

Research Article

Assessing the Relationship between Tobacco Control School Policies and Adolescent Smoking in Israel: A Multilevel Analysis

Riki Tesler^{1*}, Yossi Harel Fisch², Tanya Kolobov², Noa Shtainmetz², Irene Nebutovsky¹, and Ephraim Shapiro¹

¹The Department of Health Systems Management, Ariel University, Israel

²School of Education, Bar Ilan University, Israel

***Corresponding author**

Riki Tesler, School of Education, The Department of Health Systems Management, Ariel University, Israel, Tel: 9724543007323; Email: Riki.tesler@gmail.com

Submitted: 02 May 2017

Accepted: 18 June 2017

Published: 22 June 2017

ISSN: 2333-665X

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OPEN ACCESS**Keywords**

- Adolescence
- Tobacco smoking
- Health promotion
- School policies

Abstract

Cigarette smoking is one of the most dangerous behaviors affecting health. The World Health Organization (WHO) has stated that tobacco smoking is the second most common cause of death and is the fourth most dangerous risk factor for disease worldwide.

Health promotion policies can help reduce health-related risk behaviors and policies targeting risk behaviors have been gradually implemented across schools in Israel. This study identified the most effective school health promotion policy components and their association with risk behaviors, specifically tobacco smoking among adolescents.

Data from the random-sample Israeli 2011/12 Health Behavior in School-Aged Children (HBSC) survey was analyzed. This included interviews with 5,279 students in 95 Jewish public schools. In addition, 100 principals from the participating schools were interviewed to measure the extent of implementation of health promotion policies in their schools. A logistic hierarchical linear model (HLM) analysis was performed to simultaneously estimate the relationship between individual and school level factors with tobacco smoking.

Most variance in adolescent smoking was explained by student level variables including negative perceptions of school, lack of parental support for school issues, and time spent with friends. Among the school level measures, parental participation in health promotion intervention programs proved to be associated with lower rates of Adolescents Tobacco Smoking, over and above student characteristics. School health promotion policies should focus on parents' participation in intervention programs and should seek to improve students' perceptions of school and their sense of well-being to promote resilience.

ABBREVIATIONS

HBSC: Health Behavior in School Aged Children

INTRODUCTION

Many studies indicate that experimentation with risk behaviors increases during adolescence [1,2]. Behaviors such as tobacco smoking are often a means for adolescents to gain recognition, control, and a sense of independence [3]. Rates of smoking tobacco for Israeli youth are among the highest of the countries participating in the Health Behavior in School-Aged Children (HBSC) study, yet only recently has the Israeli Ministry of Education begun encouraging school principals to adopt and implement a health promotion policy in their schools [4].

The current study is grounded in the bio-ecological model of Bronfenbrenner that defines four major levels of environmental influences [5,6]. In particular, the study focuses on student level (microsystem) and school level (mesosystem) variables that can potentially affect smoking. Individual (microsystem) factors

that can predict risk behaviors among students include: parental support for issues related to school, students' perceptions of the school, perceptions of their peers as agents for acquiring knowledge and time spent with friends [7].

School-related (mesosystem) factors refer mainly to components of a health promotion policy that include: agenda setting, school rules, interventions, student involvement, and parental involvement [8-10]. The school system influences students by constituting a universal and normative environment to which youth belong until around the age of 18. In addition to its educational role, the school is also an important setting from a health perspective and can serve as a platform for advancing health issues, potentially affecting students' health-related attitudes and behaviors [10,11]. There is evidence linking policy and environmental change to desired youth tobacco use [12].

Schools and their existing infrastructure offer an ideal setting to impact students; indeed a coordinated approach to school health is the ecological model applied in the school setting [11,12].

A very significant factor contributing to a healthful environment at school is the establishment of a properly structured school health promotion policy under the guidance of the school principal [9,13]. The principal's perceptions, management, and policies can directly affect the development and design of a viable health-behavior culture to be adopted by students and teachers alike. Numerous studies have found a correlation between health-promotion policies and positive changes among students for a variety of risk behaviors [14-16].

For example, studies have shown that enforcement of rules and implementation of intervention programs regarding tobacco smoking cessation significantly decreases student smoking rates [17,18]. Given these prior findings, this study attempts to examine the correlation between individual level (e.g. parental support in school matters, student perceptions of school and social involvement) and school level (e.g. school health policy) factors on risk behaviors among adolescents in Israel, with important implications for health promotion policies and interventions.

The goal of this study is to understand which factors at the student level (e.g., parental support on issues related to school, perceptions of the school and of the student, and social involvement), and school health promotion policy level (e.g., agenda setting, school rules, intervention, student involvement, and parental involvement), are associated with tobacco smoking. It was hypothesized that higher levels among the student level characteristics are associated with lower tobacco smoking. It was also hypothesized that increased levels of health promotion policies are associated with lower tobacco smoking.

MATERIALS AND METHODS

The current study is part of the multinational project Health Behavior in School-Aged Children (HBSC), undertaken under the auspices of the World Health Organization (WHO). The HBSC is a school-based survey of adolescent health, behaviors and psychosocial determinants, carried out internationally every four years, using a methodological protocol standardized across countries [19].

This anonymous, self-administered in class includes questions on risk behaviors, school perception, parental support, and social connectedness [19]. This study was based on the Israeli data from the 2011 HBSC-WHO cross-national survey of children in 6th, 8th, 10th and 12th grade. It included 5,279 students in 225 classrooms from 95 Jewish schools. The class level response rate was 94.5% with a 99% response rate of children enrolled in participating classes. Our study in 2011-2012 also included a survey of the principals of the sampled schools to ascertain the degree of adoption and implementation of a health promotion policy. Of the 160 principals surveyed, 100 principals' responses were included in the study, after excluding those who were not from public secular or religious schools, lacked time or lacked interest in completing the survey. The Israeli HBSC research protocol received approval from the research ethics committees of both the Israeli Ministry of Education and Bar-Ilan University and this study was approved by the ethics of Ariel University. Data were collected with anonymous self-report questionnaires distributed in the classroom. Using the lists of classes and schools obtained from the Israeli Ministry of Education, a random stratified

two-stage cluster sample was obtained. The sample unit was a classroom, stratified by region, type of school and grade level with a maximum of two classrooms within each sampled school allowed.

For the first time since the implementation of the WHO HBSC project in the early 1980s, to our knowledge, school principals were surveyed. A questionnaire was administered by the research team to the principals of schools in which the students were sampled. Interview topics for the principals included commitment to health promotion in the school, the existence of school policies for regulation and enforcement of tobacco use, implementation of intervention programs, and participation of students, parents and teachers in health promotion activities.

Measurements

Dependent variables: The student level dependent variable was tobacco smoking, assessed using the question-

'How often do you smoke tobacco at present?' with several categories of responses: 'every day', 'at least once a week, but not every day', 'less than once a week' or 'never'. For analyses, a binary variable was created that compared those stating 'I do not smoke' against any level of smoking [20].

Level 1: Student Level Independent Variables: Level 1 independent variables were derived from self-reported data obtained from the student survey. Respondents' gender (0=female, 1=male), age group (6th, 8th, 10-12th) sector (secular or religious) were included in all models. Additional student level demographic variables are described below.

Material wealth was assessed by summing the scores of four items which comprise the HBSC Family Affluence Scale 16 "The summed score (ranging between 0-9) was then dichotomized as 0=low/medium and 1 =High. These classifications have been used by several national surveys.16 Cronbach's alpha was 0.81.

Parental support at school was measured by a five item scale related to readiness of parents to help the students, willingness to talk to teachers, encouragement to do well at school, interest in the student at school, and willingness to help with homework. Each item was measured on a 5-point scale (5=strongly agree; 1=strongly disagree). The resulting variable was built as an average of these questions. Cronbach's alpha was 0.83.

Student school perceptions was measured as average of twelve questions concerning four different dimensions of the variable: 1) general school perceptions; 2) student social relationships; 3) teacher-pupil relations; 4) rules and regulations. The questions are detailed in a previous HBSC survey that highlights the importance of the psychosocial school environment to students' health and health behavior.5 Responses were a Likert scale ranging from 1 to 5 (1=strongly agree; 5=strongly disagree). Cronbach's alpha was 0.85.

Social connectedness involved measures of excess time spent with friends was measured by days a week spent with friends after school and evenings a week spent out with friends from (0 to 7). Responses were recorded as 1 (0-3 days/nights out with friends), 2 (4-5 days/nights) and 3 (6-7 days/nights) Test-retest reliability was found to be moderate but acceptably stable [19].

Level 2: School Level Variables: In the principals' survey of the sampled schools, five factors were measured to assess the school's level of health promotion: Principals' commitment to health promotion in school was operationalized by the sum of the binary answers (1=yes, 0=no) to five different questions related to school mission statement referring to health promotion, health promotion implementation, membership in a health promoting school network, teacher hours dedicated to health promotion, and dedicating a staff member to health promotion. A higher summed score on the scale of 0-5 indicated a broader health promotion agenda in school. Cronbach's alpha was 0.74.

School rules regarding risk behavior was measured by three questions with binary answers (1=yes, 0=no) regarding smoking-related rules at school, practices when rules are broken and controlling compliance with these rules. A higher averaged score on the scale of 0-1 indicated a more consistent and strict applying of school rules. Cronbach's alpha was 0.80.

Implementation of school policies was operationalized by averaging the principals' answers to four questions (1=yes, a written policy; 2=yes, an informal policy; 3=no regarding a written policy about topics to be routinely discussed in lessons about smoking, having a program dedicated to health or mental health and having an anti-smoking program. A higher averaged score indicated a more activation an intervention program. Cronbach's alpha was 0.77.

Student participation was operationalized using the principals' responses to four statements about students being actively invited to participate in: development of school policies, organization of physical school environment, health promotion measure development, and planning and organizing school events. The responses involved a 5 point ordinal scale: never, rarely, sometimes, often and almost always. Answers were dichotomized as 1=yes (sometimes, often, almost always); 0=no (never or rarely). Cronbach's alpha was 0.77. Parental participation was operationalized by averaging the principals' responses to five statements: Parents of students in this school are actively invited to participate in: school policy development, organization of school physical environment, development of health promotion measures, planning school events, and health promotion school days. Responses involved a 5 point ordinal scale: never, rarely, sometimes, often and (almost) always. The items were dichotomized as 1=yes (sometimes, often, almost always); 0=no (never or rarely). Cronbach's alpha was 0.87.

RESULTS AND DISCUSSION

The conceptual framework for the international comparisons involves variables at two levels. Therefore, in order to assess student and school level predictors of tobacco smoking behavior, we ran a three step multilevel model (Table 3). The null model decomposes the variance and estimates the intra-class correlation at 45%. Model 1 included all student level variables, which resulted in a reduction of 35% in the variance among schools.

Addition of the school level variables in Model 2 reduced the variance among schools by an even larger amount, 49% compared with the null model. The student level variables proved to be stable between Table 1 and Table 2, except for the

sector (religious or secular) variable that became significant in the latter. Table 2 indicated that boys smoke 1.38 times more than girls and that smoking prevalence are 5.28 times greater in the higher grades than in the lower ones. Students from the secular schools are 1.67 times more likely to smoke than their peers in the religious schools, and more time spent with friends is associated with an increase of 64% in the smoking rate. As for the school level predictors, only parental participation was a significant predictor of smoking behavior, with a 36% lower rate of tobacco smoking in schools that have greater parental involvement.

Risk behaviors among adolescents are major public health concerns [1-4]. School constitutes an environment in which youth spend the majority of their day and the majority of the years during which they develop and mature [9,12]. Consequently, school is an appropriate framework through which to address these issues [10,11]. The current study focused on exploring which individual and school level factors correlate with adolescent tobacco smoking in Israel.

The results confirmed the student level hypothesis of lower prevalence of risk behaviors when parental support, school perception or social connectedness are higher. These findings are in accordance with previous studies showing that higher parental support and parental involvement in school matters are linked with lower rates of tobacco smoking [14-16]. In addition, this study showed that students who report negative school perceptions are more likely to report higher rates of risk-taking behaviors compared to students with positive school perceptions, consistent with previous findings about the relationship between school perception and tobacco smoking [11,17,21].

When school was perceived as a safe, structured and helpful place, students in this study were more likely to feel a sense of belonging, and the school then became a protective factor against starting to smoke tobacco. In addition, social involvement was found to influence tobacco smoking. We found that the more students are engaged in social interactions, the more likely they were to smoke tobacco. This can potentially be explained by

Table 1: Descriptive Statistics for Student Level Variables (N = 5279).

Variable				
Gender	Boys	Girls		
	52%	48%		
Age group	6 th	8 th	10 th -12 th	
	27%	22%	50%	
Sector	Secular	Religious		
	73%	27%		
		low+		
Family Affluence Scale	High	Medium		
	31%	69%		
	Mean	SD	Min	Max
Parental support	4.57	0.59	1	5
Negative school perception	2.46	2.51	1	5
Time spent with friends	2.56	1.51	0	7

Table 2: School Level Variables (N = 146).

Variable	N	Mean	SD	Min	Max
Principal's commitment to health promotion	95	0.28	0.32	0	1
School Rules about Smoking	95	0.86	0.3	0	1
Intervention program	95	1.16	0.58	0	2
Student participation in health promotion	95	3.44	0.59	1	5
Parental participation in health promotion	95	3.07	0.89	1	5

Table 3: HLM Models Predicting Adolescent Tobacco Smoking.

Smoking	Model 0			Model 1			Model 2		
	B	OR	OR CI	B	OR	OR CI	B	OR	OR CI
Intercept	-2.07***	0.13	0.09,0.17	3.9***	0.02	0.00,0.08	3.33***	0.04	0.01,0.13
Student level variables:									
Gender				-0.36*	0.7	0.51,0.94	-0.32*	0.72	0.52,0.99
Age group				2.78***	16.14	8.65,30.11	1.66***	5.28	2.09,13.33
Sector				0.32	1.37	0.71,2.61	0.54*	1.72	1.00,2.93
Family Affluence Scale				0.1	1.1	0.78,1.53	0.1	1.1	0.78,1.54
Parental support				0.47***	0.63	0.51,0.76	0.51***	0.6	0.48,0.74
Negative perceptions of school				0	1	0.94,1.05	0	1	0.94,1.05
Time spent with friends				0.48***	1.62	1.46,1.78	0.49***	1.64	1.48,1.81
School level variables:									
Agenda setting							0.29	1.34	0.67,2.65
School rules							1.15	3.15	0.87,11.39
Intervention							0	1	0.52,1.90
Students involvement							0.06	1.07	0.71,1.58
Parental involvement							1.03***	0.36	0.24,0.51
Variance components:									
u_0	2.75			1.77			1.4		
level-1, r	0.69			0.72			0.76		

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

adolescents' developmental characteristics, such as egocentrism, the tendency to conform, and to spend an increasing amount of time with friends [20].

This finding could also be explained by the increasing need to adjust and the fear of social criticism during adolescence, which may lead to experimentation with risk; these behaviors may be perceived to be the solution to feeling different, being criticized and wanting to impress [3]. In addition, the increasing amount of time adolescents spend away from parental supervision and the decrease of positive familial interaction may lead to negative interactions and the connection to risk behaviors [8,17].

The school level hypothesis that school structure and health policy variables were related to the risk and health behaviors of young people was only partly confirmed. No significant association was found between health promotion policies and risk behaviors

and few school characteristics were linked with students' health behaviors. However, among the school level measures, parental participation in health promotion intervention programs did prove to be associated with lower rates of risk behaviors such as smoking, over and above student characteristics.

In this study, greater parental involvement in developing, organizing and implementing school's health promotion policies was significantly linked to lower rates of tobacco smoking among participants. This finding is in accordance with the scientific literature, which emphasizes the importance of different ecological systems to a person's wellbeing [5-8,18]. This finding also shows the importance of parents, students and teachers coming together to lower risk behavior rates.

CONCLUSION

This study provides new insight into the links between

adolescents' ecology system and tobacco use from early adolescence to early adulthood. The multilevel analysis performed adds to our understanding of the factors that contribute to risk behaviors of youth by identifying consistent relationships between individual and school level characteristics and risk behaviors. It emphasizes the positive influence of parental participation in intervention programs, as part of the development, planning and implementation of school health promotion policies to reduce risk-taking behaviors and improve students' well-being.

ACKNOWLEDGEMENTS

This study used the HBSC-protocol of the 2011 WHO/EURO cross-national survey. The Israeli principal investigator of the 2012 survey is Yossi Harel-Fisch, Ph.D., of Bar-Ilan University.

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Cite this article

Tesler R, Fisch YH, Kolobov T, Shtainmetz N, Nebutovsky I, et al. (2017) Assessing the Relationship between Tobacco Control School Policies and Adolescent Smoking in Israel: A Multilevel Analysis. *J Addict Med Ther* 5(1): 1028.