The Effects of a Ban on Extracurricular Activities by Teachers on Students' Levels of Physical Activity in the Montreal area

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Abstract

Since physical activity is part of a healthy lifestyle, there is a lot of interest concerning the determinants of this behaviour in youth since it is tracked into adulthood. Environmental determinants belong to one subset of factors that influence physical activity. Baseline and one-year follow-up data on level of physical activity were collected in classroom questionnaires from 1264 7th grade students (56.2% of eligible students). Physical activity was assessed via an adaptation of the Weekly Activity Checklist. The effect of a ban on extracurricular activities on adolescent physical activity levels was determined. Multivariate logistic regression analyses were used to determine the effect of the ban when controlling for baseline physical activity, the number of extracurricular activities regularly offered at the school, and season at baseline. Students attending high implementation schools were significantly more likely to increase their levels of physical activity after the ban was lifted, than students in low implementation schools (odds ratio (OR) = 1.49 (95% CI= 1.16, 1.91) and 2.19 (95% CI=1.80, 2.67 for boys and girls respectively). These results suggest that a teachers' ban on sports-related ECAs was associated with a decrease in the PA levels of students attending secondary schools. The impact was higher among girls than boys.

Résumé

L'activité physique est une composante d'un mode de vie sain et beaucoup d'intérêt est accordé à l'étude des déterminants de ce comportement chez les jeunes. De plus, le niveau d'activité physique des jeunes a tendance à se maintenir durant la vie adulte. Les facteurs environnementaux appartiennent à un sous-ensemble des facteurs déterminant l'activité physique. Des données de bases et de suivi d'un an sur le niveau d'activité physique ont été colligées à l'aide de questionnaires complétés en classe par 1264 élèves de première secondaire (56,2% des élèves éligibles). Le niveau d'activité physique a été évalué à l'aide d'une liste hebdomadaire d'activités. On a ensuite évalué l'effet d'un boycottage par les professeurs des activités sportives extra-curriculaires (AEC) sur le niveau d'activité physiques des élèves à l'aide de régression logistique en contrôlant pour le niveau d'activité physique des élèves durant l'année de base, le nombre d'activités extra-curriculaires généralement offertes à l'école et l'effet de la saison.. Les élèves inscrits aux écoles où le boycottage des activités a été le plus rigoureusement appliqué augmentait plus leur niveau d'activité physique une fois le boycottage terminé que les élèves inscrits aux écoles où le boycottage était moins rigoureusement appliqué (Ratio de cotes (RC) pour les garçons = 1,49 (IC 95% =1,16; 1,91) et pour les filles = 2,19 (IC 95%=1,80; 2,67). Ces résultas suggèrent que le boycottage par les professeurs des activités sportives extra-curriculaires (AEC) a été associé avec une diminution du niveau d'activité physique des élèves inscrits à ces écoles secondaires. L'impact s'est avéré plus grand chez les filles que chez les garçons.

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This thesis is dedicated to the memory of Nenita Pabayo Carino.

Table of Contents

Abbreviations

PA	= physical activity
ECA	= extracurricular activities
SES	= socioeconomic status
BMI	= body mass index
OR	= odds ratio
CI	= confidence interval
SD	= standard deviation
LTPA	= leisure-time physical activity
(M)VPA	= (moderate to) vigorous physical activity
SCT	= Social Cognitive Theory
SEA	= Social Ecological Approach
HBM	= Health Belief Model
MET	= Resting Metabolic Rate Unit

Contribution of Authors

The McGill University Study on the Natural History of Nicotine Dependence In Teens started in 1999. The principal descriptive analyses of this survey including nicotine dependence and assessment were published by O'Loughlin et al (2002) and O'Loughlin et al (2002).

The candidate participated in data collection, data management, coding original data, data verification, and building of the SAS data files as part of the preliminary work. The candidate also developed the administrator questionnaire and collected the school-level data. The candidate conducted all the analyses, initial interpretation and preparation of the manuscript. The candidate worked closely with Dr. K. Gray-Donald, the thesis supervisor, Dr. J. O'Loughlin, the thesis co-supervisor and the Principal Investigator of the project, in developing the research question. Dr. Gray-Donald, Dr. O'Loughlin, and the other members of the thesis committee, Dr. L. Gauvin, and Dr. G. Paradis provided guidance with suggestions, additional analyses, interpretations and reviewing the manuscript.

The paper on t*he effects of a ban on extracurricular activities by teachers on students' levels of physical activity in the Montreal area* was co-authored by the members of the committee. The candidate along with the committee decided on the choice of variables and the type of analyses to be conducted.

1. Introduction

The increasing prevalence of obesity and overweight among children and adolescents is causing great concern among health practitioners and researchers (Alpert 1994). In Canada, nationally representative data provide strong indications of increasing overweight and obesity in youth. Specifically, the prevalence of overweight increased from 15% in 1981 to 28.8% in 1996 among boys, and from 15% to 23.6% among girls. The prevalence of obesity doubled from 5% to 13.5% in boys to and from 5% to 11.8% in girls during this same period (Tremblay & Wilms 2000).

Both clinical and epidemiological studies show that lifelong obesity often begins in childhood (Suter 1993) and that half of overweight children will be obese adults (Reynolds et al 1990; Raitakari et al 1994). Adult obesity is associated with increased risks of heart disease, diabetes, cerebrovascular events, colorectal cancer, gout, osteoarthritis and other chronic conditions (Rich 1999). Investigations to identify risk factors for obesity in youth need to be conducted so that effective intervention strategies can be developed and implemented.

Weight gain will not occur when energy balance is maintained, that is when energy intake equals energy expenditure (Dietz and Gortmaker 2001). On the other hand, weight gain occurs when energy intake exceeds energy expenditure (Dietz and Gortmaker 2001). Overall energy and fat intake, physical activity levels, and sedentary behaviour have all been investigated individually or in combination as risk factors for obesity (Muecke et al 1992). However, clinical and epidemiological research strongly points to the importance

of regular physical activity to prevent obesity (Haskell et al 1992; Pate et al 1995; O'Loughlin et al 2000). In addition to its impact on obesity, physical activity promotes optimal growth and development in children and adolescents. It can help prevent short-term health problems and may prevent long-term chronic health problems such as obesity, cancer, and cardiovascular disease (Story et al 1999). Conversely, physical inactivity can increase overweight and obesity in adolescents.

One important area of research aims to identify factors that influence physical activity behaviour. Currently, studies have investigated environmental factors that affect behaviour. Environmental factors include those related to the environments in which people live and work. These factors are those present in the physical and social environment to which the individual is exposed repeatedly (Sallis et al 1992a). Social environmental factors include the influences of family and peers. Physical environmental factors include those of the physical environment, such as access to parks and gyms. Subgroups of social and physical environmental factors include those that are cultural, economical, and political. The presence or absence of social and physical environmental factors is hypothesized to influence behaviour and thus health.

An ideal place to study social and physical environmental factors that influence children is the school. Schools represent an ideal milieu in which to address health promotion needs of children and youth (McGinnis & McGraw 1991) and to implement interventions to promote change. Adolescents spend many of their waking hours during the week at school and school policies and environments can influence adolescent behaviours. For example, school policies may limit initiation of tobacco use among adolescents (Pinilla

2002). Availability of healthy choices at the cafeteria food can be a determinant of food selection (Lytle et al 2002; Shannon et al 2002). Easy access to sports equipment can promote physical activity (Sallis 2001). This study will examine how the removal of positive environmental factors affects adolescent behaviour.

As part of the McGill University Study on the Natural History of Nicotine Dependence In Teens, data on physical activity are collected every 3-4 months during the school year from 1999-2004 among students initially aged 12-13 years in Montreal, Canada. During the course of this prospective study, a labour dispute between Public School Boards in the Montreal area and the teachers' unions resulted in teachers stopping to supervise extracurricular activities, including interschool sports competitions, intramural sports activities, and special events involving physical activity. The objective of this study is to identify the effects of this ban on extracurricular sports activities by teachers on the level of physical activity of adolescents.

2. Review of the Literature

The following is a general overview of the literature on physical activity in youth. First, definitions are presented to distinguish between physical activity and related terms. Next, the patterns and prevalence of physical activity in children and adolescents are described. Third, theoretical frameworks that describe how healthy behaviours are influenced and changed are presented to situate the importance of environmental factors in health behaviours. Studies highlighting the influence of environmental factors on physical activity are then reviewed. Finally, issues concerning the measurement of physical activity in children and adolescents are addressed.

2.1 Definitions of Physical activity, Physical Fitness and Exercise

Physical activity, and related terms such as *exercise* and *physical fitness* are often used interchangeably, even though they represent different concepts. *Physical activity* has been defined as "any bodily movement produced by skeletal muscles that results in energy expenditure" (Casperson et al 1985). Physical activity is a type of health behaviour. Outcomes of physical activity include increased energy expenditure and elevated cardio-respiratory function. *Exercise* is a specific type of physical activity that has been defined as planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness. It may be seen as purposeful and volitional (Casperson et al 1985). *Physical fitness is* a set of characteristics including cardiorespiratory endurance, muscular strength, muscle definition, body composition, and flexibility or related skills such as balance, speed, power, and coordination), that relate to

the ability to perform physical activities (Casperson et al 1985). Improved *physical fitness* may result from chronic physical activity and/or exercise. Although physical activity and physical fitness are related, some researchers have suggested that fitness, and not physical activity may be genetically determined, and that physical activity may be a more important factor in decreasing the risk of Cardiovascular disease (CVD) than physical fitness (Jenner et al 1992; Riddoch et al 1991).

Health Canada (1999) defines a person aged 12-24 as being active if he or she expends $\geq$3.0 kcal/kg/day. Regular physical activity is defined as performing $\geq$12 activities per month. These are recommendations for achieving optimal health benefits from leading a physically active lifestyle. This is beneficial to the well being of youth by lowering the risk for chronic health problems such as CVD and Type II diabetes. For this reason, the prevalence of physical inactivity amongst youth is of concern to health professionals.

2.2 Prevalence and patterns of physical activity in youth

Table 1 summarizes reports that describe the frequency of physical activity among children and adolescents. For each study, a description of the population, the method of assessment of physical activity and the main findings, are presented.

Although the study populations and methodologies differ, certain consistent patterns emerge. First, the prevalence of inactivity is high, ranging from 11-40%. Boys are generally more physically active than girls and they participate in more vigorous physical activity. From early adolescence (approximately 11 years old) onwards, there is a steady

decline in levels of physical activity and the declines seem to be much steeper in girls. There is some indication that ethnicity relates to physical activity. Asian and Hispanic youth are identified as having lower physical activity levels. Black children were reported as having both higher and lower levels of physical activity. The results regarding socio-economic status are not consistent. Some studies observed an association between low socio-economic status and physical inactivity, although others did not observe this relationship. Overall, these studies indicate that a significant proportion of youth are not meeting physical activity levels recommended by health professionals, which is 30 minutes of activity of moderate intensity on all days of the week for all people over the age of two years (US Surgeon General Report 1996).

Table 1 Summary of reports describing the prevalence and patterns of physical activity in youth.			
Investigator	Study Population	Methods/Physical Activity Indicator	Key Findings
Wolf et al 1993 (USA)	552 girls in grades 5-12	• Godin-Shepard PA Survey (reported frequency of mild, moderate and strenuous exercise in past week) • Indicator: total exercise score after weighting frequency by estimated intensity. 2000 goal for strenuous activity, 3 or more times/week for 15 minutes or more	• 36.4% of girls met goal • Asian subjects were least active, followed by Hispanics, and Black subjects. • Age-related decrease in PA level
Pratt et al 1999, a review (USA)	Various age groups of young people in grades 9-12. 16,262 questionnaires completed in 151 schools	• Youth Risk Behaviour Survey • Indicator: vigorous PA; participate in ≥3 or more days during past week that made them sweat and breathe hard. Moderate physical activity; ≥5 sessions per week of any activity and that the total activity time ≥150 min. Inactive; no reported leisure-time activity during the past month.	• 63.8% of students reported participating in vigorous PA for at least 20 min • Boys (72.3%), girls (53.5%), whites (66.8%), blacks (53.9%), Hispanics (60.4%) • Age-related decrease in PA
Zakarian et al 1994 (USA)	2214 9th and 11th grade students from a low SES Minority population	• Self-administered questionnaires • "How often do you do physical exercise when not at school for at least 20 min without stopping?" • Indicator: Active if participating in vigourous exercise ≥3 times/week	• 11% did not participate in vigorous exercise • Males and 9th graders more likely to participate in vigorous activity than girls and 11th graders
Sallis et al 1996 (USA)	1871 9th and 11th grade high school students in San Diego	• In-class self-administered questionnaires • 3 PA measures: non-school activity, frequency and duration of participation in 25 activities during past 2 wks, participation in 9 school sports.	• Boys frequency 41% higher than girls in participation in vigorous exercise • Times/week of vigorous activity out of school, males, 3.8 and females, 2.5 (p=0.001)
Simons-Morton et al 1997 (USA)	2410 males and females in grade 3	• One-on-one personal interview • Assessed previous day physical activity • MVPA minutes were summed • Indicator: 60 min of MVPA and 30 min of MVPA	• Males (mean): 97.1 min of MVPA, Females (mean): 82.6 min of MVPA • 12.8% reported 30 or fewer daily min, 36.6% reported 60 or fewer min of MVPA • Blacks reported more MVPA than white or Hispanic students

Table 1 Summary of reports describing the prevalence and patterns of physical activity among youth.			
Investigator	Study Population	Methods/Physical Activity Indicator	Key Findings
Health Canada, 1999 (Canada)	Youth and Young Adults aged 12 to 24	• National Population Health Survey, 1996/97 • Indicator: self reported monthly frequency of physical activities lasting more than 15 minutes per occasion. Regular:≥12 times per month; Occasional: 4-11 times per month; Infrequent:0-3 times per month	• 69% reported regular LTPA • 18% occasional • 13% infrequent
Gordon-Larsen, 1999 (USA)	>14,000 adolescents in grades 7 to 12, comprised of 3135 blacks, 2446 Hispanics, 976 Asians	• 1996 National Longitudinal Study of Adolescent Health, questionnaires • asked about the times per week spent engaged in various physical activities, each activity grouping was assigned an MET value • Indicators: physically active if ≥5 MVPA per week, 5-8 metabolic equivalents	• Physical activity is lowest for female and minority adolescents • 33% of the adolescents reported ≥ 5 MVPA • Ethnic differences were greater among females • Lowest PA found for non-Hispanic black and Asian females • Participation in MVPA decreases with age in all groups
O'Loughlin et al, 1999	2285 students aged 9-13 in all 130 grade 4 to 6 classes	• Self-report 7-day recall adapted from the Weekly Activity Checklist • A frequency score was computed for each student by summing the total number of activities across the 7 days • Indicator: students were classified as inactive if scores were six or less.	• Prevalence of inactivity was higher among girls (24.4%) than boys (20.5%) • Asian children of both sexes were less active than children of other family origins
Casperson et al, 2000 (USA)	10,645 male and female respondents ages 12-21	• National Health Interview Survey, using 1992 Youth Risk Behaviour Survey supplement and 1991 Health Promotion/Disease Prevention supplement • Indicators: Physical inactivity-no participation in vigorous or moderate physical activity; Regular, sustained, light to moderate- 5 or more d/wk and 30 or more min/occasion of walking or bicycling; Regular, vigorous-3 or more d/wk of running, jogging, or swimming	• Adolescent males were 11.3 percentage points higher in physical activity than females • Regular physical and strengthening activity patterns declined from 12 through 21

Table 1 Summary of reports describing the prevalence and patterns of physical activity among youth.

Investigator	Study Population	Methods/Physical Activity Indicator	Key Findings
Kimm et al, 2000 (USA)	2379 girls (1213 black, 1166 white) followed from ages 9-10 yr to 18-19 yr in a multi-centre study	• 3-d activity diary (AD) and a habitual activity patterns questionnaire (HAQ), MET scores were derived for each activity and a total MET/day (diary) or MET/week were calculated (questionnaire)	• Steep decline from baseline to year 10 • AD scores: 446.8 to 292.1 MET min/day • 29.3 to 4.9 MET times/week
Bradley et al, 2000 (USA)	656 subjects from 21 elementary schools, grades 3-10, 50.5% were female	• Self-administered questionnaire, indicate the number of times per week they usually did specific activities • Asked to report what 3 activities spent the most time doing • Each activity was assigned a MET level: 2, 3, 5, or 8 • Indicator: if subject reported at least two or three activities with METs of 5 or 8, then was considered "active"	• Girls more often reported sedentary activities overall • Sedentary activities more frequent with increasing age • African-American girls reported fewer vigorous activities than Caucasian or other race girls
Armstrong et al, 2000 (UK)	11-13 year olds age 11: 104 boys, 98 girls	• Continuous heart rate monitoring, 9am to 9pm over 3 school days of the same week • Indicator: moderate activity 140 bpm, vigorous activity 160 bpm sustained for 10 or 20 min	• Both indicators declined with age • % of boys that accumulated 30min/d with heart rate above 139bpm: year 1-80%, year 2- 77%, year 3-60% • % of girls that accumulated 30min/d with heart rate above 139bpm: year 1-75%, year 2- 70%, year 3-40%
Van Mechelen et al, 2000 (the Netherlands)	98 Females 83 males, interviewed at 13, 14, 15, 16, 21, 27	• Semi-structured interview to assess for organized sports, nonorganized sports, transportation, work related activities, divided into moderate, vigorous, and very vigorous physical activity, based on MET • Indicator: Habitual Physical Activity was characterized as exceeding 4 METs	• For total weighted activity score MET/wk, a significant decrease was found for both male (42%) and female subjects (17%)
Hoefer et al, 2001 (USA)	712 boys 966 girls, aged 13	• Self-administered 7d student recall checklist of 41 activities • Summary variable was out-of-school PA: kcal/kg/wk	• Boys participated in more weekly PA than girls • Boys PA 136.28±125.6 kcal/kg/wk vs girls' PA 125.86±114.29 kcal/kg/wk; p=0.001)

Table 1 Summary of reports describing the prevalence and patterns of physical activity among youth.

Investigator	Study Population	Methods/Physical Activity Indicator	Key Findings
Krisjansdottir & Vilhjalmsson, 2001 (Iceland)	Representative sample of 3270 11-16 year olds	• Self-administered survey of health related behaviours • Indicator: regular leisure time strenuous exercise: reported if engaging in sport or exercise with exertion at least 3 times/week for an average of at least 20 min per session. Leisure time physically active: if participate in leisure time sports or activities at least 3 times a week	• Only 39% were physically active during leisure time • 29% engaged in regular leisure time strenuous exercise • girls were less leisure time physically active and less involved in leisure time strenuous exercise • PA decreased with age, especially after early adolescence • upper-class students were more physically active than working class
Barnett et al, 2002 (Canada)	3432 grade 4 and 5 students aged 9 to 12	• Same children as O'Loughlin et al (1999) • Self-report 7-day recall adapted from the Weekly Activity Checklist • A frequency score was computed for each student by summing the total number of activities across the 7 days • Indicator: students were classified as inactive if score was 6 or less	• Boys: Year 1 cohort, 13.8% inactive, 62.2% moderately active, 24.1% very active. Year 2 cohort, 17.4% inactive, 61.5% moderately active, and 21.1% very active • Girls: Year 1 cohort, 24.5% inactive, 62.1% moderately active, 13.4% very active. Year 2 cohort, girls: 28.7% inactive, 59.9% moderately active, 11.4% very active

2.3 Theoretical Frameworks for Behaviour Change

This thesis investigates how the environment can change or influence behaviour. Since there has been an alarming increase in physical inactivity concurrent with a rising prevalence of overweight and obesity, it is important that researchers and practitioners understand what influences this behaviour. Numerous theoretical models attempt to define what influences people's behaviour. However, not all models address the environment. The following paragraphs describe selected theoretical models including the Stages of Change Model, the Health Belief Model, the Social Cognitive Theory, and the Socio-Ecological Approach Model. Their strengths and weaknesses regarding the relation between the environment and behaviour will be discussed.

2.3.1. Stages of Change

The Stages of Change Model, also known as the Transtheoretical Model (Prochaska et al 1982), was originally developed to increase understanding of addictive behaviours such as smoking, drinking, or drug abuse, but it may also be applicable to the study of exercise behaviour change Costakis et al (1999).

According to the Transtheoretical Model, people who intentionally change habitual behaviours do not do so all at once, but through a series of five stages: pre-contemplation, contemplation, preparation, action, and maintenance (Prochaska et al 1982). Because different psychological processes are relevant at each of the five stages, people at different stages of change require different interventions, information, and types of

support. Interventions are more likely to be effective when they are tailored to the individual's stage of change.

However, the model does not address social and physical environmental influences on behaviour. In addition, the model does not take into account how family, peers, mentors and co-workers affect behaviour.

2.3.2. Health Belief Model

Rosenstock (1966) developed the Health Belief Model (HBM), which describes how perceptions of vulnerability and beliefs about disease influence behaviour. More specifically, the model suggests that an individual's behaviour is influenced by psychosocial factors and social cues that influence risk behaviours. Individuals have a set of personal beliefs about disease and illness that mediate the perception of threat, thus influencing the chances of an individual taking action to avoid illness. This set of beliefs is shaped by experiences and are influenced by the beliefs of family, peers, role models, and friends. Based on this model, if people feel vulnerable towards illnesses such as heart disease and hypertension and are told that high levels of physical inactivity will increase the chances of these health conditions, they will more likely adopt behaviour that will increase their physical activity.

The Health Belief Model is based on the assumption that people make health-related decisions based on beliefs about the seriousness of disease (Rice 1999). For example,

someone who believes that death from type II diabetes is a likely outcome of inactivity might be motivated to be more active.

Another assumption is that each person has a feeling or perception of his/her own susceptibility to illness (Rice 1999) and that their behaviour is influenced by their desire to avoid illness. Someone who is concerned about their physical inactivity levels may try to increase their physical activity by joining a gym, sports team, and decreasing the amount of time watching television. In contrast, others may feel that they are immune to illness and will expend little effort to avoid risks. For instance, people who do not feel susceptible to the effects of a sedentary lifestyle might be less likely to engage in interventions designed to increase physical activity.

The final assumption of the Health Belief model is that each person has beliefs about the benefits of implementing action to avoid or to fight disease (Rice 1999), and that there are costs and barriers to action. For example, an individual may believe that being physically inactive will lead to disease, but is not willing to implement recommended actions to reverse the effects of a sedentary lifestyle because they find the barriers to being physically active too challenging.

These three assumptions highlight the diversity in cognitive processes between people. People have differing perceptions of health risk and the risk factors, such as physical inactivity, that may be associated with health risk. There are varied ways in which people react to health risks. For example, they can choose to act upon these threats or do nothing. The HBM recognizes the social factors that affect our cognitive processes

because people use advice from family, experts, and peers to shape their thinking and decision-making. However, the model does not address the reasons why some people take health concerns more seriously than others. Rice (1999) suggests that the model is more useful to explain the behaviour of educated people. Furthermore, although the model accounts for social environmental influences on behaviour, it does not account for physical environmental factors.

2.3.3. The Social Cognitive Theory (SCT)

The Social Cognitive Theory (Bandura 1977, 1989), which was originally named Social Learning Theory, is a psychosocial conceptual framework that describes the reciprocal relationships among behaviour, personal factors, and the environment. It describes behaviour in the context of an objective environment that is both physical and social. For example, the model posits that an individual's physical activity level is influenced by the physical environment (i.e. the presence of a bike path, swimming pool, or basketball court will encourage physical activity), and by the social environment (i.e. support from friends, family, and co-workers).

Bandura (1989) links a personal factor, self-efficacy, to an individual's behaviour. He states that every time we engage in a behaviour there are good or bad consequences. Rewards, positive experiences, occur when we engage in appropriate behaviour and punishments, negative experiences, occur when our behaviour is inappropriate. Outcome expectations are identified when individuals can anticipate which behaviours will lead to which outcomes. Outcome expectations develop as humans mature. Efficacy expectation is the belief that one can successfully complete the behaviour that will achieve the

expected outcome. Bandura (1989) stated that, "expectations of personal mastery affect both initiation and persistence of coping behaviour. The strength of people's convictions in their own effectiveness is likely to affect whether they will even try to cope with given situations" (Bandura p. 193 1977). Low self-efficacy is the belief that one has low capability or skill to manage an event or task (Bandura 1977) and therefore the behaviour is less likely to be performed. In contrast, individuals with high self-efficacy are more likely to view tasks to be harmless, and are therefore more likely to perform them. Thus, as an individual's self-efficacy increases, the more likely healthy behaviour will be performed (Clark & Dodge 1999). This model would hold that intervention programs should attempt to increase individuals' self-efficacy related to specific behaviours in order to increase their ability to perform a healthy behaviour.

Clark & Dodge (1999) have used self-efficacy to create a model for disease management, which can also be applied to encouraging the adoption of a healthy behaviour. According to the model, one draws from intrapersonal resources, such as attitudes and beliefs, and from external resources, such as information and advice from experts and role models. The individual then regulates his or her behaviour, makes judgments using criteria set by experts and role models and then tries new behaviours. If the outcome is positive, then it is likely that the action will be repeated. If an individual feels confident that he or she has the capability to repeat the performance, it is more likely that the behaviour will be adopted (Clark & Dodge 1999). This self-regulation process allows people to identify strategies that are successful in changing their behaviour.

The social and physical environment can influence self-efficacy. Peer and family advice, encouragement, and modelling may influence self-efficacy positively or negatively. An individual having a friend to participate in physical activities with, will more likely have an increased self-efficacy to be physically active. Conversely, an individual who is surrounded by people who are not physically active or are discouraging to be physically active may have a decreased self-efficacy and may not adopt a physically active lifestyle. In the same manner, physical environmental factors may affect self-efficacy. Easy access to equipment, parks, and facilities in a safe and welcoming atmosphere can increase one's self-efficacy, thus increasing the likelihood of adopting the behaviour. Limited access to equipment, parks, and facilities in a dangerous and inhospitable environment may decrease one's self-efficacy, thus leading to the likelihood of not being physically active.

The Social Cognitive Theory has proved to be extremely important in explaining behaviour change. It emphasizes that advice from peers and experts, which is part of the social environment, needs to be shaped to increase the probability of success of behavioural change. Public health professionals have used this model to develop research on health behaviour and to implement interventions to promote healthy behaviours. SCT emphasizes the need to address physical and social environmental cues.

2.3.4. Socio-Ecological Approach

The Social-Ecological Approach is another framework that describes the relationship between environmental and behavioural determinants of health (Green & Kreuter 1999), although it does not address personal factors. It is based on the interrelations between

human beings and their environments (Green et al 1996). More specifically, social ecology emphasizes the social, institutional, and cultural contexts of people-environment relations (Green & Kreuter 1999).

This model assumes that health is shaped by environmental subsystems including the family, community, workplace, cultural beliefs and traditions, economics, the physical world, and social relationships. These subsystems must therefore be addressed when developing health promotion interventions. Thus, when using physical activity as an example, people cannot be physically active unless they are provided with the resources and opportunity to be physically active.

Green & Kreuter (1999) describe five implications of this model. First, changes in one system may cause negative or positive changes in another system. For example, government cutbacks to social funding can lead to a decrease in opportunity to pursue healthy lifestyles. Second, the model depicts the reciprocal relationship between behaviour and the environment such that the environment can affect people's actions, and the environment can be shaped by the actions of individuals and communities. Third people can behave differently in different environments since resources vary in different environments. For example, a wealthy community has the resources to build bike paths and community centres that influence people to be more physically active. However, the same individuals might not be active if they lived in a poorer community in which opportunities to be physically active are not available. Fourth, health promotion is most effective when developed at the community level, since interventions need to be specific to environments. Local concerns, traditions, needs and constraints can be addressed

much more easily at the community level (Green & Kreuter 1999). Fifth, efforts must be targeted at multiple levels of the social-ecological systems in which people live. Examples of these levels include health, education, welfare, commerce, and transportation (Green et al 1996).

While the model can be used to develop and implement behaviour change interventions, critics suggest that it promotes the implementation of "band aid" solutions that are very easy and affordable (i.e. placing signs). Hancock (1977), for example, emphasized that the underlying and deeper causes of unhealthy behaviours need to be addressed including poverty, racism, sexism, and inadequate health care.

2.3.5. Mandala of Health

The Mandala is a term originating from Buddhism and Hinduism and used in meditation, that describes geometric shapes symbolic of the universe. The Mandala of Health is another ecological model that is complex, holistic, multidimensional and interactive, and which integrates the natural and social sciences. The principal difference between this model and those described previously is that health, not behaviour, is the main outcome, and behaviour is depicted as one of the main determinants of health.

According to this model, the individual (body, spirit, and mind) is at the centre. The individual is not in isolation, but is within a family that contributes to establishing health values, attitudes, and habits that influence health. The family acts as an important mediating factor between the individual and social institutions (Berger & Neuhaus 1977).

There are four main factors that affect the health of the individual. Human biology comprises the genetic traits and dispositions, and the biochemical, physiologic, and anatomic state of the individual and his or her family. Personal behaviour includes physical activity, eating habits, smoking and drinking. The psychosocial environment includes socio-economic status, exposure to advertising, and social support systems. The physical environment includes accessibility to affordable housing, clean air and drinking water, and safe work environments.

This model illustrates that behaviour is only one determinant of health, and that factors influencing health, influence each other by reinforcing or negating one another. For example, behaviour influences and is influenced by the physical environment. Physical activity such as walking or jogging may be encouraged by accessibility to safe parks.

Another important aspect of the model is that it is dynamic in that factors in the model act in two directions (Hancock 1985). The health of individuals is influenced by the factors in the model and person or people can influence each factor. For example, jogging in the park can affect the individual. In turn, individuals can act individually or together to change the parks to make it more accessible and safe.

There are several implications of this model with respect to high-risk populations. First, one or more factors can influence someone to be at high risk for an illness. For instance, whether or not a person smokes is influenced by family members' smoking, peer pressure, and advertising (Hancock 1985). Thus, members of high-risk populations may share some or all of these factors. Second, solutions to health problems are not simple.

Addressing only one aspect of a health issue, such as the biological factor, will not be successful in changing health behaviours. For example, wearing a nicotine patch addresses only the biological aspect of nicotine addiction. However, the individual may need social support from friends and might benefit from being in physical environments where smoking is not allowed.

Similar to the other theoretical models, there are negative and positive aspects of the Mandala of Health. It does address numerous factors that influence health and behaviour, and it does it take the complexity, interactive and dynamic nature of human behaviour and health into account. However, this same complexity may cause problems - it may be difficult to test hypotheses that account for this diversity due to limited resources.

These theoretical frameworks are very useful in explaining behaviour and behaviour change, and researchers have used these models to test hypotheses. Numerous studies have investigated the importance of social (ie. peer, teacher, coach, and parental modelling) and physical environmental (ie. access to play areas, such as soccer fields and basketball courts, and equipment such as soccer balls and basketballs) factors on physical activity behaviour of adolescents. In this thesis, the effect of a loss in an environmental factor through a ban on extracurricular sports activities, on adolescent physical activity will be explored.

2.4 Environmental determinants of physical activity

Most work to date investigating the influences of the social and physical environment on levels of physical activity in youth have used cross-sectional study designs. As a result, these studies can only show associations with physical activity not causation. Physical environmental cues that promote physical activity have been investigated in adults. For example, Coleman & Gonzalez (2001) found that signs promoting the use of stairs in buildings increased their use. Similarly, Boutelle et al (2001) reported that using signs that read, "Take the stairs for your health" or artwork and music to increase the aesthetic qualities of stairwells increased use of stairs. Brownson et al (2001) reported an association between access to parks, indoor gyms, and treadmills and physical activity, when controlling for SES. More specifically, people who had access to parks were more likely to be physically active.

Table 2 describes the results of studies investigating the influence of the social and physical environmental factors on physical activity levels of children and adolescents. Only studies with at least one potential predictor in common with this thesis were included (Most studies reviewed are cross-sectional). These studies emphasize that social and physical environmental factors may influence behaviour or vice versa.

Table 2 Summary of studies investigating environmental correlates and determinants of physical activity in youth.

Author	Age and Sample Size	Methods/Physical Activity Indicator	Key Findings
Perusse et al, 1989 Quebec, Canada Cross-Sectional	1,610 subjects from 375 families	• 3 d record, including 1 weekend day • each day was divided in 96 periods of 15 min • the subjects were asked to note the energy expenditure of the dominant activity scale 1-9 • indicators: mean sum of the 3d and the number of activities rated from 1 to 9 was counted for each day (categories: ≥ 1.2 kcal/kg/15min)	• Correlation between parental modelling or parental physical activity with adolescent physical activity, r=0.16, p≤ 0.01 • Correlation between full siblings, r=0.42, p≤ 0.01 • Indicates relationship is stronger between relatives of the same generation
Moore et al, 1991 Framingham Study (USA) Cross-sectional	100 children 4-7yrs olds and their mothers	• Caltrac accelerometer to assess PA of both children and parents for 2 periods of 5 consecutive days 6 months apart • Indicator: categorized as active or inactive on the basis of if their counts were above or below the median for their generation and sex-specific distribution	• Children of active mothers were 2.0 (95% C.I.= 0.9, 4.5) times as likely to be active • Children of two active parents are 5.8 (95% C.I.=1.9, 17.4) times as likely to be active.
Sallis et al, 1992b USA Cross-sectional	9-yr olds 148 girls 149 boys 84% were white	• For children: 1 d checklist self-administered questionnaire and the Caltrac accelerometer • For parents: a self-administered questionnaire • METS were calculated via the checklist and accumulated activity counts were calculated via the caltrac	• Facilitating participation in organized physical sports and activities is a correlate of PA • Girls: Parent transported child to play predicted for physical activity, ß=0.16, p=0.02 • Boys: Parent transported child to play predicted an increase in PA measured, ß=0.16, p=0.06 • Boys: parent played with child correlated for PA, ß=0.22, p=0.01

Table 3 Summary of studies investigating environmental correlates and determinants of physical activity in youth.

Author	Age and Sample Size	Methods/Physical Activity Indicator	Key Findings
Stucky-Ropp & DiLorenzo, 1993 USA Cross-sectional	242 5th and 6th grade children 50% males	• Children and Parent PA Questionnaire • a precoded activities list was used to assign a MET value per activity. A sum of minutes spent only on vigorous activity was calculated per day. A mean of 3d was determined	• Youth influenced by socialized family variables. Families serve as learning environments that may influence each other's behaviour • Boys: friends and family modelling/support had a ß=0.08, p=0001 increase in PA • Girls: Mother's family support had a ß=0.57, p=0.006 increase in PA
Gentle et al, 1994 Cross-sectional	382 14 and 15 yr olds	• School-based questionnaire • A level of exercise score for in-school and out-of-school activities was computed to produce an overall score • Indicators: High exerciser, those in the highest quartile of overall score	• Support from peers and coaches are correlated with physical activity • 47% of high exercisers and 18% of low exercisers had family encouragement to exercise, $p<0.01$ • 86% of high exercisers and 27% of low exercisers encourage adults in the family to exercise $p<0.01$
Pate et al 1996a USA Cross-sectional	12-15, 16-18 yr olds 2,652 high active 1,641 low active	• Questionnaire; how many of the past 14d have you done at least 20 min of hard exercise that made you breathe heavily, and done at least 20 min of light exercise that made you breathe a little faster • Indicator: High-active: reported ≥ 6d of hard and ≥ 6d of light exercise. Low-active: reported fewer than 2d of light and no days of hard were classified as low active	• Percentage of students reporting participation in school sports was considerably higher in the high-active group than in the low-active group (60.2% vs. 21.8%)

Table 2 Summary of studies investigating environmental correlates and determinants of physical activity in youth.			
Author	Age and Sample Size	Methods/Physical Activity Indicator	Key Findings
Trost et al 1999 Cross-sectional	198 6th grade students 52% female mean age=11.4±0.6 yrs	• Computer Science and Applications Inc. (CSA) activity monitor • Subjects wore monitors for 7d consecutively • Usual MPA and VPA were calculated using the counts from the 7d	• In boys only, involvement in community PA organizations were predictors of MPA and VPA • Pearson-Product-Moment correlation coefficients: Community Organizations and MPA (0.26, p=0.01) and VPA (0.28, p=0.04)
O'Loughlin et al, 1999 Cross-sectional	2285 students aged 9-13 in all 130 grade 4 to 6 classes	• Self-report 7-day recall adapted from the Weekly Activity Checklist • A score was computed for each student by summing the total number of activities across the 7 days • Indicator: inactive if score was ≤6	• Participation in sports at and outside of school and those with more parent support were more active • Boys and girls who did not participate in organized sports had ORs around 2.0 for being physically inactive, 95% C.I.
Dale et al 2000 USA Cross-over trial	40 girls and 38 boys 3rd and 4th grade	• Children were active for 2d and restricted for the next 2d • CSA accelerometer was worn on active and restrictive days in the morning until bedtime • Movement counts/min were summed for the whole day	• Children do not compensate for inactivity during the school day • On Active day, mean counts/min (SD): Active-445 (284), Restricted day 187(121), p=0.002 • Avg movement counts/min were higher after school following the active days (525) vs the restricted day (186)
Hoefer et al, 2001 (USA) Cross-sectional	712 boys 966 girls, aged 13 from 9 districts in Southern California	• Self-administered 7d student recall checklist of 41 activities • Summary variable was out-of-school PA: kcal/kg/wk • Parental provision of transportation per week (0 to 7)	• Parent transportation for PA contributed to girls' PA (p<0.01) and their participation in sports/activity lessons (p<0.01) • Transportation contributed marginally (p=0.06) to boys' total PA, but significantly to their participation in sports/activity lessons (p=0.001)

Table 2 Summary of studies investigating environmental correlates and determinants of physical activity in youth.

Author	Age and Sample Size	Methods/Physical Activity Indicator	Key Findings
Sallis et al, 2001 USA Cross-sectional	24 public middle schools grades: 6-8 1081 students from San Diego Ca	• SOPLAY (System for Observing Play and Leisure Activity in Youth) was used to code the number of participants and their activity levels before school, during lunch, and after school • Physical activity was coded as sedentary, walking, or very active • Accessibility of area, presence of supervision, organized activities, and equipment were recorded	• School environments with high levels of teacher supervision, basketball hoops, tennis courts, baseball diamonds and football or soccer goals were correlated with physical activity • Environmental characteristics explained 42% of the variance in the proportion of girls who were physically active and 59% of the variance for boys
Barnett et al, 2002 (Canada) Longitudinal	3432 grade 4 and 5 students aged 9 to 12	• Same sample as O'Loughlin (1999) • Self-report 7-day recall adapted from the Weekly Activity Checklist • A frequency score was computed for each student by summing the total number of activities across 7 days • Indicator: inactive if score was ≤ 6	• In boys, 1 yr predictor for decline in PA to inactive status was no participation in school teams (OR=1.81, 95% CI=0.93-3.55) • In girls, 2 yr predictors for decline to inactive status was no participation in school teams (OR=2.14, 95% CI=0.92-5.00)
Lee et al, 2002 (USA) Cross-sectional	8165 youths aged 12 to 21 years	• The Youth Risk Behaviour Survey. "On how many of the last 7 days did you participate in any sports or exercise that made you sweat or breathe hard for at least 20 min" • 1990 US census	• Low socio-economic status was associated with less physical activity. • <3750$ income: ß=-031, p<0.01 • 3750-7500$: ß=-0.30, p<0.01

Cross-sectional studies suggest that parental role modelling, supervision of organized sports activities, parental transportation to activities, support from peers and family members, participation in organized sports, and access to play areas such as basketball courts, are significant positive correlates of physical activity. Longitudinal studies suggest that participation in school and out of school sports, parent encouragement to be physically active, and parent providing transportation to sports activities are predictors for physical activity.

A recent cross-over trial illustrates the importance of extracurricular activities during the school day. Physical activity levels among children in grade 4 were measured for four consecutive days. Two days were active and students were permitted to participate in outdoor recess and physical education class. Two days were restricted and the participants spent their recess time indoors at a computer terminal and no physical education class was scheduled. Accelerometers were used to assess activity levels during active and inactive days. Dale et al (2000) determined that subjects did not compensate for days during which activity within school was restricted. More specifically children did not compensate for a sedentary school day by increasing their levels of physical activity after school. Children's after school activity count was higher on active days (525 counts per min) than on restricted days (186 counts per min) (Dale et al 2000). Thus, being active during school promotes further activity after school.

School environments may promote physical activity because peer and teacher support is present during school activities (Buhrmester & Furhman 1987). Sallis et al (2001) established that school environments with high levels of teacher supervision and

numerous play areas were positively correlated with physical activity. Therefore, physical environmental cues such as playground equipment, park space, basketball courts, and soccer fields present at school and accessed during recess could encourage physical activity at and after school.

Although cross-sectional studies previously suggest that environmental factors affect physical activity, longitudinal research is needed to establish the role of these factors as determinants of physical activity.

2.5 Measurement of Physical Activity

The methodologies utilised to measure physical activity differ. There are strengths and weaknesses that can affect the inferences drawn from these studies. These assessment tools and their advantages and disadvantages will now be discussed.

It is known that there is a lack of precise, well-validated measures of physical activity, behaviour and activity related energy expenditure for youth, ie. "The gold standard," which is a serious impediment to research in this area (Pate 1993). A measure of energy expenditure against which all other measures of energy expenditure could be validated is needed. Assessment tools that do exist are classified into three groups: direct observation, motion sensors and heart rate monitors, and self-report techniques, each with advantages and disadvantages. Which instrument is the best suited to a specific context is often determined by the study design.

Observational Measures

For young children, observational measures are usually most relevant. Observation of physical activity is manually recorded onto a coding form or entered in a computer file (Pate, 1993). Physical activity is then rated using categories based on intensity. Advantages of this method include increased face validity (i.e. measuring what one wants to measure). In addition, this technique is highly reliable. "Reported inter-observer agreements have been in the range of 84 to 98% with Kappa statistics that have approximated 0.90 (McKenzie 1991)", indicating that well-trained observers are likely to observe and record similar results. Disadvantages include that significant effort and resources are needed to train the observers. These techniques are very costly since observers need to be paid for their time when observing the children.

Thus, observation methods should be used for small sample sizes. Observing teenagers may be inappropriate and difficult because adolescents are often unlikely to want to be observed under close supervision and in addition are unlikely to remain in a closed environment such as a classroom for extended time periods.

Motion Sensors and Heart Rate Monitors

The most widely used motion sensor and heart rate monitor currently is the Caltrac accelerometer (Pate 1993). This is a small device worn at the waist, which includes a lightweight transducer that is sensitive to vertical acceleration. The Caltrac can estimate the amount of energy expenditure. Physical activity is recorded as "counts" in a research setting (Pate 1993). Correlation coefficients range from 0.35 to 0.62 when the Caltrac is validated against direct observation methods (Freedson 1991), and reliability coefficients

range from 0.30 to 0.79 (Freedson 1991). Heart rate monitors are most useful as a measure of physical activity when "calibrated" to each individual subject's heart rate, which varies with factors such as body size, age, and physical fitness.

Although motion sensors do not demonstrate high reliability, benefits include that observer recall subjectivity is eliminated, and the cost is limited. However, there is little information provided by motion sensors on physical activities engaged in and the association between physical activity and environmental factors (Pate 1993). Furthermore, breakdown and tampering with the device by the subject is possible. Caltrac accelerators are optimal for small sample sizes.

Self-Report

The most widely used method to measure physical activity in youth is the self-report (Pate 1993). These assessment tools are classified into four categories (Sallis 1991): (i) Self-administered recall tools require children to report their own activities on a prepared form, which have open or closed ended responses. This tool is very useful since it is inexpensive and therefore ideal for large cohort studies. Interview-administered recall questionnaires, which are useful for young children and adolescents who cannot complete a self-administered questionnaire, require well–trained interviewers to administer and facilitate a structured interview. Diaries instruct participants to code physical activity throughout the day in a diary format. Proxy reports are used for very young children who cannot complete self-administered questionnaires or diaries and thus call for parents, guardians, teachers or other adults to report the child's activity using any of the three previously mentioned methods. Variables developed from this type of questionnaire are

duration of exercise, frequency of participation in sports activities, and energy expenditure estimations (Pate 1993).

Table 3 lists the self-report measures of physical activity commonly used in studies with youth. This study is rare in that it was conducted to simultaneously assess test-retest reliabilities of 4 different common measures administered at a 3-day interval between Time 1 (Friday) and Time 2 (Monday) and to assess validity with a caltrac accelerometer (Sallis et al 1993). The investigators used a standard of acceptance of r=0.70 for reliability. Only the Weekly Activity Checklist was established as being acceptable. Furthermore, this assessment tool was the only weekly recall to be supported by validity correlations at both Time 1 and Time 2. The Weekly Activity Checklist was utilised to measure the physical activity levels of the students participating in the NDIT study. Moreover, Sallis et al's (1993) study is essential for this thesis.

Table 3 Self-report measures of physical activity in youth (Sallis et al 1993)

Name of Measure	List of Activities	15 Minute Continuous Activity Requirement	Instructions	Intraclass Reliability Correlation,r	Pearson Correlations with Caltrac Accelerometer, r
Yesterday Activity Checklist 1-Day	Yes	Yes	1. Think of activities that you did outside of school yesterday. 2. Check activities that you did for 15 minutes or more at one time.	0.60	Time 1: 0.33, $p<0.01$ Time 2: 0.22, $p<0.05$
Weekly Activity Sum 7-Days	Yes	Yes	1. For each activity that you did for 15 minutes or more at one time, write down how many times you did this activity before and after school (Monday-Friday). 2. Then write how many times you did the activity for 15 or more minutes on the weekends (Saturday-Sunday).	0.51	Time 1: 0.40, $p<0.01$ Time 2: 0.15, ns
Weekly Activity Checklist 7-Days	Yes	Yes	1. Think about the activities that you did outside of school during the past week-that means before or after school or on weekends. 2. For each activity you did for 15 minutes or more at one time, mark an X to show which day you did that activity.	0.74	Time 1: 0.34, $p<0.01$ Time 2: 0.26, $p<0.05$
7 Day Tally 7-Days	No	No	1. Mark an X by each day last week that you did an activity outside of school that was hard enough to make you get tired or breathe hard or sweat.	0.68	Time 1: 0.11, ns Time 2: -0.10, ns

2.6 Conclusion

There are very few longitudinal studies that investigate the physical and social environmental determinants of physical activity among youth. Studies to date suggest that school environments might shape, change or otherwise influence child and adolescent levels of physical activity. Access to equipment and play areas that are safe and supervised by teachers can increase physical activity. Modelling, encouragement, and support from peers, coaches, and parents also may influence youth physical activity. This current study will add to this knowledge base by exploiting a "natural" experiment in which an environmental influence, extracurricular activities, is removed in some schools and then later reinstated. We observed activity levels during this natural experiment and can quantify the effects of the loss of this environmental factor. As a result, enhanced understanding of the relationship between extracurricular activities and physical activity might lead to intervention strategies that can promote the maintenance of healthy levels of physical activity during adolescence.

Manuscript

Effect of a ban on extracurricular sports activities by secondary school teachers on physical activity levels of adolescents

3.1 Abstract

Objectives: To examine the effect of a teachers' ban on supervising sports-related extracurricular activities (ECAs), on levels of physical activity among adolescents.

Methods: The study population included 1264 grade 7 students (mean age 12.3 years at baseline) in a convenience sample of ten secondary schools in Montreal. Compliance by teachers with the ban was high in seven schools, and low in three schools. Data on students' levels of physical activity were collected in a 7-day recall at baseline when the ban was in effect, and again one year later after the ban had been lifted.

Results: Schools offered 18 (SD=5) ECAs on average, during a no ban school year. Students attending schools that strongly supported the ban (i.e., high implementation schools) were significantly more likely to increase their levels of physical activity after the ban was lifted, than students in low implementation schools (odds ratio (95% confidence interval)= 1.49 (1.16, 1.91) and 2.19 (1.80, 2.67) among boys and girls respectively).

Conclusion: These data suggest that a teachers' ban on sports-related ECAs was associated with a decrease in levels of physical activity of secondary school students. The impact of the ban was greater among girls than boys.

3.2 Introduction

Physical activity promotes optimal growth and development in children and adolescents, prevents short-term health problems, and over the lifespan, it may prevent long-term chronic diseases such as diabetes, cancers, and cardiovascular disease (Story 1999). Recent secular declines in levels of physical activity among children and adolescents (Centers for Disease Control 1994; Centers of Disease Control 1998; US Surgeon General Report 1996; Health Canada 1999; Alpert et al 1994) are of considerable concern because physical inactivity that develops early in life may track from childhood to adolescence and adulthood (Suter 1993; Pate et al 1996; Kuh et al 1992; Kelder et al 1994; Malina 1996; Telama et al 1996; Telama et al 1997). In addition, patterns of physical inactivity can be linked to the increasing prevalence of obesity and overweight among children and adolescents (Alpert 1994).

Girls are more likely to be physically inactive than boys (Health Canada 1999; O'Loughlin et al 1999; Bradley et al 2000; Hoefer et al 2001 & Barnett et al 2002), and the recent secular declines in physical activity have been much steeper among girls than boys (Gordon-Larsen 1999; Casperson et al 2000; Armstrong et al 2000 & Barnett 2002). Better understanding of the determinants of physical inactivity among youth and especially among girls is needed so that more effective preventative intervention can be designed.

While several recent studies suggest that social environmental factors such as parental and peer support are important determinants of physical activity (Sallis et al 2000; Stucky-Ropp et al 1993; Sallis et al 1992a; Sallis et al 1999a; Sallis et al 1999b; Hoefer et al 2001), few studies have investigated features of the physical environment as potential determinants of this behaviour (Dishman & Sallis 1994).

In particular, schools offer environments and opportunities that could influence youth physical activity behaviour. Sallis et al (2001) observed that levels of physical activity were positively correlated with school environments in which there were high levels of teacher supervision and adequate sports equipment and resources including basketball hoops, tennis courts, baseball diamonds and football and soccer goals. Barnett et al (2002) established that lack of participation in school sports predicted one-year declines in physical activity in boys and two-year declines in physical activity in girls. In addition, active students are more likely to participate in school sports than inactive students (Pate et al 1996a; O'Loughlin et al 1999). Dale et al (2000) determined that students did not compensate for a loss in opportunity to be physically active during the day, for example spending recess indoors at a computer terminal and not scheduling physical education class, by being more active after school. Overall, these studies suggest that schools are important milieus that provide important opportunities for youth to be physically active.

Over the last few years, labour disputes across Canada have resulted in the implementation of bans by schoolteachers on supervising extracurricular sports and other activities. During these bans, which can last as long as six months, teachers refuse to supervise sports activities outside the academic curriculum. The net result is that the

number of opportunities for students to be physically active at school is reduced considerably. There is some concern students might be negatively affected. However, no one has yet examined if and how bans on extracurricular sports activities at school affect levels of physical activity in youth.

As part of the McGill University Study on the Natural History of Nicotine Dependence in Teens (NDIT Study), data on levels of physical activity were collected prospectively from 1264 students attending ten secondary schools in the Montreal, Canada. During this ongoing six-year investigation, teachers in seven of the ten schools stopped supervising extracurricular sports activities during a 4-month period as a result of a labour dispute. As a consequence, many students had limited access to opportunities to be physically active at school during this time period.

When the NDIT Study began in 1999, teachers in seven of the ten study schools had stopped supervising sports-related extracurricular activities (ECAs). In schools where the ban was actively implemented (high implementation schools) the number of opportunities for students to be physically active at school was reduced considerably. The ban had little or no impact in three schools, because teachers in these schools did not implement the ban (low implementation schools). This difference in implementation was due to the schools being from different school boards. The ban was lifted in winter 2000 when the labour dispute was resolved. The objective of this study was to measure the effect of the ban on levels of physical activity among adolescents during this period.

3.3 Methods

Data for this analysis were drawn from the first year of data collected in the on-going NDIT study, a six year prospective investigation of the natural history of nicotine dependence. The study population included 1264 grade 7 students (56.2% of those eligible to participate), aged 12-13 years at baseline, in a convenience sample of ten secondary schools located in or near Montreal. A detailed description of the study methods has been previously published (O'Loughlin et al 2002a).

3.3.1 Study Variables

Data were collected in self-report questionnaires completed at school by students every 3-4 months during the school year (Appendix 1). Baseline data were collected between October 1999 and January 2000. In addition to questionnaire data, trained technicians measured height, weight and triceps and subscapular skinfold thickness biannually according to a standardized protocol (Evers & Hooper 1995).

Socio-demographic data included sex, age, language spoken at home, family composition, and parental education. Students provided the postal code for their home addresses, and data on average household income in specific postal codes were obtained from the 1996 Canada Census (Statistics Canada 1996). We coded season of completion of the questionnaire as fall or winter.

To obtain data on the number of sports-related ECAs offered in each study school, school principals or vice-principals completed a self-report questionnaire that collected data on intramural sports, extramural sports, and special events related to physical activity. A series of questions were used to collect data for a regular school year during which there was no ban on extracurricular activities (Appendix 2). Schools were categorized as providing many ($\geq$8) or few (<18) sports-related ECAs during a no-ban school year.

Another series of questions collected these same data for a period during which a ban was in effect in 2002 and comparisons were made to retrospectively classify schools for the 1999 ban (Appendix 2). Schools were categorized as "*high implementation" (of the ECA ban)* if there was a large reduction in the number of sports-related ECAs during the ban, defined as losing over 60% of the ECAs when the ban was implemented. *Low implementation schools* included those with little or no difference in the number of ECAs available during the ban compared to a no-ban school year.

BMI was computed by weight (kg)/height $(m)^2$. Subjects were categorized as overweight (yes, no) according to BMI percentile curves for males and females aged 12 years (Cole 2000). To avoid classifying children who are muscular or have a large bone structure as being overweight, according to BMI cut-offs, subjects must also have had tricep skinfolds over the 85^{th} percentile of the sample (Johnson-Down et al 1997).

Frequency of physical activity was determined at each data collection in a seven-day recall adapted from the Weekly Activity Checklist (Sallis et al 1993) to reflect common physical activities engaged in by adolescents in Montreal (Appendix 1, question 15). For

each of the preceding seven days, students checked which 25 physical activities they had participated in on that day. A frequency score was computed for each student by summing the total number of activities checked across all seven days. The original instrument correlated with an objective activity measure (Caltrac accelerometer) at $r=0.34$, $p<0.01$, and the 3-day test-retest reliability was 0.74 (Sallis et al 1993). Our version of the Weekly Activity Checklist showed evidence of convergent construct validity because it was positively correlated with energy intake (Johnson-Down et al 1997).

To reflect changes in levels of physical activity over the one-year follow-up, we subtracted the baseline physical activity score (obtained during the ECA ban) from the score obtained in fall 2000 after the ban had been lifted. "Increased physical activity" was coded "yes" if the score increased over time. It was coded "no" if the score decreased or did not change over time.

3.3.2. Analysis

The analysis included baseline data and data collected one year later. Few subjects were lost to follow-up at one year - 94.2% of baseline participants completed the one-year follow-up questionnaire. The dependent variable was change in the physical activity score between baseline and the one-year follow-up. Univariate analysis was conducted to determine if there were significant associations between various potential correlates and the outcome or the main predictor. Only variables associated with both (p-values ≤ 0.10) were retained as potential confounders for further analysis. The association between the

implementation of the ECA ban and change in physical activity was tested in multiple logistic regression, controlling where appropriate for the potential confounding influences of baseline physical activity, the number of extracurricular activities offered in a no ban school year, season at baseline, parental education, household income, sex, language, and overweight. The Generalized Estimating Equations (GEE) method was used to account for clustering in schools. All analyses were stratified by sex. Analyses were performed with SAS 8.0 (SAS 1999).

3.4 Results

Data were available for a total of 1264 subjects at baseline; 47.9% were male; 31.2% spoke French at home, 50.2% spoke English, 11.2% spoke both, and 7.4% indicated another home language. Two-thirds of subjects (64.8%) attended an English language school. The mean age of subjects at baseline was 12.3 (SD=0.6). The average baseline physical activity score was 17.9 (12.6) activities per week (19.7 (14.0) among boys and 15.5 (11.1) among girls, $p<0.001$).

Schools offered 18.0 (SD=5.1) sports-related ECAs on average each year (range 11.0-24.0). Seven schools (6 English and 1 French) offered "many" sports-related ECAs, and three schools (I English, 2 French) offered "few" ECAs. Of the ten study schools, seven (all English) were classified as having "high implementation" of the ECA ban and the three French schools were categorized as having "low implementation" of the ECA ban. Table 1 compares sports-related ECAs offered in high and low implementation schools during a no ban school year.

Table 1. Description of sports-related extracurricular activities (ECAs) available in the 10 study schools in a no ban school year, according to support for the ECA ban. Montreal, Canada, 1999-2000.

	High implementation schools	Low implementation schools	p-value
Total sports-related ECAs, mean (sd)	20.0 (4.3)	13.3 (4.0)	0.08
Intramural sports activities, mean (sd)*	7.7 (3.0)	8.0 (1.7)	0.86
Extramural sports activities, mean (sd)**	9.3 (3.0)	2.0 (1.7)	<0.01
Sports-related special events, mean (sd)┼	3.0 (1.0)	3.3 (0.6)	0.53

* Basketball, soccer, football, rugby, swimming, softball, volleyball, hockey, badminton, weight room, cosom/floor hockey, gymnastics, track and field, field hockey, cross-country skiing, downhill skiing, lacrosse

** Basketball, soccer, flag/touch/contact football, football, rugby, swimming, badminton, softball, volleyball, tennis, hockey, cosom/floor hockey, curling, gymnastics, indoor track and field, outdoor track and field, field hockey, cross-country skiing, downhill skiing, wrestling, lacrosse

┼ Track and field days, outings to promote sports, sports tournaments, fund-raising sports activities (Jump Rope for Heart, Terry Fox Run, etc.), sports week/month, school dances, ski trips

The baseline characteristics of subjects in high and low implementation schools are presented in table 2. Subjects in high implementation schools were more physically active at baseline, a higher proportion lived in census tracts with higher average household incomes, and their parents were more likely to be university educated. The average change score of the students who decreased their physical activity was -8.57 (SD=8.56). The average change score of the students who increased their physical activity was 11.54 (SD=10.40).

The proportions of subjects whose physical activity scores increased between baseline and the one-year follow-up, according to selected baseline sociodemographic and school-related characteristics are presented in table 3. Girls who attended high implementation schools were more likely to increase their physical activity than girls attending low implementation schools. This relationship was also evident in boys but the association was not statistically significant. Subjects of both sexes who were not physically active at baseline were more likely to increase their physical activity over time. Students who attended schools that offered many ECAs during a no-ban school year were more likely to increase their physical activity. Finally subjects whose baseline physical activity levels were assessed during the winter were more likely to increase their physical activity over time. Parents' level of education, household income, and overweight status were not associated with physical activity change scores. Based on these analyses possible confounders of the association between the ban and change in physical activity included baseline physical activity, the number of ECAs offered during a no-ban school year, season at baseline, and language. These variables were retained for multivariate analysis.

Adjusted odds ratios for the likelihood of increasing physical activity over time among students attending a high implementation ban school are shown in table 4. After adjusting for potential confounders, students who attended high implementation schools were 1.85 times more likely to increase their physical activity more when the ban was lifted, relative to students in low implementation schools. The effect of the ECA ban was greater among girls than boys.

Table 2. Comparison of the characteristics of subjects in high and low implementation schools, Montreal, Canada 1999

	Subjects in high implementation schools (n= 766)	Subjects in low implementation schools (n= 432)	p-value
Age, y, mean (SD)	12.2(0.5)	12.4(0.7)	<0.01
Male, %	49.7	44.6	0.09
Baseline physical activity, mean (SD)	19.5(13.6)	15.3(10.2)	<0.01
University educated, %			
Father	61.8	32.9	<0.01
Mother	53.4	36.9	<0.01
Overweight, %	12.7	14.8	0.33
Average household income, mean (SD)	71 892(24 464)	48 280(13 857)	<0.01

Table 3. Univariate associations between selected variables and increase in physical activity among adolescents in Montreal, Canada, 1999-2000

	Proportion of subjects that increased their physical activity					
	Boys			Girls		
	Total	Increased		Total	Increased	
	n	%	p	n	%	p*
Ban						
Low implementation	161	52.2	0.08	201	46.8	<0.01
High implementation	315	60.6		343	65.0	
Overweight						
No	387	57.9	0.61	448	58.0	0.74
Yes	67	61.2		68	55.9	
Active at Baseline						
No	72	84.7	<0.01	88	86.4	<0.01
Yes	404	53.0		456	52.9	
Father university-educated						
No	135	57.0	0.87	165	61.2	0.58
Yes	157	56.0		170	58.2	
Mother university-educated						
No	146	57.5	0.75	199	59.8	0.66
Yes	158	55.7		160	57.5	
Household income						
Low	107	52.3	0.19	131	56.5	0.44
Medium	115	64.4		142	62.7	
High	108	57.4		129	55.8	
Language spoken at home						
French	200	54.5	0.22	238	50.4	<0.01
Other	276	60.1		306	64.4	
ECAs provided in no-ban school year						
Few	134	47.8	<0.01	168	45.2	<0.01
Many	342	61.7		376	64.1	
Season baseline questionnaire completed						
Fall	309	53.1	<0.01	370	53.5	<0.01
Winter	167	66.5		174	68.4	

* p-values obtained from chi-square analysis indicate significant differences in proportions according to categories of each potential correlate

Table 4. Adjusted odds ratios* and 95 percent confidence intervals for increased physical activity among subjects in high relative to low implementation schools, Montreal, Canada, 1999-2000

	OR_{adj} (95% CI)
All subjects	
Low implementation	Ref
High implementation	1.85 (1.56-2.19)
Males	
Low implementation	Ref
High implementation	1.49 (1.16-1.91)
Females	
Low implementation	Ref
High implementation	2.19 (1.80-2.67)

*Odds ratios were adjusted for baseline physical activity, number of ECAs offered during a no-ban school year and the season at baseline.

3.5 Discussion

This study is the first to examine the effects of a ban on extracurricular activities by teachers on the physical activity behaviour of adolescents. It suggests that when opportunities to be physically active at school are eliminated (ECAs) adolescent levels of physical activity were detrimentally affected. More specifically, when the 1999 ban was lifted, adolescents in high implementation schools increased their levels of physical activity. Against a backdrop of age-related declines in physical activity, this suggests that the ban might have had a negative impact on levels of physical activity. This study therefore provides indirect evidence for the influence of environmental factors on physical activity and suggests that ECAs have a positive effect on adolescents. These findings are consistent with those of Sallis et al (2001), which indicated that selected aspects of school environments were correlated with levels of physical activity.

Because levels of physical activity in adolescents are linked to excess weight gain (O'Loughlin et al 2000), and because the prevalence of overweight and obesity is steadily increasing in North American youth (Alpert 1994; Tremblay & Wilms 2000) these results should raise concern among policy makers, including those influencing the availability and accessibility of ECAs. Offering more ECAs in schools with low amounts can have a positive effect on physical activity levels of youth. A decision that eliminates access to opportunities to be physically active at school through budget cuts for example, or in this case ECA bans, can affect the physical activity levels of adolescents, and especially girls. While pressure tactics using ECA bans to impact negotiations in labour disputes are becoming more common, it is important that the potential health impact on adolescents is

recognized and taken into account. Even short-term decreases in access to school-based sports activities could result in weight gain. Alternatively lack of access to school sports could interrupt the maintenance of physical activity levels in vulnerable groups, resulting in longer-term inactivity.

Our results suggest that girls were more affected by the ban than the boys. Several studies suggest that girls are more dependent on their scholastic environments for physical activity possibly because there are fewer opportunities for girls to be physically active outside school. As girls approach puberty, there may be a decrease in community-based structured activity programs being offered (Goran et al 1998). Barnett et al (2002) hypothesized that girls might not sustain level of free play activity in the absence of structured school-based activity. Goran et al (1998) asserted that this might be due to a decrease in social desirability to be physically active amongst girls. Boys may be more likely to engage in physical activity when they socialize during their free time and are therefore less dependent on activities in school or they are more likely to compensate for a loss of opportunity to be physically active and engage in activity outside of school. On the other hand, girls are more dependent on structured opportunities to be physically active, such as ECAs.

Alternatively, the socialization of girls encourages less independence in behavioural choices, which may be reflected in health behaviours, such as physical activity (Lee & Cubbin 2002). Structured activity at school might be more accessible to girls than structured activity offered in the community. Compared to boys, the socialization of adolescent girls into community-organized physical activity may be influenced more by

parental support (Butcher 1983). Specifically, parents need to dedicate time, money and support to ensure that their daughters participate in community-based sports. School-related activities might be more accessible to girls since money and transportation are not barriers to participation, and equipment and facilities are available at close distances to students' homes. If there are different levels of parental support for boys and girls, this could relate to lower participation in community sports by girls.

Possible limitations might restrict the interpretation of the results. Because the study schools were not a random sample of all schools in the Montreal area, the ability to generalize the results might be limited. The physical activity score was based on self-reports by adolescents, which are subject to misclassification. However, as indicated earlier, our 7-day recall has been shown to be reliable (Sallis et al 1993) and there is evidence for criterion-related validity against the Caltrac accelerometer (Sallis et al 1993) and convergent construct validity against energy intake (Johnson-Down 1997). In addition, there is little reason to suspect that misclassification was differential according to exposure or outcome. A third limitation relates to the non-experimental study design, which might not have allowed adequate control of possible confounding by language. Because teachers in the French schools did not comply with the ECA ban to the same extent as English teachers, none of the three French schools were categorized as high implementation schools. Therefore, there is almost complete overlap between exposure to the ban and language, and it was not possible to control for language in the multivariate modelling. It could be that the changes observed in levels of physical activity were related to language and not the exposure of the ban. Similarly the baseline levels of physical activity were not equivalent in high and low implementation schools. Residual

confounding by this variable might have introduced bias. However, there is no reason to believe that it is the language causing this difference in physical activity change.

The outcome, change in physical activity, was measured between age 12 and 13 years. Studies have consistently indicated that there is a decline in physical activity during this period without indication that there is a difference in physical activity behaviour due to language (Health Canada 1999; Gordon-Larsen 1999; O'Loughlin et al 1999; Casperson et al 2000; Kimm et al 2000; Bradley et al 2000; Barnett et al 2002). Therefore, an increase in physical activity that occurs only amongst children who speak English at home is unlikely. The students who were not physically active were affected by the ban the most. These students were more likely to increase their physical activity when the ECA ban was lifted.

Overall this study suggests that the school environment can influence the maintenance of healthy behaviours such as physical activity, among adolescents. More specifically, students attending schools with low levels of opportunities for physical activity were more likely to increase their physical activity levels once activities were reinstated. The effect appeared to be greater on girls than boys. It is important that both decision makers and teachers understand the implications of reducing opportunities for physical activity.

This study highlights the importance of environmental factors on physical activity behaviour among adolescents. The results indicate that school environments can shape healthy behaviour by offering opportunities to be physically active. Organized activities offered by schools are an important aspect of the school environment. Not only do ECAs offer opportunities to be physically active, they offer occasions for peer, parental, and coach role modelling, as well as opportunities for adolescents to socialize in safe and supervised environments. This study can encourage policy makers to offer other opportunities for students to be physically active at school when decisions are made that eliminate opportunities at school.

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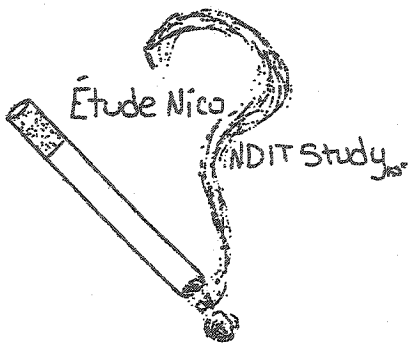
Appendix 1

McGill University Study on Nicotine Dependence in Teens Questionnaire

PLEASE PRINT YOUR NAME _____
First name Last name



MCGILL UNIVERSITY STUDY ON NICOTINE DEPENDENCE IN TEENS

QUESTIONNAIRE VERSION	0 6		
SCHOOL			
DOSSIER NUMBER			
SURVEY NUMBER			
TODAY'S DATE	DAY	MONTH	YEAR
GRADE			
RECALL MONTHS	0 8		

1. In what month is your birthday?

☐ 1	January	☐ 7	July
☐ 2	February	☐ 8	August
☐ 3	March	☐ 9	September
☐ 4	April	☐ 10	October
☐ 5	May	☐ 11	November
☐ 6	June	☐ 12	December

2. On what day of the month is your birthday? Circle the correct day.

1	2	3	4	5	6	7	8	9	10	
11	12	13	14	15	16	17	18	19	20	
21	22	23	24	25	26	27	28	29	30	31

3. In what year were you born?

☐ 1984
☐ 1985
☐ 1986
☐ 1987
☐ 1988
☐ Other _____
Specify year

4. How old are you today? Write the correct number in the box.

☐ years

5. Are you a.....?

☐ 1 Boy ☐ 2 Girl

6. This chart asks about: (1) the adults with whom you live, and (2) whether or not the adults you live with currently smoke cigarettes.

First, check the box if you live with the person. Next, for the people you live with, check the box if he/she currently smokes cigarettes. If you live in more than one household (part-time with your Mom and part-time with your Dad), check ALL the boxes that apply...

Check the box if ...	You live with this person	He/she currently smokes cigarettes
Biologic mother	☐	☐
Biologic father	☐	☐
Step-mother	☐	☐
Step-father	☐	☐
Aunt(s)	☐	☐
Uncle(s)	☐	☐
Grandmother(s)	☐	☐
Grandfather(s)	☐	☐
Other(s) → Name them	☐	☐
a) _____	☐	☐
b) _____	☐	☐

7. Now think about your brother(s) and sister(s) (including step-brothers/sisters and half brothers/sisters). Write the correct numbers in the boxes. If an answer is zero, write in "0".

You have ☐ brother(s)

You have ☐ brother(s) who smoke(s) cigarettes

You have ☐ sister(s)

You have ☐ sister(s) who smoke(s) cigarettes

8. Now, think about your friends. How many of the people whom you usually hang out with smoke cigarettes?

- ☐ 1 None
- ☐ 2 A few
- ☐ 3 About half
- ☐ 4 More than half
- ☐ 5 Most or all

9. What language(s) do you speak well enough to carry on a conversation? *Check ALL that apply.*

- ☐ French
- ☐ English
- ☐ Portuguese
- ☐ Greek
- ☐ Spanish
- ☐ Italian
- ☐ Chinese
- ☐ Vietnamese
- ☐ Arabic
- ☐ Other(s) _____
  Name them

10. What language do you speak most often at home? *Check ONE box.*

- ☐ 1 English
- ☐ 2 French
- ☐ 3 French and English
- ☐ 4 Other _____
  Specify

11. Were you born...?

☐ 1 In Canada → _____
Name province

☐ 2 Outside Canada → _____
Name country

12. How long have you lived in Canada?

☐ All my life

OR

☐ I have lived less than one year in Canada

OR

I have lived ☐☐ years in Canada

13. Was your biologic father born...?

☐ 1 In Canada → _____ OR ☐ 7 I don't know which province
Name province

☐ 2 Outside Canada → _____ OR ☐ 7 I don't know which country
Name country

☐ 7 I don't know

14. Was your biologic mother born...?

☐ 1 In Canada → _____ OR ☐ 7 I don't know which province
Name province

☐ 2 Outside Canada → _____ OR ☐ 7 I don't know which country
Name country

☐ 7 I don't know

AQ7. How much education has your father had?

- Did not finish high school ☐1
- High school graduate ☐2
- Vocational, technical school ☐3
- CEGEP ☐4
- University ☐5
- Don't know ☐6
- Not applicable ☐7
- Other _____ ☐8

_____

AQ8. How much education has your mother had?

- Did not finish high school ☐1
- High school graduate ☐2
- Vocational, technical school ☐3
- CEGEP ☐4
- University ☐5
- Don't know ☐6
- Not applicable ☐7
- Other _____ ☐8

_____

AQ9. What is your home postal code?

☐☐☐ ☐☐☐

Don't know ☐777777

15. Now, think about the physical activities that you did last week from Monday to Sunday outside your regular school gym class. For each activity that you did for 5 minutes or more at one time, mark an "X" to show the day(s) on which you did that activity.

	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
Bicycling to school, bicycling to do errands, going for a bicycle ride							
Swimming/diving							
Basketball							
Baseball/softball							
Football							
Soccer							
Volleyball							
Racket Sports (badminton, tennis)							
Ice hockey/ball hockey							
Jump rope							
Downhill skiing, snowboarding							
Cross-country skiing							
Ice skating							
Rollerblading, skateboarding							
Gymnastics (bars, beams, tumbling, trampoline)							
Exercise / physical conditioning (push-ups, sit-ups, jumping jacks, weight-lifting, exercise machines)							
Ball-playing (dodge ball, kickball, wall-ball, catch)							
Track and field							
Games (chase, tag, hopscotch)							
Jazz/classical ballet							
Dancing (aerobic, folk, at a party)							
Outdoor play (climbing trees, hide and seek)							
Karate/ Judo/ Tai Chi/ Kung Fu							
Boxing, wrestling							
Outdoor chores (mowing, raking, gardening)							
Indoor chores (mopping, vacuuming, sweeping)							
Mixed walking / running / jogging							
Walking							
Running/Jogging							
Other(s) → Name them							
a)							
b)							
c)							

16. Since September of this school year, did you belong to any of the following intramural or extramural school sports teams (teams that were not part of your regular gym class)...?

	Yes
School basketball team	☐
School soccer team	☐
School football team	☐
School track and field team	☐
School rugby team	☐
School wrestling team	☐
School swimming team	☐
School softball team	☐
School cross-country ski team	☐
School volleyball team	☐
School gymnastics team	☐
School hockey team	☐
Other(s) → Name them a) _____ b) _____	

17. Now think about sports teams and lessons <u>outside of school</u>. <u>In the past 3 months</u>, did you belong to a...?

	Yes
Basketball team	☐
Soccer team	☐
Football team	☐
Swimming team	☐
Baseball team	☐
Volleyball team	☐
Hockey team	☐
Ballet/dance classes	☐
Aerobics classes	☐
Ski lessons	☐
Judo/Karate lessons	☐
Other(s) → Name them	
a) _____	
b) _____	

18. How many hours of television (including video movies) do you usually watch in a single day? *If the answer is zero, write "0" in the box. If the answer is less than ½ hour, write "LT ½".*

On weekdays, I usually watch ☐ hour(s) of television a day

On weekends, I usually watch ☐ hour(s) of television a day

19. How many hours do you usually play video or computer games, or use the Internet in a single day? *If the answer is zero, write "0" in the box. If the answer is less than ½ hour, write "LT ½".*

On weekdays, I usually play video or computer games .... ☐ hour(s) a day

On weekends, I usually play video or computer games .... ☐ hour(s) a day

20. During the past 3 months, how often have you...?

	Never	Rarely	Sometimes	Often
Felt too tired to do things	☐1	☐2	☐3	☐4
Had trouble going to sleep or staying asleep	☐1	☐2	☐3	☐4
Felt unhappy, sad, or depressed	☐1	☐2	☐3	☐4
Felt hopeless about the future	☐1	☐2	☐3	☐4
Felt nervous or tense	☐1	☐2	☐3	☐4
Worried too much about things	☐1	☐2	☐3	☐4

21. During the <u>past 3 months</u>, have you been worried or stressed by any of the following...?

	Not at all OR This does not apply to me	A little bit	Quite a bit	A whole lot
Your parents separating or divorcing	☐ 1	☐ 2	☐ 3	☐ 4
Loneliness	☐ 1	☐ 2	☐ 3	☐ 4
Breaking up with your boyfriend or girlfriend	☐ 1	☐ 2	☐ 3	☐ 4
Your relationship with your father	☐ 1	☐ 2	☐ 3	☐ 4
Your relationship with your mother	☐ 1	☐ 2	☐ 3	☐ 4
Your relationship with your brother(s)/ sister(s)	☐ 1	☐ 2	☐ 3	☐ 4
Your relationship with your friends	☐ 1	☐ 2	☐ 3	☐ 4
A health problem (such as acne or asthma)	☐ 1	☐ 2	☐ 3	☐ 4
Your weight	☐ 1	☐ 2	☐ 3	☐ 4
Sex	☐ 1	☐ 2	☐ 3	☐ 4
Your new family (parents remarried)	☐ 1	☐ 2	☐ 3	☐ 4
Financial problems in your family	☐ 1	☐ 2	☐ 3	☐ 4
School work	☐ 1	☐ 2	☐ 3	☐ 4
Other(s) → Please describe				
a) _____	☐ 1	☐ 2	☐ 3	☐ 4
b) _____	☐ 1	☐ 2	☐ 3	☐ 4

22. During the past 3 months, how often did you...?

	Never	A bit to try	Once or a couple of times a month	Once or a couple of times a week	Usually every day
Smoke a cigar or cigarillo	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Use chewing tobacco or snuff	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Drink alcohol (beer, wine, hard liquor)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

23. The next questions are about smoking cigarettes. To begin, have you ever IN YOUR LIFE smoked a cigarette, even just a puff (drag, hit, haul)?

☐ 1 No

☐ 2 Yes, 1 or 2 times

☐ 3 Yes, 3 or 4 times

☐ 4 Yes 5 to 10 times

☐ 5 Yes, more than 10 times

24. Check the one box that describes you best...

☐ 1 I have never smoked a cigarette, even just a puff → *Go to question 32*

☐ 2 I have smoked cigarettes (even just a puff), but not at all in the past twelve months

☐ 3 I smoked cigarettes once or a couple of times in the past twelve months

☐ 4 I smoke cigarettes once or a couple of times each month

☐ 5 I smoke cigarettes once or a couple of times each week

☐ 6 I smoke cigarettes every day

25. Have you ever smoked a <u>whole</u> cigarette (down to or close to the filter)?

☐ 1 No→ *Go to question 28*

☐ 2 Yes

26. How old were you when you smoked a <u>whole</u> cigarette (down to or close to the filter) for the first time?

I was ☐ years old
write age

OR

☐ 7 I don't remember

27. Have you smoked 100 or more <u>whole</u> cigarettes in your life? (100 cigarettes = 4 packs of 25)

☐ 1 No

☐ 2 Yes

28. Have you ever taken cigarette smoke into your lungs for more than one puff?

☐ 1 No → *Go to question 31*

☐ 2 Yes

29. How old were you when you took cigarette smoke into your lungs for more than one puff?

I was ☐ years old
write age

OR

☐$_7$ I don't remember

30. The FIRST FEW TIMES you took cigarette smoke into your lungs, did you experience any of the following...?

	Not at all	A bit	A lot
Coughing	☐$_1$	☐$_2$	☐$_3$
Burning in your throat	☐$_1$	☐$_2$	☐$_3$
Upset stomach	☐$_1$	☐$_2$	☐$_3$
Heart racing/pounding	☐$_1$	☐$_2$	☐$_3$
Dizziness	☐$_1$	☐$_2$	☐$_3$
Nausea	☐$_1$	☐$_2$	☐$_3$
Headache	☐$_1$	☐$_2$	☐$_3$
Other(s)→Describe			
a) _____	☐$_1$	☐$_2$	☐$_3$
b) _____	☐$_1$	☐$_2$	☐$_3$

31. Would you say that you are someone who has tried smoking cigarettes, but has now stopped smoking completely and (probably) forever...?

☐$_1$ No

☐$_2$ Yes

☐$_7$ I don't know

32. When you see other kids your age smoking cigarettes, how easy is it for you <u>not</u> to smoke?

- ☐ 1 Very easy not to smoke
- ☐ 2 Quite easy not to smoke
- ☐ 3 A bit difficult not to smoke
- ☐ 4 Very difficult not to smoke

33. How often have you felt like you really need a cigarette?

- ☐ 1 Never
- ☐ 2 Rarely
- ☐ 3 Sometimes
- ☐ 4 Often

34. How physically addicted to smoking cigarettes are you?

- ☐ 1 Not at all physically addicted
- ☐ 2 A little physically addicted
- ☐ 3 Quite physically addicted
- ☐ 4 Very physically addicted

35. How mentally addicted to smoking cigarettes are you?

- ☐ 1 Not at all mentally addicted
- ☐ 2 A little mentally addicted
- ☐ 3 Quite mentally addicted
- ☐ 4 Very mentally addicted

36. How easy is it for you to get cigarettes?

- ☐ 1 Very easy to get cigarettes
- ☐ 2 Quite easy to get cigarettes
- ☐ 3 A bit difficult to get cigarettes
- ☐ 4 Very difficult to get cigarettes
- ☐ 7 I don't know (I never tried to get cigarettes)
- ☐ 8 I don't smoke

INSTRUCTIONS: Now, think carefully about your cigarette smoking experiences during the past 3 months, that is during February, March and April. Let's begin with April.

37. During April, on how many days did you smoke cigarettes, even just a puff?

- ☐ 1 None →*Go to question 40*
- ☐ 2 1 day
- ☐ 3 2-3 days
- ☐ 4 4-5 days
- ☐ 5 6-10 days
- ☐ 6 11-15 days
- ☐ 7 16-20 days
- ☐ 8 21-30 days
- ☐ 9 Every day
- ☐ 77 I don't know

38. On the days that you smoked during April, how many cigarettes did you usually smoke each day?

- ☐ 1 Less than 1 cigarette (one or a few puffs)
- ☐ 2 1 cigarette
- ☐ 3 2-3 cigarettes
- ☐ 4 4-5 cigarettes
- ☐ 5 6-10 cigarettes
- ☐ 6 11-15 cigarettes
- ☐ 7 16-20 cigarettes
- ☐ 8 21-25 cigarettes
- ☐ 9 More than 25 cigarettes
- ☐ 77 I don't know

39. Write the correct number in the box. During April, the most I smoked in a single day was...

☐☐☐ cigarettes

OR

☐ Less than one cigarette (one or a few puffs)

OR

☐ 77 I don't know

40. Now think about this past March. During March, on how many days did you smoke cigarettes, even just a puff?

- ☐ 1 None → *Go to question 43*
- ☐ 2 1 day
- ☐ 3 2-3 days
- ☐ 4 4-5 days
- ☐ 5 6-10 days
- ☐ 6 11-15 days
- ☐ 7 16-20 days
- ☐ 8 21-30 days
- ☐ 9 Every day
- ☐ 77 I don't know

41. On the days that you smoked during March, how many cigarettes did you usually smoke each day?

- ☐ 1 Less than 1 cigarette (one or a few puffs)
- ☐ 2 1 cigarette
- ☐ 3 2-3 cigarettes
- ☐ 4 4-5 cigarettes
- ☐ 5 6-10 cigarettes
- ☐ 6 11-15 cigarettes
- ☐ 7 16-20 cigarettes
- ☐ 8 21-25 cigarettes
- ☐ 9 More than 25 cigarettes
- ☐ 77 I don't know

42. Write the correct number in the box. During March, the most I smoked in a single day was...

☐ cigarettes

OR

☐ Less than one cigarette (one or a few puffs)

OR

☐$_{77}$ I don't know

43. Now think about this past February. During February, on how many days did you smoke cigarettes, even just a puff?

☐$_{1}$ None → *Go to question 46*

☐$_{2}$ 1 day

☐$_{3}$ 2-3 days

☐$_{4}$ 4-5 days

☐$_{5}$ 6-10 days

☐$_{6}$ 11-15 days

☐$_{7}$ 16-20 days

☐$_{8}$ 21-30 days

☐$_{9}$ Every day

☐$_{77}$ I don't know

44. On the days that you smoked during February, how many cigarettes did you usually smoke each day?

- ☐ 1 Less than 1 cigarette (one or a few puffs)
- ☐ 2 1 cigarette
- ☐ 3 2-3 cigarettes
- ☐ 4 4-5 cigarettes
- ☐ 5 6-10 cigarettes
- ☐ 6 11-15 cigarettes
- ☐ 7 16-20 cigarettes
- ☐ 8 21-25 cigarettes
- ☐ 9 More than 25 cigarettes
- ☐ 77 I don't know

45. Write the correct number in the box. During February, the most I smoked in a single day was...

☐ cigarettes

OR

☐ Less than one cigarette (one or a few puffs)

OR

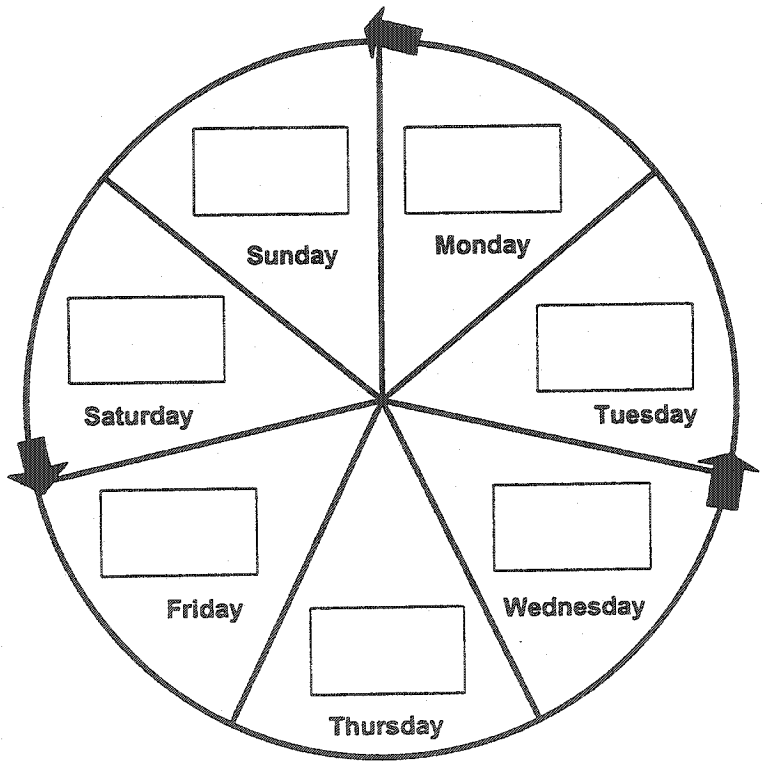
☐ 77 I don't know

46. Now, think about the past 7 days. Did you smoke any cigarettes in the past 7 days, even just a puff?

☐₁ No → *Go to* **INSTRUCTIONS box** *at the bottom of the page*

☐₂ Yes

47. Starting with yesterday which was _____, follow the arrows and write in the box how many cigarettes you smoked on each day, even just a puff. If an answer is zero, write in "0".



INSTRUCTIONS: The rest of the questions are only for students who have smoked cigarettes, even just a puff, in the past 3 months. If you have <u>not smoked cigarettes at all in the past 3 months</u>, please go to the end of the questionnaire and work quietly on the puzzle.

48. How often do you smoke cigarettes?

	Never	Sometimes	Often / Always
While waiting for a bus	☐ 1	☐ 2	☐ 3
After a meal	☐ 1	☐ 2	☐ 3
Going to school in the morning	☐ 1	☐ 2	☐ 3
Going home from school in the afternoon	☐ 1	☐ 2	☐ 3
When you are alone	☐ 1	☐ 2	☐ 3
When you are with your friends	☐ 1	☐ 2	☐ 3
At home	☐ 1	☐ 2	☐ 3
On the weekends	☐ 1	☐ 2	☐ 3
At lunch or between classes at school	☐ 1	☐ 2	☐ 3
In the evenings, on school days	☐ 1	☐ 2	☐ 3

49. Do one or both of your parents know that you (have) smoke(d) cigarettes?

☐ 1 No

☐ 2 Yes

☐ 7 I don't know

50. Are you allowed to smoke inside your home?

☐ 1 No

☐ 2 Yes

51. Do you smoke cigarettes now because it is really hard to quit?

- ☐ 1 No
- ☐ 2 Sometimes
- ☐ 3 Often/always
- ☐ 4 I don't know because I have never tried to quit
- ☐ 5 Other → Please explain _____
- ☐ 7 I don't know (I smoke so little) or this does not apply to me

52. How much of a cigarette do you usually smoke?

- ☐ 1 One or a few puffs
- ☐ 2 Less than half of it
- ☐ 3 About half of it
- ☐ 4 Most of the cigarette
- ☐ 5 Right down to or near the filter
- ☐ 7 I don't know (I smoke so little) or this does not apply to me

53. Now think about the times when you have cut down or stopped using cigarettes or when you haven't been able to smoke for a long period (like most of the day). How often did you experience the following...?

	Never	Rarely	Sometimes	Often
Feeling irritable or angry	☐ 1	☐ 2	☐ 3	☐ 4
Feeling restless	☐ 1	☐ 2	☐ 3	☐ 4
Increased appetite or hunger	☐ 1	☐ 2	☐ 3	☐ 4
Heart beat slowed down	☐ 1	☐ 2	☐ 3	☐ 4
Feeling nervous, anxious or tense	☐ 1	☐ 2	☐ 3	☐ 4
Feeling down, depressed, miserable or sad	☐ 1	☐ 2	☐ 3	☐ 4
Trouble concentrating	☐ 1	☐ 2	☐ 3	☐ 4
Feeling drowsy or sleepy	☐ 1	☐ 2	☐ 3	☐ 4
Headaches	☐ 1	☐ 2	☐ 3	☐ 4
Upset stomach	☐ 1	☐ 2	☐ 3	☐ 4
Feeling a strong urge or need to smoke	☐ 1	☐ 2	☐ 3	☐ 4
Trouble sleeping	☐ 1	☐ 2	☐ 3	☐ 4

54. On the days that you smoke, when do you *usually* smoke your first cigarette of the day?

- ☐ 1 Right when you wake up
- ☐ 2 In the morning
- ☐ 3 In the afternoon
- ☐ 4 In the evening
- ☐ 5 Another time _____ When?
- ☐ 7 I don't know (I smoke so little) or this does not apply to me

55. Which cigarette would you most hate to give up? Check ONE box.

- ☐ 1 Last one of the day
- ☐ 2 First one of the morning
- ☐ 3 After meals
- ☐ 4 With alcohol
- ☐ 5 When experiencing negative emotions like being upset
- ☐ 6 After school
- ☐ 7 When I'm at a party or hanging out with friends
- ☐ 8 Other _____ Describe
- ☐ 77 I don't know (I smoke so little) or this does not apply to me

56. Do you find it difficult not to smoke in places where it's not allowed (at a movie theatre, at home if your parents don't know you smoke)?

- ☐ 1 Not at all difficult
- ☐ 2 A bit difficult
- ☐ 3 Very difficult
- ☐ 7 I don't know (I smoke so little) or this does not apply to me

57. If you are sick with a bad cold or sore throat, do you smoke?

- ☐ 1 No, I stop smoking when I'm sick
- ☐ 2 Yes, but I cut down on the amount I smoke
- ☐ 3 Yes, I smoke the same amount as when I'm not sick
- ☐ 7 I don't know (I smoke so little) or this does not apply to me

58. How deeply do you usually inhale the smoke?

- ☐ 1 Just into my mouth
- ☐ 2 Back into my throat
- ☐ 3 Into my lungs shallow
- ☐ 4 Into my lungs deep
- ☐ 7 I don't know (I smoke so little) or this does not apply to me

59. How true are each of the following statements for you?

	Not at all true	A bit true	Very true
When I am angry, smoking cigarettes calms me down.	☐ 1	☐ 2	☐ 3
Cigarettes are good for dealing with boredom.	☐ 1	☐ 2	☐ 3
When I'm upset with someone, a cigarette helps me cope.	☐ 1	☐ 2	☐ 3
When I'm feeling down, a cigarette makes me feel good.	☐ 1	☐ 2	☐ 3
A cigarette gives me energy when I'm tired.	☐ 1	☐ 2	☐ 3
I enjoy the taste of a cigarette.	☐ 1	☐ 2	☐ 3
When I'm alone, a cigarette helps me pass the time.	☐ 1	☐ 2	☐ 3
Smoking cigarettes calms me down when I feel nervous.	☐ 1	☐ 2	☐ 3
Smoking cigarettes helps me control my weight.	☐ 1	☐ 2	☐ 3
When I have a problem, a cigarette helps me feel better about it.	☐ 1	☐ 2	☐ 3
Smoking cigarettes helps me concentrate on my homework.	☐ 1	☐ 2	☐ 3
Smoking cigarettes relieves tension when I am stressed.	☐ 1	☐ 2	☐ 3

60. How true are each of the following statements for you?

	Not at all true	A bit true	Very true
I feel a sense of control over my smoking. I can "take it or leave it" at any time.	☐ 1	☐ 2	☐ 3
Sometimes even when I tell myself I'm not going to have a cigarette, I find myself smoking anyway.	☐ 1	☐ 2	☐ 3
I consider myself to be a social smoker.	☐ 1	☐ 2	☐ 3
I avoid going to a friend's house where you're not allowed to smoke even though I might enjoy hanging out with him/her.	☐ 1	☐ 2	☐ 3
In situations where I need to go outside to smoke, it's worth it even in cold or rainy weather.	☐ 1	☐ 2	☐ 3
I feel more comfortable with other smokers than with non-smokers.	☐ 1	☐ 2	☐ 3
I go for hours or days without smoking and I don't even realise it.	☐ 1	☐ 2	☐ 3
If I wake up during the night, I feel I need a cigarette.	☐ 1	☐ 2	☐ 3
I can function much better in the morning after I've had a cigarette.	☐ 1	☐ 2	☐ 3
I have cut down or stopped physical activities or sports because of my smoking	☐ 1	☐ 2	☐ 3

61. Do you ever have cravings to smoke cigarettes?

☐ 1 No → *Go to question 66*

☐ 2 Yes

62. How often do you have cravings to smoke cigarettes?

☐ 1 Very rarely

☐ 2 Sometimes

☐ 3 Often

☐ 4 Very often

63. How strong are your cravings to smoke cigarettes?.

- ☐ 1 Not at all strong
- ☐ 2 A bit strong
- ☐ 3 Quite strong
- ☐ 4 Very strong

64. When you crave a cigarette, how much of the cigarette can satisfy your urge to smoke?

- ☐ 1 A few puffs
- ☐ 2 Less than half of the cigarette
- ☐ 3 About half of the cigarette
- ☐ 4 The whole cigarette
- ☐ 5 More than a whole cigarette

65. How much of the craving that you feel is ..?

	None	A little bit	Quite a bit	A whole lot
From your body	☐ 1	☐ 2	☐ 3	☐ 4
From your head	☐ 1	☐ 2	☐ 3	☐ 4

66. How true are each of the following statements for you?

	Not at all true	A bit true	Very true
Compared to when I first started smoking, I need to smoke a lot more now to be satisfied.	☐1	☐2	☐3
Compared to when I first started smoking, I can smoke much more now before I start to feel nauseated or ill. OR ☐5 I've never felt nauseated or ill from smoking.	☐1	☐2	☐3
I get dizzy or nauseous when I smoke my usual amount of cigarettes	☐1	☐2	☐3
I often run out of cigarettes quicker than I thought I would	☐1	☐2	☐3
I spend a lot of time getting cigarettes (going out of my way to a store where I know they will sell to me; trying to find someone who will buy them for me)	☐1	☐2	☐3
I spend a lot of time smoking cigarettes (chain smoking, smoking a lot throughout the day)	☐1	☐2	☐3
I've stopped hanging out with certain people because of my smoking	☐1	☐2	☐3

67. Now to finish off, a few questions about quitting smoking. At this point in time, how much do you really want to quit smoking cigarettes completely and forever?

☐1 Not at all

☐2 A little bit

☐3 Quite a bit

☐4 A whole lot

68. In the <u>past 3 months</u>, did you seriously try to quit smoking completely and forever?

☐1 No→ *Go to question 70*

☐2 Yes, once

☐3 Yes, two or more times

69. Think about the last time you tried to quit smoking. Did you quit smoking completely (for a while)?

- ☐ 1 No, but I cut down a lot
- ☐ 2 No, but I cut down a little
- ☐ 3 No, the amount I smoke didn't change at all
- ☐ 4 Yes → I quit completely for [ ] days
  write number of days
- ☐ 5 Yes → I quit completely and have remained nonsmoking ever since

70. How confident are you right now that you can or you have quit smoking completely and forever ?

- ☐ 1 Very confident
- ☐ 2 Fairly confident
- ☐ 3 Not very confident
- ☐ 4 Not at all confident

71. What is the MAIN REASON that you don't quit smoking now. Check ONE box only.

- ☐ 1 I don't want to, I enjoy smoking
- ☐ 2 It's become a routine that would be really hard to break
- ☐ 3 It's too hard because everyone around me smokes
- ☐ 4 My cravings for cigarettes are too strong
- ☐ 5 I have too much stress in my life
- ☐ 6 I feel uncomfortable when I stop smoking
- ☐ 7 I don't need to (because I smoke so little now)
- ☐ 8 Something else → Describe _____

THAT'S ALL! THANK YOU VERY MUCH.

HOW TO PLAY

First, read the list of words, then look at the puzzle. The words are found in all directions-vertically, horizontally, diagonally, backward. Circle each letter of word found and strike it off the list. The letters are often used more than once so do not cross them out. It is best to find the big words first. When you find all the words listed in the clues you'll have a number of letters left over that spell out the WONDERWORD. The answer is at the bottom of the page.

73. VEGETABLE SALAD

S	D	E	S	S	T	G	M	B	K	B	L	E	H	E
S	R	O	E	U	R	O	S	L	E	R	G	O	T	S
O	I	E	B	O	S	T	A	E	E	A	L	A	M	E
L	D	E	W	S	U	T	T	K	I	D	N	E	L	T
S	R	O	M	O	S	S	O	L	B	I	T	S	E	S
S	R	A	R	Q	L	H	O	R	M	S	C	K	E	K
K	L	P	U	E	C	F	C	R	R	H	S	O	F	R
L	S	A	A	I	S	R	E	N	I	A	T	N	O	C
P	S	V	T	N	T	G	A	R	B	A	C	O	L	L
H	E	R	G	N	I	N	N	U	T	S	T	T	I	T
S	A	B	I	W	N	A	R	O	U	I	A	H	G	S
D	P	G	B	U	E	E	P	U	R	E	L	G	H	I
U	E	A	A	L	T	E	V	I	N	E	S	I	T	O
B	A	L	S	A	E	P	K	C	I	H	C	R	Z	M
B	T	L	W	K	E	S	T	O	P	T	A	B	L	E

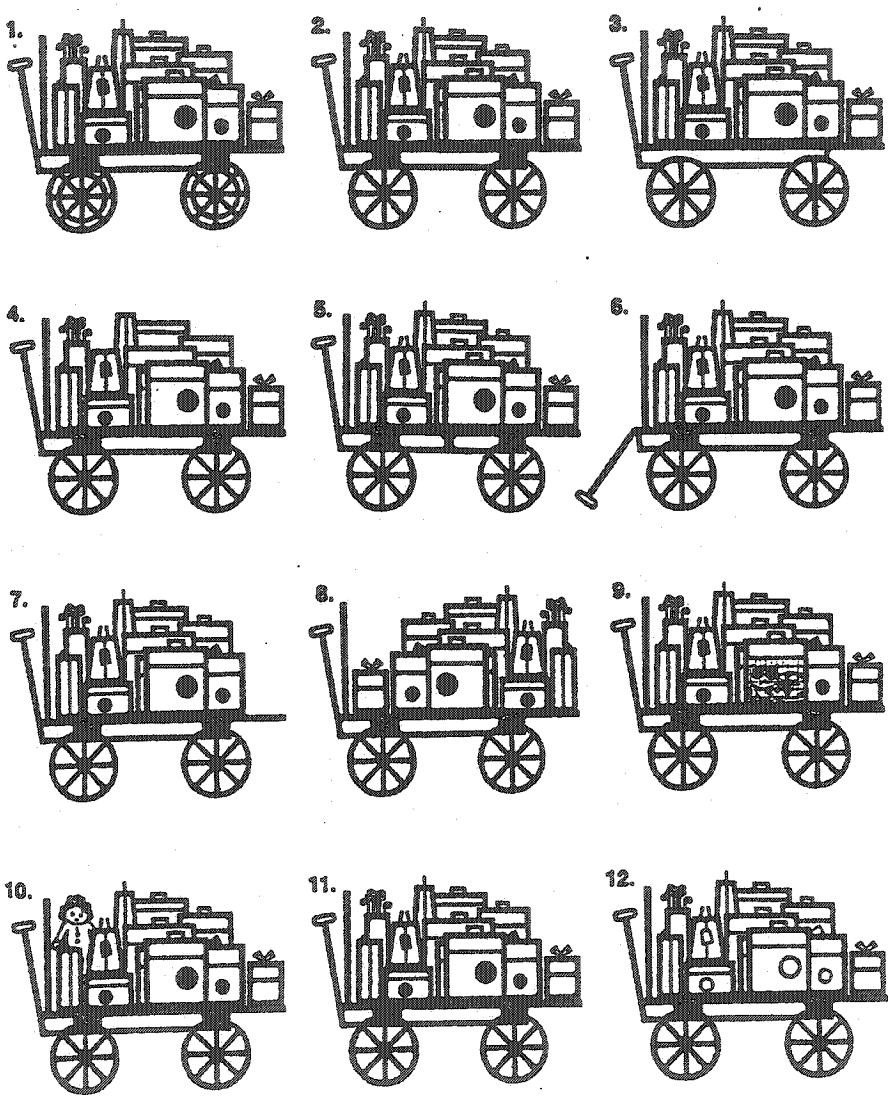
CLUES **Solution: 10 letters**

Annual, Artichoke; Basket, Beans, Beets, Begin, Blossom, Bright, Buds; Carrots, Chickpeas, Containers, Cool; Feel, Fertilize, Flowers, Foliage; Germinate, Grow; Hold; Keep; Leaves, Leek, Light, Loss; Moist, Moss; Neat; Pain, Peat, Pebbles, Potatoes, Pots, Pure; Radish, Root; Seeds, Small, Soil, Sprouts, Squash, Stalk, Stems, Stunning; Table, Tubers, Turnip; Vines; Water, Week, Work.

Answer: Delectable

MATCH-UP

Can you find the two pictures that are identical?



Answer: 2 & 11

DOODLE SHEET

Appendix 2

McGill University Study on Nicotine Dependence in Teens Questionnaire for School Administrators

MCGILL UNIVERSITY STUDY ON NICOTINE DEPENDENCE IN TEENS

Questionnaire for School Administrators

May/June 2002

1. **Name of school:** _____

2. **Are you the school... ?**

   ☐1 Principal

   ☐2 Vice-Principal

   ☐3 Other: _____
   Specify

3. **Today's date:** ☐☐ ☐☐ **, 2002**
   Day Month

4. **How many years have you worked in this school?**

   ☐☐ Years

5. **How many students were registered in your school on September 30, 2001 in ...?**

   Secondary I ☐☐ Secondary IV ☐☐

   Secondary II ☐☐ Secondary V ☐☐

   Secondary III ☐☐

6. **How many teachers currently work in this school...?**

   Full-time ☐☐

   Part-time ☐☐

7. **Does your school have a policy in regard to smoking on school property?**

☐1 No→ Go to question 13

☐2 Yes

8. **In what year was the (first) smoking policy implemented?**

[ ]

X7777 Don't know

9. **What is the current school policy <u>for teachers</u> regarding smoking on school property?**

☐1 No smoking anywhere on school property

☐2 Can smoke in a specific location(s) <u>outside</u> the school building

☐3 Other (specify)_____

10. **What is the current school policy <u>for students</u> regarding smoking on school property?**

☐1 No smoking anywhere on school property

☐2 Students in Secondary I and II cannot smoke <u>anywhere on school property</u>; students in Secondary III-V can smoke outside the building in designated locations

☐3 Other (specify)_____

11. **Does your school have any problems enforcing the current smoking policy?**

☐1 None → Go to question 13 ☐3 Some

☐2 Few ☐4 A lot

12. **Please describe the problem(s) enforcing the current smoking policy:**

_____

_____

13. **Have any outside speakers come to your school this year to talk with students about smoking?**

☐1 No

☐2 Yes

14. **Does your school distribute a written guide or handbook to students that describes the school smoking policy?**

- ☐ 1 No
- ☐ 2 Yes

15. **Have any students been warned, given a suspension, or otherwise disciplined by the school this year for smoking on school property?**

- ☐ 1 No→ Go to question 17
- ☐ 2 Yes

16. **Approximately how many students have been warned, given a suspension or otherwise disciplined this year for smoking on school property?**

☐ 1	Less than 10	☐ 5	40 to 49	☐ 9	80 to 89
☐ 2	10 to 19	☐ 6	50 to 59	☐ 10	90 to 99
☐ 3	20 to 29	☐ 7	60 to 69	☐ 11	100 or more
☐ 4	30 to 39	☐ 8	70 to 79		

For the following questions....

Tobacco Control Education - includes tobacco control curriculum, tobacco control activities, or both.

Tobacco Control Curriculum - lessons delivered during class time as part of a particular course.

Tobacco Control Activities - special events and/or programs in your school delivered during or outside of regular class time.

17. **Is tobacco control education (i.e. tobacco control curriculum and/or activities) a priority in your school?**

☐ 1	Very low priority	☐ 4	High priority
☐ 2	Low priority	☐ 5	Very high priority
☐ 3	Moderate priority		

18. **Is tobacco control education available to the students in your school?**

- ☐ 1 No→ Go to question 21
- ☐ 2 Yes

19. **How does tobacco control education fit into the curriculum?** (Check all that apply)

- ☐ 2 Smoking/tobacco is part of the health education program
- ☐ 2 Tobacco education is taught on its own
- ☐ 2 Tobacco education is taught within the context of other subject areas (e.g. with Family Studies, Biology, or Religion/Values)
- ☐ 2 Tobacco education is encompassed within extracurricular activities
- ☐ 2 Other (specify):

_____

20. **Approximately how many teachers or staff (i.e., school nurse) in your school are involved in tobacco control education?**

☐ Teachers

21. **Are there any activities or materials available at your school to help students quit smoking?**

- ☐ 1 No → Go to question 24
- ☐ 2 Yes

22. **What is the nature of the smoking cessation activities/materials?** (Check all that apply)

- ☐ 2 Group sessions held outside of school hours
- ☐ 2 Group sessions held at lunch time
- ☐ 2 Group sessions held during class time
- ☐ 2 Self-help materials
- ☐ 2 Individual counselling
- ☐ 2 Other (specify):

_____

23. **Approximately how many students participate in smoking cessation activities each year at your school?**

☐ Students

☐ 777 Don't know

24. How true are each of the following for you?

		Not at all true	A bit true	Very true
a.	Student smoking is a serious problem in this school.	☐1	☐2	☐3
b.	I believe preventing tobacco use among youth is important.	☐1	☐2	☐3
c.	I consider the tobacco control education programs delivered at my school to be effective.	☐1	☐2	☐3
d.	I am concerned about tobacco control education in my school.	☐1	☐2	☐3
e.	I understand why some individuals consider tobacco control education to be important.	☐1	☐2	☐3
f.	I am interested in more information on the time and energy commitments that tobacco control education may require.	☐1	☐2	☐3
g.	I am interested in learning more about tobacco control education.	☐1	☐2	☐3
h.	I consider preventing tobacco use to be important for schools to address.	☐1	☐2	☐3
i.	I would like to explore the possibility of improving tobacco control education in my school.	☐1	☐2	☐3
j.	I am concerned about the health consequences of tobacco use.	☐1	☐2	☐3
k.	I believe that encouraging smokers to quit is important.	☐1	☐2	☐3
l.	I believe that providing a smoke-free environment is important.	☐1	☐2	☐3

25. **Now a few questions about physical activities. What time does your school…?**

Start in the morning (e.g. 8:30) ☐

Break for lunch (e.g. 12:00-13:00) ☐ Cycle 1

☐ - Cycle 2

End in the afternoon (e.g. 15:30) ☐

26. **Is there time set aside specifically for extracurricular sports activities during the school day?**

☐1 No

☐2 Yes Please describe: _____

_____

27. **What proportion of your students take the school or city bus to school?**

☐1 Few

☐2 Less than half (but more than few)

☐3 About half

☐4 More than half (but less than most/all)

☐5 Most/All

28. **In a normal school year with no ban on extracurricular activities (ECA), how many students participate in intramural sports (outside the regular physical education class)?**

☐1 Few

☐2 Less than half (but more than few)

☐3 About half

☐4 More than half (but less than most/all)

☐5 Most/All

29. **In a normal school year (no ECA ban), how many students participate in <u>extramural</u> (inter-school) sports?**

- ☐ 1 Few
- ☐ 2 Less than half (but more than few)
- ☐ 3 About half
- ☐ 4 More than half (but less than most/all)
- ☐ 5 Most/All

30. **Are the teachers/staff in your school who coach/supervise students in extracurricular sports compensated for their time (i.e., paid for coaching; given compensatory time; etc.)?**

- ☐ 1 None (no teachers/staff are compensated)
- ☐ 2 Some
- ☐ 3 All
- ☐ 7 Don't know

31. **During a normal school year (no ECA ban), which of the following <u>intramural</u> sports are available at your school (at any grade level)?**

Yes		Yes	
☐ 2	Basketball	☐ 2	Cosom/Floor hockey
☐ 2	Soccer	☐ 2	Gymnastics
☐ 2	Football	☐ 2	Track and field
☐ 2	Rugby	☐ 2	Field hockey
☐ 2	Swimming	☐ 2	Cross-country skiing
☐ 2	Softball	☐ 2	Downhill skiing
☐ 2	Volleyball	☐ 2	Lacrosse
☐ 2	Hockey	☐ 2	Other (specify): _____
☐ 2	Badminton	☐ 2	Other (specify): _____
☐ 2	Weight room		

32. **During a normal school year (no ECA ban), which of the following <u>extramural</u> sports are available at your school (at any grade level)?**

Yes		Yes	
☐2	Basketball	☐2	Curling
☐2	Soccer	☐2	Gymnastics
☐2	Flag/touch/contact football	☐2	Indoor track and field
☐2	Football	☐2	Outdoor track and field
☐2	Rugby	☐2	Field hockey
☐2	Swimming	☐2	Cross-country skiing
☐2	Badminton	☐2	Downhill skiing
☐2	Softball	☐2	Wrestling
☐2	Volleyball	☐2	Lacrosse
☐2	Tennis	☐2	Other (specify): _____
☐2	Hockey	☐2	Other (specify): _____
☐2	Cosom/floor hockey		

33. **During a normal school year (no ECA ban), does your school offer any of the following special sports events (at any grade level)?**

Yes	
☐2	Track and field days
☐2	Outings to promote sports
☐2	Sports tournaments
☐2	Fund-raising sports activities (Jump Rope for Heart, Terry Fox Run, etc.)
☐2	Sports week/month
☐2	School dances
☐2	Ski trips
☐2	Other (specify): _____
☐2	Other (specify): _____

34. **During a normal school year (no ECA ban), is the gym in your school available to students for free play…? Is the free play supervised?**

	Available for free play			Supervised	
	Never	Sometimes	Often	No	Yes
Before school	☐1	☐2	☐3	☐1	☐2
At lunch	☐1	☐2	☐3	☐1	☐2
After school	☐1	☐2	☐3	☐1	☐2

35. **Does the current ECA ban affect sports activities at your school?**

☐1 No → Go to question 43

☐2 Yes

36. **Would you say the current ECA ban eliminated <u>intramural</u> sports in your school…?**

☐1 Not at all ☐3 Almost completely

☐2 Partially ☐4 Completely

37. **Would you say the current ECA ban eliminated <u>extramural</u> sports in your school…?**

☐1 Not at all ☐3 Almost completely

☐2 Partially ☐4 Completely

38. **Would you say the current ECA ban eliminated sports-related special events in your school…?**

☐1 Not at all ☐3 Almost completely

☐2 Partially ☐4 Completely

39. **Since the current ECA ban began in January 2002, has the gym in your school been available to students for free play…?**

	No	Yes
Before school	☐1	☐2
At lunch	☐1	☐2
After school	☐1	☐2

40. **Since the current ECA ban began in January 2002, have any of the following <u>intramural</u> sports been available at your school (at any grade level?)**

Yes		Yes	
☐2	Basketball	☐2	Cosom/Floor hockey
☐2	Soccer	☐2	Gymnastics
☐2	Football	☐2	Track and field
☐2	Rugby	☐2	Field hockey
☐2	Swimming	☐2	Cross-country skiing
☐2	Softball	☐2	Downhill skiing
☐2	Volleyball	☐2	Lacrosse
☐2	Hockey	☐2	Other (specify): _____
☐2	Badminton	☐2	Other (specify): _____
☐2	Weight room		

41 **Since the ECA ban began in January 2002, have any of the following <u>extramural</u> sports activities been available at your school (at any grade level?)**

Yes		Yes	
☐2	Basketball	☐2	Curling
☐2	Soccer	☐2	Gymnastics
☐2	Flag/touch/contact football	☐2	Indoor track and field
☐2	Football	☐2	Outdoor track and field
☐2	Rugby	☐2	Field hockey
☐2	Swimming	☐2	Cross-country skiing
☐2	Badminton	☐2	Downhill skiing
☐2	Softball	☐2	Wrestling
☐2	Volleyball	☐2	Lacrosse
☐2	Tennis	☐2	Other (specify): _____
☐2	Hockey	☐2	Other (specify): _____
☐2	Cosom/floor hockey		

42. **Since the ECA ban began in January 2002, have any of the following special events involving physical activity been available to students at your school? (at any grade level?)**

Yes

- ☐ 2 Track and field days
- ☐ 2 Outings to promote sports
- ☐ 2 Sports tournaments
- ☐ 2 Fund-raising sports activities (Jump Rope for Heart, Terry Fox Run, etc.)
- ☐ 2 Sports week/month
- ☐ 2 School dances
- ☐ 2 Ski trips
- ☐ 2 Other (specify): _____
- ☐ 2 Other (specify): _____

43. **How supportive of the ECA ban are the teachers in your school?**

- ☐ 1 Very unsupportive
- ☐ 2 Somewhat unsupportive
- ☐ 3 Neutral
- ☐ 4 Somewhat supportive
- ☐ 5 Very supportive
- ☐ 7 Don't know

44. **How supportive of the ECA ban are the students in your school?**

- ☐ 1 Very unsupportive
- ☐ 2 Somewhat unsupportive
- ☐ 3 Neutral
- ☐ 4 Somewhat supportive
- ☐ 5 Very supportive
- ☐ 7 Don't know

45. **How supportive of the ECA ban are the parents/guardians in your school?**

- ☐ 1 Very unsupportive
- ☐ 2 Somewhat unsupportive
- ☐ 3 Neutral
- ☐ 4 Somewhat supportive
- ☐ 5 Very supportive
- ☐ 7 Don't know

46. **How involved in school life are the parents/guardians of students in your school?**

- ☐ 1 Very uninvolved
- ☐ 2 Somewhat uninvolved
- ☐ 3 Neutral
- ☐ 4 Somewhat involved
- ☐ 5 Very involved
- ☐ 7 Don't know

47. **We would like you to think back to the previous ECA ban, which began in Fall 1999. How many months did that ban last in your school?**

☐ Months

☐777 Don't know

48. **How would you compare the impact of the 1999 ban with this current ban in terms of the impact on sports activities or special events involving physical activity? The 1999 ban had…**

☐1 A lot less impact

☐2 Somewhat less impact

☐3 About the same impact

☐4 Somewhat more impact

☐5 A lot more impact

☐7 Don't know

49. **How would you compare the teacher support of the 1999 ban with this current ban on ECA's? In 1999 the teachers were…**

☐1 A lot less supportive

☐2 Somewhat less supportive

☐3 About the same

☐4 A little less supportive

☐5 A lot more supportive

☐7 Don't know

THANK YOU VERY MUCH!

Appendix 3

Ethics Certificate

RÉGIE RÉGIONALE DE LA SANTÉ ET DES SERVICES SOCIAUX
DE MONTRÉAL-CENTRE

APPROBATION DU PROJET PAR LE COMITÉ D'ÉTHIQUE

Le Comité d'éthique de santé publique de la Régie régionale de Montréal-Centre a examiné le projet de recherche :

A prospective study on the natural history of nicotine dependence

Soumis par: *Madame Jennifer O'Loughlin*

Le comité d'éthique a conclu que la recherche proposée respecte les règles éthiques en santé publique définies par la Régie régionale de Montréal-Centre.

Membres du comité:

M. Denis Allard	*Agent de recherche*
Dr. Robert Allard	*Médecin*
Mme Lorraine Bernier	*Agente de recherche sociosanitaire*
Dr. Nicole-Hébert-Croteau	*Médecin-conseil*
M. Alain Gauthier	*Secrétaire général, C.S. Marguerite Bourgeois*
Mme Marie Hirtle	*Avocate*
Mme Marcelle Monette	*Conseillère à la recherche et au développement professionnel*
Mme Francine Tardif	*Sociologue consultante*
M. Claudio Zanchettin	*Professeur en philosophie*
Dr. Bernard Heneman	*Médecin-conseil et président du comité*

Président du comité

99-04-07
Date

Note: Le présent certificat n'est valide que si une preuve d'acceptation du protocole pour son évaluation scientifique a été déposée auprès du comité d'éthique de la santé publique.

certifica.eth