Predictors of Health Risk Behaviours Among Young Adults: Analysis of the National Population Health Survey

Kenneth R. Allison, PhD,[1] Edward M. Adlaf, PhD,[1,2] Anca Ialomiteanu, MA,[2] Jürgen Rehm, PhD [1-3]

A B S T R A C T

This paper examines the individual and social determinants of physical inactivity, daily smoking, heavy drinking, and overall risk behaviour among 1,395 Canadians aged 20-24 in the 1994 National Population Health Survey. Logistic regression was used to estimate models of risk behaviour using the following variables: sex, mastery, self-esteem, sense of coherence, chronic stress, psychological distress, social support, income adequacy, education, and main activity (working, looking for work, attending school, other). Results of the analysis indicate that the most consistent predictors were chronic stress and main activity. Thus, social context appears to be an important influence on risk-related behaviour, and should be taken into account in approaches designed to promote health behaviours.

A B R É G É

Cet article examine les déterminants individuels et sociaux de l'inactivité physique, du tabagisme au quotidien, de l'alcoolisme aigu et de la prise de risques en général dans le comportement chez 1 395 Canadiens âgés de 20 à 24 ans, à partir des données de l'Enquête nationale sur la santé de la population de 1994. En recourant à une analyse de régression logistique, on a fait des évaluations des types de comportement à risque à partir des variables suivantes : sexe des individus, maîtrise de soi, estime personnelle, cohérence, stress chronique, détresse psychologique, soutien social, suffisance du revenu, niveau de scolarité, et principale activité (employé, à la recherche d'un emploi, suit des études, autres). Les résultats de l'analyse indiquent que les prédicteurs les plus constants étaient le stress chronique et l'activité principale. Par conséquent, le contexte social semble avoir une influence importante sur les comportements à risque, et doit être pris en considération dans les interventions destinées à promouvoir des comportements sains.

Several studies in Canada and elsewhere have documented patterns and correlates of health-related behaviours,[1-7] and numerous theoretical frameworks have been utilized to explain these behaviours,[8-16] and physical activity,[17-19] tobacco, alcohol and drug use specifically.[20-23] Although there is considerable literature assessing the correlates and explanations of health-related behaviours among adults, there is less information concerning adolescents and young adults.[18,24] This information is needed to develop theoretically and empirically based health promotion policies and programs.

In this paper we examine the role of selected individual and social determinants of physical inactivity, daily smoking, heavy drinking, and overall risk behaviour in a sample of Canadians aged 20-24 years. Individual determinants refer to: personal characteristics of individuals (sex); personal resources (mastery, self-esteem, and sense of coherence); chronic stress and psychological distress. Social determinants include: social resources (social support); socioeconomic status (income adequacy, education); and main activity (attending school, working, seeking work, or other). These individual and social determinants reflect many of the factors believed to be related to health.[25,26] The question addressed here is, what are the roles of these individual and social determinants in predicting an array of risk behaviours among young adults?

The social determinants can be conceptualized as broad environmental influences on behaviour. For example, unemployment and low income among young adults negatively affect individuals in the sense that they may be more likely to use tobacco and alcohol, and less likely to engage in physical activity.[27] Another type of social determinant, social resources, is considered to be protective regarding risk behaviours. Social support is expected to have an inverse relationship with risk behaviours.[28]

Concrete life circumstances (like unemployment) may affect health-related behaviours partly through the stress process.[29,30] Chronic stress (life strains), such as problematic roles and relationships, can engender depression and other health conditions, and may also be related to risk behaviours.[30,31] While some previous studies have examined the relationship between other types of stress and substance use, they have not examined the specific relationship between chronic stress and substance use.[32,33] We have begun to examine the relationship between chronic stressors, coping, and substance use in earlier research on secondary school students.[34,35] The relationship between chronic stress and physical inactivity is less clear.

Personal resources (mastery, self-esteem, sense of coherence) are conceptualized as being protective in the sense of moderating the effects of life circumstances on risk behaviours. Mastery, originally conceptualized by Adler, is currently used to signify notions of competence and perceived con-

1. Department of Public Health Sciences, Faculty of Medicine, University of Toronto
2. Addiction Research Foundation Division, Centre for Addiction and Mental Health, Toronto, Ontario
3. Fachhochscule Hamburg, Germany
Correspondence and reprint requests: Dr. Kenneth R. Allison, Associate Professor, Department of Public Health Sciences, Faculty of Medicine, University of Toronto, 12 Queen's Park Crescent West, Toronto, Ontario, M5S 1A8, Tel: 416-978-5869, Fax: 416-978-2087, E-mail: k.allison@utoronto.ca.

trol.[14,36] Self-esteem refers to one's perception of self-worth.[37] Antonovsky's notion of coherence refers to the sense that one's reality has structure and meaning – even if events are not personally controllable, individuals are said to be able to cope if they perceive that the events are part of a coherent system or structure.[38] We expect personal resources, like social support, to have an inverse relationship with risk behaviours.

METHODS

Sample

The 1994 National Population Health Survey (NPHS) was used as the basis for the findings reported in this paper. Developed to collect information on the Canadian population, the NPHS consists of a two-stage stratified area sample of households. The design targeted household residents at the time of the survey, excluding those residing on Indian Reserves, Canadian Forces Bases, and some remote areas of Quebec and Ontario.[39] Information was collected on all members of each household sampled and, additionally, one individual aged 12 and over was randomly selected for an in-depth interview (N=17,626). Interviews, which averaged one hour, were conducted in the respondent's household by Computer Assisted Personal Interview (CAPI) methods. The response rate for the personal in-depth interview was 96%. A full description of NPHS survey design and other methodological issues is described elsewhere.[39]

In this paper our data are based on interviews with 1,395 (647 males, 748 females) 20-24 year olds, conducted during the first wave of data collection (1994-95). This sample was selected because, while we wished to examine the individual and social determinants of health risk behaviour for both adolescents (aged 15-19) and young adults (aged 20-24), several of the relevant questionnaire items were not asked of adolescents. Since our purpose is to examine the predictive value of a common group of factors on health risk behaviours, the 15-19 age category could not be included.

Measures

Further information concerning the measures described below can be found in the background documents.[40,41]

TABLE I					
Description of Predictor Variables					
Measure	**Source**	**Description**	**Range**	**M**	**SD**
Sex	—	1 item	0-1	0.48	0.50
Mastery (derived scale)	Pearlin & Schooler (1978)[42]	7 items on 5 pt. scale	2-28	19.96	3.88
Self-Esteem (derived scale)	Rosenberg (1965)[37]	6 items on 5 pt. scale	1-24	19.86	2.99
Sense of Coherence (derived scale)	Antonovsky (1979)[38]	13 items on 7 pt. scale	4-78	54.18	12.42
Chronic Stress (adj. index)	Wheaton (1991)[43]	17 t/f items	0-16	3.79	2.70
Psychological Distress Score	Kessler & Mroczek (1994)[44]	6 items on 5 pt. scale	0-24	4.38	3.34
Social Support (index)	—	4 items	0-4	3.83	0.53
Income Adequacy (derived)	—	1 item	categ.	—	—
Education (derived highest level)	—	1 item	categ.	—	—
Main Activity	—	1 item	categ.	—	—

Four dependent variables were selected for the analysis. *Physical Inactivity* was measured by the Physical Activity Index, a measure derived from a set of items assessing participation in different activities, and is based on an estimate of energy expenditure. For the purpose of the current analysis, physical inactivity was dichotomously coded as inactives, those with energy expenditures below 1.5 kcal/kg/day (n = 706) or actives, those with energy expenditures greater than 1.5 kcal/kg/day (n = 627). *Daily Smoking* was coded dichotomously as daily smoker (n = 451) versus others (occasional smoker, former smoker, or non smoker, n = 944). *Heavy Drinking* contrasted those who reported consuming five or more drinks on a single occasion five or more times during the 12 months before the survey (n = 902) versus others (n = 469). Finally, *Risk Behaviour Index* distinguished those who reported physical inactivity, daily smoking, and heavy drinking (n = 196) from those who did not report all three behaviours (n = 1,199). Information on the independent variables is summarized in Table I.

Analysis

We used logistic regression to model the effects of the 10 independent variables (7 continuous or binary and 3 categorical variables) on the 4 dichotomous risk behaviours (see Table I). Reference group contrasts for categorical variables were indicator coded and were based on the group theoretically at lowest risk of each activity. Thus, for education and income adequacy, the highest level was used as the reference category. For main activity, going to school was used as the reference category. As well, in order to examine whether individual resources (mastery, self-esteem, coherence) and social resources (social support) moderate the effects of chronic stress on the risk behaviours, 4 interaction terms (chronic stress by each of the resources) were assessed after the inclusion of the 10 main effects. With listwise deletion of missing data, the 1,395 interviews were reduced to a minimum of 1,255 cases.

The calculation of correct variances from complex samples such as the NPHS requires specialized software; unfortunately, due to confidentiality, the NPHS public use file does not contain the necessary sample design information to employ such software. Although our data were based on 1,255 interviews, to crudely adjust for this issue we downweighted our sample to an effective sample size of 571, based on an average design effect of 1.93 provided by Statistics Canada.

RESULTS

Descriptive analysis of the dependent variables indicates that 52% of respondents were inactive, 29% were daily smokers, 60% were heavy drinkers, and 11% engaged in all three risk behaviours.

Before discussing the substance of the main effect findings, we must first note that none of the four interaction terms between individual and personal resources

TABLE II
Odds of Inactivity, Daily Smoking, Heavy Drinking†, and Risk Behaviour Index
by Selected Independent Variables, Ages 20-24, NPHS, 1994

Variable	Physical Inactivity			Daily Smoking			Heavy Drinking			Risk Behaviour Index		
	Wald X²	OR	95% CI	Wald X²	OR	95% CI	Wald X²	OR	95% CI	Wald X²	OR	95% CI
Sex (1 = male)	2.41			0.67			16.67***	2.4	1.6,3.6	1.46		
Mastery	0.77			0.61			0.01			0.87		
Self-Esteem	0.18			2.99			0.02			2.01		
Coherence	3.05			0.21			3.76			0.22		
Distress	0.15			0.11			0.27			0.18		
Chronic Stress	2.18			17.16***	1.21	1.1,1.3	5.69*	1.11	1.0,1.2	6.57**	1.16	1.0,1.3
Social Support	2.50			0.04			2.45			0.01		
Income Adequacy	7.26			3.51			5.25			3.97		
Education	1.39			14.42**			1.54			1.21		
Post Secondary		1.0	ref.		1.0	ref.		1.0	ref.		1.0	ref.
Completed High School		NS			1.5	0.9,2.7		NS			NS	
Less than High School		NS			3.3	1.8,6.3		NS			NS	
Main Activity	2.22			8.03*			10.39*			7.99*		
Attending School		1.0	ref.		1.0	ref.		1.0	ref.		1.0	ref.
Working		NS			1.8	1.1,3.2		1.8	1.1,3.0		3.0	1.4,6.5
Looking for Work		NS			3.0	1.3,7.0		1.0	0.5,2.3		2.1	0.7,6.7
Other		NS			1.8	0.9,3.7		0.8	0.4,1.6		2.0	0.7,5.5

† Heavy drinking is based on whether or not consumed 5+ drinks on a single occasion five times or more during the past 12 months.
N = 1,255
Based on logistic regression analysis using the weighted effective sample size. Odds ratios for non-significant variables not shown.
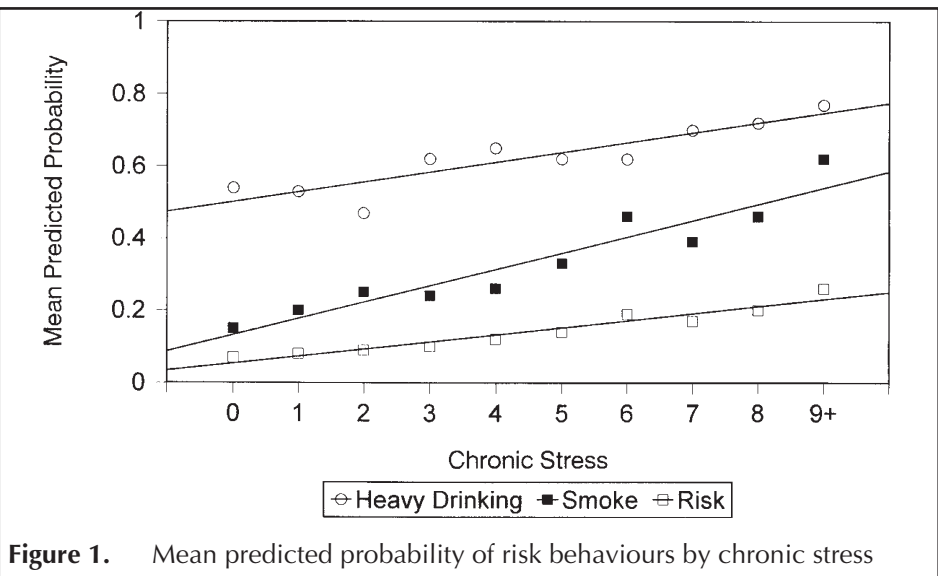* p<0.05, ** p<0.01, *** p<0.001 (Coefficients >0.05 not shown).

Figure 1. Mean predicted probability of risk behaviours by chronic stress

and chronic stress were statistically significant at the p < 0.05 level.

Only a few of the independent variables were predictive of the various risk behaviours (Table II). Of individual determinants, mastery, sense of coherence, self-esteem and distress did not show significant associations with any of the four outcomes. Sex was significantly related to heavy drinking only. Holding other factors constant, males were 2.4 times more likely than females to drink heavily. Chronic stress was the most robust predictor, significantly related to three of the four outcomes. In Figure 1, we present the mean adjusted predicted probability based on the logistic models in Table II by chronic stress. As seen, the probability of combined risk increases from 0.07 of those with zero chronic stress to 0.26 of those with values of 9 or greater. The respective increases are from 0.15 to 0.62 for daily smoking, and from 0.54 to 0.77 for heavy drinking.

Of social determinants, social support and income adequacy did not display significant associations with any of the four outcomes. Education was a significant predictor of daily smoking in the expected direction. Notably, those without high school completion were 3.3 times more likely to smoke daily compared to those with a post-secondary education. The most salient of the social determinants was main activity, significantly related to three of the four outcomes. The most robust finding is the contrast between those in school versus employed respondents. Working respondents were 1.8 times more likely to smoke daily and to drink heavily, and 3.0 times more likely to report all three outcomes than were school attenders.

DISCUSSION

The results indicate that the two most consistent predictors of risk behaviours were chronic stress (an individual determinant) and main activity (a social determinant). Higher levels of chronic stress were related to a greater likelihood of daily smoking, heavy drinking, and overall risk behaviour, a finding consistent with previous research.[34] In addition to its direct effects on risk behaviour, chronic stress may mediate the relationship between underlying social determinants and risk behaviours. While this was not examined in the present analysis, longitudinal analysis, using subsequent waves of the NPHS data, would be useful in examining the role

of chronic stress in relation to underlying structure and risk behaviours.

Young adults who were currently employed, as well as those looking for work, were generally at greater risk of daily smoking, heavy drinking, and overall risk, compared to those attending school. This is consistent with some previous research of this relationship.[45] Whether attending school (normally community college or university) confers a protective effect or represents social selection was not examined in the present analysis. Furthermore, it may be that the mechanism whereby employment status relates to risk behaviours is also related to the stress process.

The additional significant predictors (sex and education level) were not consistent across the various risk behaviours. Nevertheless, the direction of the specific relationships between these predictors and discrete behaviours was consistent with theory and previous research.

There were two unanticipated results: the absence of significant predictors of physical inactivity, and a lack of predictive ability of several variables conceptualized as individual or social determinants (mastery, coherence, self-esteem, distress, social support, and income adequacy). Regarding physical inactivity, we expected to find some significant predictors from the broad array of individual and social determinants, since such factors as sex and education level would be expected to be significantly related.[46] On the other hand, previous research concerning the dimensionality of health-related behaviour indicates separate clustering for physical activity and substance use behaviours.[8,47,48] Thus, the predictors of physical inactivity might be expected to differ from those of daily smoking, heavy drinking, and overall risk behaviour.

The lack of significant predictors among several variables theoretically related to risk behaviours may be partly explained by the use of general, as opposed to specific, measures of these independent variables. For example, it is likely that the use of more proximal, behaviour-specific, measures of such concepts as self-esteem, mastery, and social support would increase their predictive capacity, much in the same way as do condition-specific measures of such con-

cepts as self-efficacy and perceived control.[14,49] Moreover, there are likely additional factors, not included in the NPHS, that predict these specific behaviours.

This study indicates that risk behaviour, particularly daily smoking and heavy drinking, are related both to social and individual factors. The most consistent predictors of risk behaviour converge conceptually on the notion of social context. That is, life situations (employment status) and life experience (chronic stress) provide the context in which risk behaviours take place. To extend this discussion to public health policy and practice, we need to understand the context of risk behaviours in order to support attempts to change them. For example, smoking cessation programs need to include an examination of the role of social environmental factors as well as attitudinal factors in order to address the salient issues of young adult smokers.

REFERENCES

1. Stephens T, Fowler-Graham D (Eds.). *Canada's Health Promotion Survey 1990: Technical Report*. Ottawa: Minister of Supply and Services, 1993.
2. Stephens T, Craig C. *The Well-Being of Canadians: Highlights of the 1988 Campbell's Survey*. Ottawa: Canadian Fitness and Lifestyle Research Institute, 1990.
3. Adlaf E. Alcohol and other drug use. In: Stephens T, Fowler-Graham D (Eds.), *Canada's Health Promotion Survey 1990: Technical Report*. Ottawa: Minister of Supply and Services, 1993.
4. Adlaf E, Ivis F, Smart R, Walsh G. *The Ontario Student Drug Use Survey, 1977-1995*. Toronto: Addiction Research Foundation, 1995.
5. Heath G, Pratt M, Warren C, Kann L. Physical activity patterns in American high school students. *Arch Pediatr Adolesc Med* 1994;148:1131-36.
6. Johnston L, O'Malley P, Bachman J. *National Survey Results on Drug Use from the Monitoring the Future Study, 1975-1993*. Rockville: National Institute on Drug Abuse, 1994.
7. American School Health Association. *The National Adolescent Student Health Survey: A Report on the Health of America's Youth*. Oakland: Third Party Publishing, 1989.
8. Norman R. *The Nature and Correlates of Health Behaviour*. Ottawa: Health and Welfare Canada, 1986.
9. Zimmerman R, Vernberg D. Models of preventive health behavior: Comparison, critique, and meta-analysis. In: Albrecht G (Ed.), *Adv Med Sociol, Volume 4 - A Reconsideration of Health Behavior Change Models*. Greenwich, CN: JAI Press, 1994;45-67.
10. Fishbein M, Ajzen I. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Boston: Addison-Wesley, 1975.
11. Langlie J. Social networks, health beliefs, and preventive health behavior. *J Health Soc Behav* 1977;18:244-60.
12. Strecher V, DeVellis B, Becker M, Rosenstock I. The role of self-efficacy in achieving health behavior change. *Health Educ Q* 1986;13:73-91.
13. Wallston K, Wallston B. Health locus of control scales. In: Lefcourt H. (Ed.), *Research with the Locus of Control Construct* Vol. 1. New York: Academic Press, 1981;189-243.
14. Allison K. Theoretical issues concerning the relationship between perceived control and preventive health behaviour. *Health Educ Res* 1991;6(2):141-51.
15. Perry C, Baranowski T, Parcel G. How individuals, environments, and health behavior interact: Social cognitive theory. In: Glanz K, Lewis F, Rimer B (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice* 2nd Edition. San Francisco: Jossey-Bass Publishers, 1997;153-78.
16. Prochaska J, DiClemente C. Stages and processes of self-change of smoking: Toward an integrative model of change. *J Consult Clin Psychol* 1983;51:983-90.
17. Hofstetter C, Hovell M, Sallis J. Social learning correlates of exercise self-efficacy: Early experiences with physical activity. *Soc Sci Med* 1990;31(10):1169-76.
18. Reynolds K, Killen J, Bryson M, et al. Psychosocial predictors of physical activity in adolescents. *Prev Med* 1990;19(5):541-51.
19. Godin G, Shephard R. Use of attitude-behaviour models in exercise promotion. *Sports Med* 1990;10(2):103-21.
20. Boyle M, Szatmari P, Offord D, Merikangus K. Substance use among adolescents and young adults: Prevalence, socio-demographic correlates, associated problems and familial aggregation. Ontario Health Survey 1990 Working Papers (No. 2), Toronto: Ontario Ministry of Health and Premiers Council on Health, Well-Being and Social Justice, 1993.
21. Vingilis E, Adlaf E. The structure of problem behaviour among Ontario high school students: A confirmatory factor analysis. *Health Educ Res* 1990;5:151-60.
22. Allison K. Academic stream and tobacco, alcohol, and cannabis use by Ontario high school students. *Int J Addict* 1992;27(5):559-68.
23. Vaucher S, Rehm J, Benvenuti J, Müller R. Young teenagers and access to alcohol in a Swiss canton: Evidence from observational testing and from a telephone survey. *Addict* 1995;90:1619-25.
24. Dishman R, Dunn A. Exercise adherence in children and youth: Implications for adulthood. In: Dishman R (Ed.), *Exercise Adherence: Its Impact on Public Health*. Champaign, IL: Human Kinetics Publishers, 1988;155-200.
25. Gore S, Aseltine R, Colton M. Social structure, life stress and depressive symptoms in a high school-aged population. *J Health Soc Behav* 1992;33:97-113.
26. Federal, Provincial and Territorial Advisory Committee on Population Health. *Strategies for Population Health: Investing in the Health of Canadians*. Ottawa: Minister of Supply and Services Canada, 1994.
27. Peirce R, Frone M, Russell M, Cooper M. Relationship of financial strain and psychosocial resources to alcohol use and abuse: The mediating role of negative affect and drinking motives. *J Health Soc Behav* 1994;35:291-308.
28. Thoits P. Stress, coping, and social support processes: Where are we? What next? *J Health Soc Behav* Extra Issue, 1995;53-79.
29. Pearlin L, Lieberman M, Menaghan E, Mullan J. The stress process. *J Health Soc Behav* 1981;22:337-56.

30. Aneshensel C, Rutter C, Lachenbruch P. Social structure, stress, and mental health: Competing conceptual and analytic models. *Am Sociol Rev* 1991;56:166-78.
31. Wheaton B. Life transitions, role histories, and mental health. *Am Sociol Rev* 1990;55:209-23.
32. Hansell S, White H. Adolescent drug use, psychological distress, and physical symptoms. *J Health Soc Behav* 1991;32:288-301.
33. Oetting E, Beauvis F. Common elements in youth drug abuse: Peer clusters and other psychosocial factors. *J Drug Iss* 1987;17:133-51.
34. Allison K, Adlaf E, Mates D. Life strain, coping, and substance use among high school students. *Addict Res* 1997;5(3):251-72.
35. Allison K, Mates D. Student stress, coping, and drug use. *Public Health Epidemiol Rep Ont* 1990;1(6):82-89.
36. Lefcourt H. Internal versus external control of reinforcement: A review. *Psychol Bull* 1966;65:206-20.
37. Rosenberg M. *Society and the Adolescent Self-Image*. Princeton: Princeton University Press, 1965.
38. Antonovsky A. *Health, Stress, and Coping*. San Francisco: Jossey-Bass, 1979.
39. Statistics Canada. NPHS Public Use Microdata Documentation. National Population Health Survey, 1995a.
40. Statistics Canada. Questionnaire. National Population Health Survey, 1995b.
41. Statistics Canada. Derived Variables. National Population Health Survey, 1995c.
42. Pearlin L, Schooler C. The structure of coping. *J Health Soc Behav* 1978;19:2-21.
43. Wheaton B. Chronic stress: Models and measurement. Paper presented at meeting of the Society for the Study of Social Problems. Cincinnati, Ohio, 1991.
44. Kessler R, Mroczek D. Written communication, 1994.
45. Graetz B. Health consequences of employment and unemployment: Longitudinal evidence for young men and women. *Soc Sci Med* 1993;6:715-24.
46. Allison K, Adlaf E. Predictors of inactivity: An analysis of the Ontario Health Survey. *Can J Public Health* 1996;87(5):354-58.
47. McDonough P, Rootman I, Corey P, Ferrence R. Interrelations Among Health Behaviours. Ontario Health Survey 1990 Working Papers (No. 4), Toronto: Ontario Ministry of Health and Premiers Council on Health, Well-Being and Social Justice, 1993.
48. Hays R, Stacy A, DiMatteo M. Covariation among health-related behaviors. *Addict Behav* 1984;9(3):315-18.
49. Allison K, Dwyer J, Makin S. Self-efficacy and participation in vigorous physical activity by high school students. *Health Educ Behav* 1999;26(1):10-22.