey, Supplementary file
Note: b=unstandardized regression coefficient. beta=standardized regression coefficient. se=standard error (jackknife estimate). The regression coefficients and standard errors are for the full regression model (with all variables controlled). R² change is presented for each block of predictors entered hierarchically in steps denoted by bold print. Sample size is 945 after listwise deletion.

† The regression coefficient for this variable was significant when first entered in the hierarchical regression analysis. In the final model controlling for all other variables, it no longer attained significance.

* p < 0.05

** p < 0.01

*** p < 0.001

F(12, 932)=22.17, p < 0.001

And in fact, young people who had never been married reported higher levels of multiple-risk behaviour than did those who were or had been married (including common-law relationships). Another adult role, being employed, was not associated with multiple-risk behaviour in either sex. Moreover, two “non-adult” roles, being a student and living with parents, actually tended to deter multiple-risk behaviour. Non-students would be predicted to engage in more risk behaviours than those who were attending school, college or university. Previous research, too, has found somewhat higher levels of smoking and sexual risk

Table 3
Regression results predicting multiple-risk behaviour from socio-demographic, social role, and personal variables, males aged 15 to 24, Canada excluding territories, 1994/95

Variable	b	se	beta	R ² change	Adjusted R ²
Cohort†	.145	.124	.061	.040***	.039***
Income‡	.043*	.023	.092*	.001	.039***
Social roles				.073***	.108***
Never married	.488**	.178	.131**		
Student	-.579***	.133	-.239***		
Employed	.063	.116	.026		
Lives with parent(s)	-.405**	.164	-.155**		
Personal risk factors				.027***	.132***
Distress	.031*	.018	.088*		
Unhappy	.155	.103	.077		
Self-esteem	-.013	.022	-.031		
Personal protective factors				.037***	.166***
Mastery	.003	.018	.009		
Social support	-.196	.157	-.080		
Religious attendance	-.528***	.129	-.179***		
Intercept	1.845				
Total R²	.18***				

Data source: 1994/95 National Population Health Survey, Supplementary file
Note: b=unstandardized regression coefficient. beta=standardized regression coefficient. se=standard error (jackknife estimate). The regression coefficients and standard errors are for the full regression model (with all variables controlled). R² change is presented for each block of predictors entered hierarchically in steps denoted by bold print. Sample size is 807 after listwise deletion.

† The regression coefficient for this variable was significant when first entered in the hierarchical regression analysis. In the final model controlling for all other variables, it no longer attained significance.

‡ The regression coefficient for this variable was not significant when first entered in the hierarchical regression analysis. In the final model controlling for all other variables, it attained significance.

* p < 0.05

** p < 0.01

*** p < 0.001

F(12, 794)=14.38, p < 0.001

Limitations

One of the strengths of this research is the aggregation of several risk behaviours to form a multiple-risk behaviour index. The use of this index, however, is not without shortcomings. The four individual risk behaviours (smoking, binge drinking, sex with multiple partners, and sex without a condom) were each dichotomized prior to forming the aggregate index. Dichotomization of variables necessarily reduces the standard deviation, which limits the amount of variance that can be explained by predictors in the regression equation.

The decision to dichotomize was based on several considerations, including the fact that two of the variables (smoking and sex without a condom) had only three possible response options. In the case of smoking, the natural distribution showed that the vast majority of respondents reported smoking either daily or not at all (very few indicated smoking occasionally), thus making dichotomization of smoking behaviour a reasonable choice. Although binge drinking and sex with multiple partners could have been represented with continuous variables, the distributions were positively skewed, but with some outliers so extreme that the regression results likely would have been biased had continuous measures been used. Taking into account the possible response options for each risk behaviour, the distributions of the separate behaviours, and the need to standardize the risk behaviours for the aggregate index, dichotomization seemed to be the best solution. For selected purposes, the use of dichotomous variables to indicate the absence or presence of risk behaviour is not uncommon in the literature.^{9,10}

On a related note, the specific cut-off used to define risk is necessarily somewhat arbitrary.⁹ For example, in this analysis, the risk of binge drinking was defined as one occasion within the last year, which might be considered a too liberal definition of risk. Similarly, only two sex partners in the last year would not be considered risky by some definitions. Consensual definitions do not exist, however, and are unlikely to arise until researchers use standardized questions and measures of risk behaviour across studies. Readers should exercise caution in interpreting the results of this analysis by understanding clearly how multiple-risk behaviour was defined and measured.

Finally, the regressions that predict multiple-risk behaviour left large portions of variance unexplained (78% for females and 82% for males). Nevertheless, the amount of variance explained in this analysis is in line with other surveys that examine risk behaviours in large, cross-sectional studies of adolescents and young adults.^{2,8,11}

behaviour among non-students than students, although students may be more likely to binge drink.^{5,8} As might be expected, young people who lived with at least one parent would be predicted to report fewer risk behaviours. The increased autonomy associated with leaving home may create a context in which risk behaviours would be explored by young adults. Overall, marital status, employment status, student status and living arrangements explained 11.1% and 7.3% of the variance in multiple-risk behaviour for females and males, respectively, after controlling for age and income.

Household income was not strongly associated with multiple-risk behaviour. Among females, lower income was related to higher levels of multiple-risk behaviour when it was entered in the second step of the multiple regression model, but lost significance when all other variables were included. Among males, income was not a significant predictor of multiple-risk behaviour when entered in the second step of the regression, but in the final model that controlled for all other variables, higher income predicted higher scores on the multiple-risk index.

Distress increases risk

For both sexes, higher distress was significantly linked with higher levels of multiple-risk behaviour. However, neither unhappiness nor low self-esteem was a significant predictor, possibly because of the strong relationship of distress to unhappiness and self-esteem (Appendix B). Together, these three personal risk factors accounted for about 3% of the variance in multiple-risk behaviour among females and males, after controlling for socio-demographic and social role variables.

Religious attendance decreases risk

A number of factors are “protective” with regard to multiple-risk behaviour; that is, they might be expected to decrease the chances of participation in such activities. Three were examined in this analysis: sense of mastery, social support, and attendance at religious services. A sense of mastery and social support were not significant predictors of multiple-risk behaviour. But for both sexes, attendance at religious services was linked with lower

A risk-taking age

The National Population Health Survey contains no information about drinking and driving. However, it does show that at ages 15 to 24, binge drinking is relatively prevalent.

Based on impaired driving charges, drunk driving is more common among young adults than among teenagers. In 1996, the 20-to-24 age group represented a somewhat larger share of persons charged with impaired driving than they did of licensed drivers.¹² At ages 16 to 19, however, the numbers charged were proportional to the number of licensed drivers. Males made up the vast majority of people charged with impaired driving.

Motor vehicle accident fatality rates rise sharply after age 15. In 1994, the mortality rate from motor vehicle accidents for males aged 0 to 14 was less than 5 deaths per 100,000. At ages 15 to 19 and 20 to 24, the rate soared above 30. By age 25, the rate dropped back below 20 where it remained until age 75 and older. Females were much less likely than males to die in a motor vehicle accident. Nonetheless, the pattern by age was the same for females, with rates almost tripling between ages 10 to 14 and 15 to 19.

Motor vehicle accident deaths, by sex and age group, Canada, 1994

	Males		Females	
	Number of deaths	Deaths per 100,000	Number of deaths	Deaths per 100,000
All ages	2,223	15.3	939	6.4
0-4	40	3.9	36	3.7
5-9	43	4.3	20	2.1
10-14	50	4.9	29	3.0
15-19	308	30.6	110	11.5
20-24	322	30.9	79	7.8
25-29	219	18.8	74	6.5
30-34	219	16.1	78	5.9
35-39	179	14.0	52	4.1
40-44	151	13.4	59	5.2
45-49	125	12.5	52	5.3
50-54	94	12.3	47	6.2
55-59	94	14.9	40	6.3
60-64	80	13.4	41	6.6
65-69	67	12.9	57	9.7
70-74	82	19.7	57	10.7
75-79	68	25.6	49	12.8
80-84	55	33.8	40	14.6
85+	27	27.2	19	8.3

Data source: Canadian Vital Statistics Data Base

levels of multiple-risk behaviour. This echoes other research showing that beliefs in traditional norms may lessen involvement in multiple-risk activities.¹¹ Together, these personal protective factors explained about 5% of the variance in females' and 4% of the variance in males' multiple-risk behaviour, after controlling for all other variables in the analysis.

Concluding remarks

Overall, the factors considered in this analysis explained 22% of the variance in multiple-risk behaviour among females and 18% of the variance among males. Clearly, there are other important predictors of risk behaviour that were not assessed by the NPHS. If family difficulties (for instance, parent-adolescent conflict)¹³ and involvement with friends who engage in reckless activities had been considered, the regression models might have explained substantially more of the variance in multiple-risk behaviour. Additional information on the family, peer, neighbourhood and cultural contexts would increase understanding of who is most at risk.¹⁴⁻¹⁶ However, the social role variables that were examined (in particular, whether the young person lived with parents or had a spouse) provide important insight about the circumstances in which risk behaviour is elevated or reduced.

The NPHS does not address other equally important and relatively common risk behaviours such as illicit drug use, delinquency, and driving while drunk¹⁶ (see *A risk-taking age*). A more comprehensive set of risk behaviours might better distinguish young people who are experimenting with a few potentially harmful activities from those who are engaged in a pattern of such conduct.

Finally, given that the data were collected from the participants at only one point in time, it is not possible to disentangle cause-and-effect relations. For instance, multiple-risk behaviour might be as much the cause of distress as it is the result. Follow-up data on NPHS respondents will shed light on the sources, course and consequences of multiple-risk behaviour among teenagers and young adults as they mature. ●

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Appendix A

Independent variables

Sociodemographic characteristics

Cohort refers to the age group of the respondents. The two cohorts, 15 to 19 and 20 to 24, were distinguished by scores of 0 and 1, respectively.

Household income was scored as 1 (no income), 2 (less than \$5,000), 3 (\$5,000 to \$9,999), 4 (\$10,000 to \$14,999), 5 (\$15,000 to \$19,999), 6 (\$20,000 to \$29,999), 7 (\$30,000 to \$39,999), 8 (\$40,000 to \$49,999), 9 (\$50,000 to \$59,999), 10 (\$60,000 to \$79,999), or 11 (\$80,000 or more). Data were missing for 79 respondents (4%).

Social roles

Marital status was coded as 0 (married, living common-law, divorced, separated or widowed) or 1 (never married). No data were missing.

Student status (0 if not a student; 1 if attending school) was determined by the response to "Are you currently attending a school, college or university?" Data were missing for two respondents.

Employment status was coded as 0 (not currently working) or 1 (currently has a job). Data were missing for 20 respondents (1%).

Lives with parent(s) was coded as 0 (those who reported any arrangement other than living with at least one parent) or 1 (living with at least one parent). Data were missing for eight respondents.

Personal risk factors

Distress was measured with six items based on a subset of questions from the Composite International Diagnostic Interview (CIDI).¹⁷ The CIDI is a structured diagnostic instrument designed to produce diagnoses according to the definitions and criteria of both DSM-III-R and the Diagnostic

Criteria for Research of the ICD-10. Each item was rated on a five-point scale ranging from “none of the time” (0) to “all of the time” (4). Respondents were asked, “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?”

The sum of these items was calculated to form a scale score (ranging from 0 to 24), with higher scores indicating stronger feelings of distress. Data were missing for 37 respondents (1.9%).

Unhappiness was measured by a single item asking, “Would you describe yourself as being *usually*: Happy and interested in life? (1); Somewhat happy? (2); Somewhat unhappy? (3); Unhappy with little interest in life? (4); or So unhappy that life is not worthwhile? (5).” Scores ranged from 1 to 5, with higher scores indicating more unhappiness. One respondent did not provide information for this question.

Self-esteem, or the positive feelings that an individual holds for him/herself, was measured with six items.^{18,19} Each item was rated on a five-point scale, ranging from “strongly agree” (0) to “strongly disagree” (4). The items were:

- 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 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 scoring).

A scale was constructed from the sum of the items (ranging from 0 to 24), with higher scores indicating higher self-esteem. Data were missing for 38 respondents (1.9%).

Personal protective factors

Mastery, or the extent to which individuals believe that they are in control of their lives, was measured with seven items¹⁸ rated on a five-point scale, ranging from “strongly agree” (0) to “strongly disagree” (4).

The seven items were:

- 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 the problems of life.
- Sometimes you feel that you are being pushed around in life.
- What happens to you in the future mostly depends on you (reverse scoring).
- You can do just about anything you really set your mind to (reverse scoring).

The sum of the items was calculated (ranging from 0 to 28), with higher scores indicating a superior sense of mastery. Data were missing for 42 respondents (2.1%).

Perceived social support was measured by “yes/no” responses to four items:

- Do you have someone you can confide in, or talk to about your private feelings or concerns?
- Do you have someone you can really count on to help you out 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 number of “yes” responses was summed to form an index ranging from 0 to 4, with higher scores indicating more social support. Scores were missing for 42 respondents (2.1%).

Religious attendance was measured with a single question: “Other than on special occasions (such as weddings, funerals or baptisms), how often did you attend religious services or religious meetings

in the past 12 months? The response categories were: At least once a week; At least once a month; At least three or four times a year; At least once a year; Not at all. Respondents who replied “At least

once a week” or “At least once a month” were assigned a score of 1 (regular attendance). All others were assigned a score of 0. Data were missing for 37 respondents (1.9%).

Appendix B

Pearson correlations among variables, by sex (cohorts combined)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
Cohort (1)	...	-.23*	-.42*	-.44*	.18*	-.48*	-.07*	-.05	.11*	.07*	.02	-.05	.14*
Income (2)	-.01	...	.14*	.13*	.14*	.42*	-.02	-.16*	.15*	.13*	.08*	.03	-.15*
Social roles													
Never married (3)	-.34*	.21*	...	.39*	-.06*	.53*	.09*	.02	-.03	.01	.03	-.00	.07*
Student (4)	-.45*	.10*	.25*	...	-.18*	.38*	.07*	.03	-.04	.03	.05	.02	-.23*
Employed (5)	.20*	.15*	-.14*	-.26*	...	.00	-.10*	-.11*	.13*	.14*	.00	-.05	.05
Lives with parent(s) (6)	-.37*	.35*	.53*	.26*	-.04	...	-.04	-.01	-.03	.00	.03	.10*	-.21*
Personal risk factors													
Distress (7)	.00	-.04	.02	.01	-.11*	-.01	...	.48*	-.35*	-.40*	-.24*	-.02	.19*
Unhappy (8)	.01	-.11*	.04	-.09*	-.03	-.02	.43*	...	-.48*	-.44*	-.31*	-.04	.07*
Self-esteem (9)	.03	.12*	.06*	.10*	.04	.07*	-.29*	-.37*	...	.52*	.21*	-.04	-.01
Personal protective factors													
Mastery (10)	.01	.21*	.04	.08*	.07*	.07*	-.41*	-.35*	.49*	...	.24*	.04	-.10*
Social support (11)	.00	.10*	-.04	.03	.05	.03	-.22*	-.15*	.13*	.18*	...	-.01	-.01
Religious attendance (12)	-.10*	-.06*	.06*	.02	.01	.07*	.00	.01	-.03	.00	-.03	...	-.25*
Multiple-risk index (13)	.20*	.04	-.02	-.29*	.08*	-.16*	.14*	.15*	-.10*	-.09*	-.12*	-.19*	...

Data source: 1994/95 National Population Health Survey, Supplementary file

Note: Correlations for females are above the diagonal; correlations for males are below. Sample size for females is 945, and for males, 807 (listwise deletion).

* $p < 0.05$

... Figure not applicable