RESEARCH ARTICLE

Correlates of Susceptibility to Smoking among Secondary School Students in Kota Tinggi District, Johor, Malaysia

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Abstract

Background: Smoking among adolescents has been linked to a variety of adverse and long term health consequences. "Susceptibility to smoking" or the lack of cognitive commitment to abstain from smoking is an important predictor of adolescent smoking. In 2008, we conducted a study to determine the psycho-sociological factors associated with susceptibility to smoking among secondary school students in the district of Kota Tinggi, Johor. Materials and Methods: Two thousand seven hundred students were randomly selected by proportional stratified sampling. Analyses on 1,736 non-smoking students revealed that prevalence of adolescents susceptible to smoking was 16.3%. Results: Male gender (aOR=2.05, 95%CI= 1.23-3.39), poor academic achievement (aOR 1.60, 95%CI 1.05-2.44), ever-smoker (aOR 2.17, 95%CI 1.37-3.44) and having a smoking friend (aOR 1.76, 95%CI 1.10-2.83) were associated with susceptibility to smoking, while having the perception that smoking prohibition in school was strictly enforced (aOR 0.55, 95%CI 0.32-0.94), and had never seen friends smoking in a school compound (aOR 0.59, 95%CI 0.37-0.96) were considered protective factors Conclusions: These results indicate that follow-up programmes need to capitalise on the modifiable factors related to susceptibility to smoking by getting all stakeholders to be actively involved to stamp out smoking initiation among adolescents.

Keywords: Susceptibility - adolescents smoking - Kota Tinggi, Malaysia - psycho-socio factors

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Introduction

Cigarette smoking is the leading preventable cause of mortality in Malaysia for the past three decades (Ministry of Health, 2003). Ministry of Health (MOH) aims to reduce the smoking prevalence by half by the year 2020 (Norsiah, 2013). This is to ensure that diseases related to smoking will not be a major public health problem from 2020 onwards. To prevent adolescent non-smokers from being initiated into smoking is one of the initiatives taken by MOH to achieve the objectives mentioned above. This is due to fact that 80% of adult smokers started smoking during their adolescent years (USDDHD, 1994) and those who did not smoke during adolescence were less likely to start smoking during adulthood (Chen and Millar, 1998). In addition, studies showed that once smoking has begun, cessation is difficult, and smoking is likely to be a long term addiction (Pierce and Gilpin, 1996). It was estimated that the median cessation age, for those who began smoking in adolescence and born between 1975 and 1979, was 33 years for men and 37 years for women. Furthermore studies also found that adolescents who smoked were more likely to use alcohol and other kinds of drugs. Use of tobacco products in whatever manner has shown that tobacco is the "gateway drug" preceding the initiation and subsequent regular use of substances such as alcohol, cannabis and other illicit drugs (Fleming et al., 1989; Kandel, 1996).

Researchers such as Laventhal and Cleargy in 1980 found that a paradigm shift about the benefits of smoking and the formation of a positive attitude towards this habit preceded smoking initiation among adolescents. The cognitive shift which occurred would cause them to begin entertaining the possibility that he or she might try a cigarette in the future. Pierce et al. (1996) defined this cognitive shift as a susceptibility to smoking, where "Susceptibility" referred to a lack of a strong cognitive commitment to not smoke. According to Pierce et al. (1996) adolescents who were susceptible were more prone to be influenced from the social environment and media to try smoking, as compared to those who were not susceptible. Unger et al. (1997) who carried out a longitudinal study for two years on adolescents, found that adolescents who were in the "susceptible" category

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in the 7th grade were 3 times more at risk to try smoking after a period of 2 years compared to those in the "non-susceptible" category. Meanwhile, Difranza et al. (2006) reported that susceptible adolescents were 2-3 times more likely to become experimental smokers. Also, Jackson, (1998) found that cognitive susceptibility was the main predictor contributing to smoking initiation among primary school students after a period of one year. Pierce et al. (1996) also found that the susceptibility variable was the independent variable of utmost significance in the prediction of experimental smokers, compared to variables such as parents, siblings and friends who smoked. Huang et al. (2005) in a longitudinal study, reported that adolescents aged 14-17 who were susceptible to smoking were 2-3 times more at risk to begin smoking after a period of 2 years compared to those who were not susceptible. Whereas Lim et al. (2011) in their study in Kota Tinggi, Johor reported that the rate of smoking initiation after a one-year period was 3.7 times higher among those who were susceptible compared to those who were not susceptible. Studies by these researchers suggest that susceptibility is a concept which can be used to predict the smoking habits of adolescents who have not yet smoked.

The higher predictive quality of the susceptibility measure to identify adolescents who are at risk of smoking had driven many researchers to carry out studies to identify that psychosocial factors such as family member smoking (parents and elder brother smoking), peer smoking (Guindon et al., 2008), unsatisfactory academic achievement, smoking ban at home (Schultz et al., 2010) as the factors associated with being susceptible to smoking; unsatisfactory academic achievement, peer and family member who smoked, social norm which favour smoking at home made adolescents more susceptible to smoking compared to those not exposed to these risk factors. Gender and age group show inconsistent results - some studies show that female and younger age group were more susceptible to smoking whilst other show otherwise (Wilkonson et al., 2008), and some indicated no differences (Chen et al., 2009; Schultz et al., 2010). Although extensive studies had been carried out in developed countries over the last few decades, research regarding factors related to susceptibility-to-smoking is scarce in this country owing to the focus being mainly on prevalence and psychosocial factors associated with smoking. Not many investigations have been carried out to determine the prevalence and correlates of susceptibility-to-smoking. It is felt that understanding the factors related to susceptibility-to-smoking will enable proactive measures to be taken to reduce its incidence rate, and hopefully contribute to lowering smoking initiation among adolescents in the future.

This paper aimed to describe the prevalence and factors linked to susceptibility to smoking among secondary school students in the district of Kota Tinggi, Johor.

Materials and Methods

The data presented in this paper are baseline data from a three-year longitudinal study on adolescent smoking which began in March 2007. The data collection ended on December 2009. The main objective of the study is to identify the psychosocial factors for smoking, the stages of smoking acquisition and the influence of factors on susceptibility to initiate smoking among secondary school students (Forms 1, 2 and 4) in the district of Kota Tinggi in Johor. This project is collaboration between the Institute for Medical Research (IMR) and the Kota Tinggi District Health Office. Study design, and instrument design were carried out by IMR while data collections were coordinated and managed by the district Health Office. Data collection was jointly conducted by two collaborators, comprising of the Principal Investigator and Assistant Research Officers, and also trained public health nurses.

Sampling

Multi-stage stratified sampling was carried out. The first stratum was the division of the district into urban/rural/Federal Land Development Authority (FELDA) areas; the second stratum consisted of secondary schools: six schools were selected from FELDA settlements area, three schools from town areas and one school from a rural area. A list of selected students was then obtained from school administrators, and simple random sampling was used. The random numbers were generated by Epi Info version 6.04d.

A total of 2700 respondents were selected based on smoking incidence of 3.5% for Forms 1 and 2, and 6% for Form 4 students, setting the maximum tolerable error at 3%, design effect of 0.67, assuming intra-class correlation coefficient of 0.5 and average proportion of students per stratum at 0.33 as well as non-response rate of 30%. The numbers of students selected from each school were calculated in proportion to the total number of students in the schools.

Study instrument

The study instrument was adapted from validated questionnaires by Hanjeet et al. (2003) and Lim et al. (2006). The instrument was tested on Forms 1, 2 and Form 4 students in a pilot test in three schools in Kota Tinggi district in November 2007 (one school from each urban, rural and FELDA area) Minor improvements were made to the questionnaire following the pilot test.

The measure of susceptibility to smoking in this study were adapted from Pierce et al, (1996), which consisted of two questions: *i*) "Do you think you will smoke a cigarette next year?" *ii*) "If one of your best friends were to offer you a cigarette, would you smoke it?"

The choice of answers was: *i*) Yes; *ii*) Probably Yes; *iii*) Probably No; and *iv*) Not At All. If the respondent answers "Not At All" to both questions, they were categorized as "not susceptible to smoking" while those who gave other answers to both questions were categorized as "susceptible to smoking". Independent variables included Age, Gender, Peer family members who smoke (i.e father, mother, sibling), Number of friends who smoke, Smoking ban enforced at home, Respondent's perception of acceptability of smoking by society, Parents's acceptance of the smoking habit around them-this was measured

by Likert type scale (1-7), the higher score indicated a negative perception toward smoking.

Study protocol

Passive consent was obtained from the students' parents prior to the study. Before data collection was carried out, consent form and letter were send to parents or guardian of the selected respondents to inform them of their children's participation in the study. The letter contained a statement of the objectives of the study, assurance of confidentiality and volunteerism. They were requested to return the sign form to school management if they did not consented their children to participate in the study. No letter was received by the school management on data collection day. Implying of consented. As part of the steps for ensuring anonymity, students who agreed to participate were asked to put only their signatures on their questionnaires which only they will be able to identify, and they were instructed not to write down their names on the questionnaires to ensure that there was no means by which their questionnaires may be traced back to them by people other than themselves. In addition, no school staffs were allowed to observe the students completing the questionnaires on site.

The study was approved by the Ministry of Education and the Johor State Education Department and ethical approval was given by the Malaysian Ministry of Health. Questionnaires were self-administered by the students. For Forms 1 and 2 students, detailed explanations were given on each question, whilst for Form four students, brief explanations on the questions and instructions on how to fill the questionnaire were attached with the forms. Help was given to those who sought further clarifications on any of the items. Completed questionnaires were packed into envelopes and the envelopes were sealed in the presence of the respondents.

Data analysis

Data were analysed using SPSS Statistics software version 16.0. Chi squared test of Fisher's exact test were used to test for a significant association between categorical variables and independent t test for continuous data. Variables with value of p equal or less then 0.2 from the univariate analysis were included in multivariate analysis using Binary Logistic Regression. The backward likelihood step-wise method of logistic regression was used to test the association between smoking and the factors. The final model of factors was checked for fitness using Hosmer-Lemeshow goodness of fit test. The p value was not significant indicating the model had fit. The final model was also analysed for all possible two-way interaction, revealing no significant interaction in the final model. All statistical analysis was done at 95% confidence level. A p value of less than 0.05 was considered as statistically significant.

Definition

Ever-smoker: those who had smoked even one puff of cigarette before but had stopped smoking since the past six months.

Non smoker: those who had never smoke.

Results

Out of 2700 samples which had been selected, 2301 (85.2%) responded, 1763 respondents who had never smoked or who previously smoked but had stopped the habit since 6 months ago were included for further analysis. Out of 1763 respondents, 824 (48.0%) were male students while 894 (52%) were females. Of the 1763 non-smoking students, 287 (16.3%) were classified as "susceptible never smokers" and 1476 (83.7%) were classified as "non susceptible never smokers"; Those who ever smoked (28.3% compared to non smoker 10.1, p<0.001), had friends who smoked (22.5% compared to 9.5 among respondent who had no friend who smoked,

Table 1. Prevalence of Susceptibility to Smoking among Secondary School Students in Kota Tinggi District, Johor

Variable	Susceptible to smoking Yes n (%)	No n (%)	Chi Square value	p value
Gender (n=1718)				
Male	173 (21.0)	651 (79.0)	48.5	<0.001
Female	81 (9.1)	812 (90.9)		
Form (1721)				
1	78 (12.8)	539 (87.2)	2.94	0.23
2	106 (15.2)	578 (84.5)		
4	68 (16.2)	351 (83.8)		
Smoking experience (n-1716)				
Ever smoker	121 (28.3)	306 (71.7)	85.6	<0.001
Non smoker	130 (10.1)	1159 (89.9)		
Locality of schooling (n-1702)				
Felda	140 (13.5)	894 (86.5)	2.51	0.11
Urban dan Rural	109 (16.3)	559 (83.7)		
Friend smoking (n=1705)				
None	97 (9.5)	925 (90.5)	55.6	<0.001
≥1	154 (22.5)	529 (77.5)		
Father smoking (n-1482)				
Yes	124 (16.2)	643 (83.8)	3.24	0.072
No	92 (12.9)	623 (87.1)		
Elder Brother smoking (n-1047)				
Yes	106 (16.8)	524 (83.2)	3.75	0.054
No	54 (12.9)	363 (87.1)		
Smoking Ban at home (n=1650)				
Yes	53 (15.3)	294 (84.7)	0.2	0.886
No	195 (15.0)	1108 (85.0)		
Academic Achievement (n-1657)				
Mostly A and B	87 (10.7)	729 (89.3)	17.4	<0.001
Mostly C to E	150 (17.8)	691 (82.2)		
Strict School regulation against students smoking (n=1703)				
Yes	197 (13.8)	1228 (86.2)	4.44	0.035
No	52 (18.7)	226 (81.3)		
Ever seen friends smokingIn school compound (n=1709)				
Yes	154 (19.5)	636 (80.5)	27.1	<0.001
No	97 (10.6)	822 (89.4)		

Table 2. Perception of Respondents Toward Society Perception of Adolescent Smoking and Parents Reaction Toward Adolescent Smoking by Susceptible Group

Variable	Respondent perception score Not susceptible	Susceptible	T value	p value
Society perception of adolescent smoking	5.62	5.49	0.33	0.32
Parents reaction toward adolescent smoking	6.6	6.36	2.43	0.016

Table 3. Multivariable Analysis of Psycho-Socio Factors with Susceptibility to Smoking among Secondary School Students in Kota Tinggi district, Johor

Variable			Crude OR (95% CI)	Adj. OR (95% CI)
Gender	Male		2.67 (2.01-3.54)	2.27 (1.22-4.22)
	Female		1	1
Age	13		1	
	14		1.25 (0.91-1.71)	
	16		1.32 (0.93-1.88)	
Smoking experience				
	Ever smoker		3.53 (2.67-4.65)	2.17 ((1.37-3.44)
	Non smoker		1	1
Locality of schooling				
	Felda		1	
	Urban dan Rural		0.80 (0.61-1.05)	
Friend smoking		None	1	1
		≥1	2.78 (2.11-3.66)	1.76 (1.10-2.83)
Father smoking		Yes	1.31 (0.98-1.75)	
		No	1	
Elder Brother smoking		Yes	1.42 (0.99-2.03)	
		No	1	
Academic Achievement				
	Mostly A and B		1	1
	Mostly C to E		1.82 (1.37-2.42)	1.60 (1.05-2.44)
Strict School regulation against students smoking				
	Yes		0.70 (0.50-0.98)	0.55 (0.32-0.94)
	No		1	1
Ever seen friend/s smoking inside and outside school compound				
	Yes		1	1
	No		0.49 (0.37-0.64)	0.59 (0.37-0.96)
	Parents reaction toward adolescent smoking		0.89 (0.81-0.97)	

*Hosmer Lemeshow 8.013 df-7 and p=0.331

p<0.001) or with unsatisfactory academic performance (obtained C-E) 17.8%, compared to 10.7% among respondents who obtained mostly A and B 10.7%, p<0.001) were more likely to be susceptible to smoking, whereas those who perceived that non-smoking rules were strictly enforced in school (13.8% compared to 18.7%) and those who had never seen their friends smoking in school were less susceptible to smoking (10.6 compared to 19.5%, p<0.001) (Table 1).

Respondents who perceived that parents may give a negative reaction if they smoked were found to be less susceptible to smoking (mean score 6.6 compared to 6.36, p=0.016), while there was no significant difference in mean score of society's reaction towards adolescent smoking cigarettes. (Table 2)

Multivariable analysis revealed that the variable of having friends who smoked (aOR 1.76, 95%CI 1.10-2.83), had smoked (aOR 2.17, 95%CI 1.37-3.44) unsatisfactory academic performances (C-E) [aOR 1.60 (1.05-2.44)] and the male (aOR 2.27, 95%CI 1.22-4.44) gender lead to a higher risk of susceptibility to smoking, whereas the variable of those assuming the strict enforcement of non-smoking rules in school (aOR 0.70, 95%CI 0.50-0.98) as well as never seeing their friends smoking in inside and outside school compound (aOR 0.49, 95%CI 0.37-0.64) were protective factors to susceptibility to smoking (Table 3).

Discussion

The vision of MOH is to establish Malaysia as a country of healthy individuals, families and society through a health system that is just and equitable, efficient, feasible, obtainable, technologically suitable, customer-friendly and compatible with the environment. This has seen various programmes being implemented including a healthy lifestyle programme aimed at reducing the prevalence of smoking by half, and making smoking-associated diseases no longer a public health concern by 2020. The majority of adolescents in Malaysia do not smoke but they are open to various exposures which may possibly cause them to smoke in the future. Pro-active steps should be taken to reduce health and social problems linked to smoking. The identification of smoking-susceptible persons and associated factors is one of the primary preventive steps to be taken towards reducing the incidence of smoking among adolescents.

The prevalence of susceptibility to smoking in this study is 16% (male 21% and female 9.1% respectively). The rate is high when compared to other Asian countries such as Thailand (9.0%), China (7.0% in Shanghai, 6.8% in Tianjin, 5.7% in Zuhai) (CDC, 2012) and Taiwan (11.3%) (Chen et al., 2009), albeit lower compared to the USA prevalence rate (21.3% and 22.9% for US junior and senior schools respectively) (Marshall et al., 2006) and 28.2% among grade 9 to 12 students in Canada (Wiwon et al., 2011), The high rate, especially among male students, is worrisome and appropriate measures should be taken to prevent this group from being ensnared into this unhealthy practice in the future. Interestingly, the results in this study also indicate that the proportion of susceptibility-to-smoking among male to female is smaller (2.2-1.0) if compared to the proportion of current smokers among male and female adolescents (30-1). This may indicate that the prevalence rates for women in the country may increase in the future. There are also significant differences among males and females in our study when compared to those in developed nations (Huang et al., 2005; Primack et al., 2007). The differences may due to the traditional gender roles in the Malaysian culture, where the male gender is still predominant, despite the rapidly changing socio-economic conditions.

Males were found to be twice as susceptible to smoking as females. The results of this study were contrasted with results reported by Castrucci et al.(2002), Unger et al. (2001) Chen et al. (2009) and Leatherdale et al. (2010) who reported otherwise. These results, however, were consistent with the results of a study on Hispanic adolescents by Gritz et al. (2003) and Jeganathan et al. (2013) which reported the odd ratio of 1.93 (95%CI 1.29-2.89) and 3.08 (95%CI 2.32-4.09) for males. This phenomenon may be due to socio-cultural differences existing between respondents in this study and respondents in the studies by the aforementioned researchers, specifically smoking among females is not a norm in the Malaysian society. Arnett and Jensen in 1994 reported that cultures were associated with the practice of an individual, with smoking as an improper habit in eastern cultures, and this may explain the differences and contradictions, along with the additional parental attention to female respondents as reported in our previous study (Lim KH et al., 2011) on adolescents in this locality. Furthermore, the majority of adult smokers in the locality were males

and male adolescents may tend to emulate the behaviour through observation learning - social learning theory posits that learning is more effective among learners who are of the same gender, and this may be an additional factor. The factors discussed here may be a plausible explanation for the findings of this study. Even so, future studies are suggested on the mechanism of how social contexts may exert different effects on boys and girls in terms of prevention of smoking.

The influence of peers in this study is more pertinent when compared to family members who smoked, as having friends who smoked (even if it is just one person) would increase the risk of a person becoming more susceptible to smoking; the result is in line with Gritz et al. (2003) (OR 4.32, 95%CI 2.25-8.29), Leatherdale et al., 2005 (OR 1.26, (1.19, 1.34), Ertas, (2007) 1.98 (1.71-2.28) who all reported that peer influence was one of the main predictor of susceptibility-to-smoking among adolescents, while at the same time it was found that the variable, of 'Fathers and Brothers who smoked', did not contribute to greater susceptibility-to-smoking in multivariate analysis. This finding contradicts the study by Wilkinson et al. (2008), Ertas (2007), Chan and Leatherdale (2011) and Huang et al. (2012) that says respondents with a brother or parent who smoke were more likely to be susceptible to smoking (OR 2.65; 95%CI 1.48-4.76; 1.17; 95%CI 1.04-1.31; 1.35; 95%CI 1.16-1.58); this could be due to the older age of respondents in the current study compared to the other studies which show that parents' influence would gradually decline as their children grew older because parental control naturally slips with the increasing age of their offspring (Baumrind, 1991). Older adolescents were more likely to obtain autonomy from the family as they seek self-identity through increasing time spent on school activities and also becoming less involved with their parents. Therefore peers would become the main reference point in terms of the similarities shared between them, and they would become the source of emotional security and normative behavior. The values, attitudes and behaviors of peers tend to be more important when compared with those of their own family; where a choice is to be made, the adolescent would prioritize the peers' values. Bhojane et al.(2011) suggested that having friends who smoked would cause an adolescent to have a positive perception towards smoking, whereas Hammond 2005 suggested that "smoking seems to fulfill (for teens) the need of uniting one with an all important peer group". These two findings may be the most plausible explanations for the results of this study.

In accordance with previous reports (Zhu et al., 1996; Gritz et al., 2003; Azagba and Asbridge, 2013) our study showed that poor academic achievement (obtain mostly C-E grades) is significantly associated with higher susceptibility-to-smoking among adolescents. Adolescents' performance at school and their own plans for the future are likely to be related to their future socio-economic status, and thus may also be an indicator of their likelihood to smoke in the future (Baumrind et al., 1991). Studies by Bryant et al. (2000), Park et al. (2011) and Mcleod et al. (2012) suggested that poor academic performance is associated directly or indirectly with increased cigarette use among adolescents. According to a recent study by Morin et al. (2011), adolescents who do well in school are less likely to smoke. Hence, our results together with findings of other studies provide strong evidence that poor academic achievement increases the likelihood of smoking among adolescents. This could be partially explained by a study from Finland which revealed that students with low academic achievement reported weaker self-efficacy to refuse smoking, more favourable attitudes towards smoking, give in to stronger social influence from their peers, and have greater intention to smoke in the future compared to students with high academic achievements (Pennanen et al., 2011). In addition, it also may be due to stress suffered by the adolescents whose academic capabilities were unsatisfactory when set against an educational system which places importance on academic achievements. This could then encourage them to search for mechanisms to cope with such stressful situations, or, unsatisfactory academic performance may drive adolescents to redefine themselves as tough and sociable through the adoption of smoker images (from their perception), use smoking as a mechanism to help them cope with their academic failure to attract peer attention and uplift their own self-esteem. Certainly, further research is needed to determine whether there is a causal relationship between academic achievement and a lower risk of smoking.

Strict school regulations and never seeing peers smoking in school were "protective factors" from susceptibility-to-smoking. The finding is in line with the empirical work by Leatherdale et al. (2005) who reported that the odds of a non- smoker being more likely to be susceptible to smoking is high if he or she attends a school with smokers around, while breaking a school rule (including prohibition of smoking) was less likely to lead to increased susceptibility to smoking; this is also in line with Chen et al. (2013) who reported that school environment can cause a school to be a high risk place for smoking initiation. The finding also supports the theory by Flay et al. (1999) which posits that environment is one of the factors that influences human behavior. The increase in time spent by adolescents in secondary schools in our schooling system would increase the influence of the school environment on individuals, but with strict enforcement of school rules and the law which prohibits individuals below 18 years old from possessing or using tobacco products may help decrease the number of students who smoke in the school compound. This would create an environment where smoking is not a norm, thus reducing adolescents' susceptibility to smoking.

In this study, the percentage of susceptibility-to-smoking increases with age, from 12% among Form 1 (age 13 years old) to 15.2% (Form 2-age 14 years old) and 16.8% among those in Form 4 (16 years old); the finding is consistent with Chen et al. (2008), Elder et al. (2000), Carvajal et al. 2004, Ertas (2007) and Elton-Marshall et al. (2013) all reported the increasing trend of susceptibility with increasing age i.e, from 14% among 7th grader, 16.3% (8th grade) and 19.2% among high school students. The finding in the current study may also partially explain why susceptibility-to-smoking increases in inverse proportion

to the level of parental monitoring exercised, that is, as monitoring decreases with a growing child susceptibility increases (Carvajal et al., 2004; Waa et al., 2011; Ozturk et al., 2013). This lack of parental monitoring has also been shown to increase the risk of susceptibility-to-smoking in a previous study (Forrester et al., 2007; Jeganathan et al., 2013).

Those who had smoked ("ever-smoker") had twice the risk of susceptibility-to-smoking as compared to those who had never smoked. The finding was consistent to Elder et al. (2000), who reported "ever-smoker" were more likely to be susceptible to smoking (OR 1.81; 1.49-2.20). Our finding may be partially explained by the "familiar heuristic" process occurring in the cognitive domain of a person who has smoked before, where previous habits were kept and would influence future behavior. In addition, a previous study (Buller et al., 2003) had also shown that past smokers had more friends who smoked, and had a positive disposition towards smoking through mental imagery and glib advertising promoted by cigarette sellers where hazards of smoking were not publicised at all. They were also less concerned about the negative physical and social consequences and this would ultimately contribute to their being susceptible to smoking. Peer influence is a contributing factor to increased susceptibility as argued above.

In our study, we found no significant association between smoking ban at home and susceptibility-to-smoking among adolescents. Studies, however, by Szabo et al. (2006), Albers et al. (2008), Schultz et al. (2010) and Ayo-Yusuf et al. (2013) have consistently shown that home smoking bans reduce the likelihood of smoking susceptibility among adolescents. However studies by Proescholdbell et al. (2000) Fisher et al. (2007) and reported that a household smoking ban was not associated with youth susceptibility to smoking among high school students whose parents were smokers, indicating that a smoking ban at home may be effective to reduce the adolescent's smoking susceptibility only when parents were non-smokers. On the other hand, our study show that a smoking ban at home was not associated with susceptibility-to-smoking although parents were non-smokers. Several factors may account for this: the level of enforcement of a smoking ban at home may be different from other studies owing to cultural norms in Malaysia which emphasise polite personal relationships with others; this and the need to maintain decorum as required by custom may prevent an individual from asking others, such as relatives, not to smoke in their house, although the restriction applies to family members. Selective and inconsistent enforcements may reduce the effect of a smoking ban on adolescents. Previous studies (Biener et al., 1997; Albers et al., 2008) showed that consistent application of a rule or message is crucial if it is to be effective with adolescents. Some studies (Flay et al., 1999; Martinez-Donate, 2009) showed that partial smoking ban has not been effective in influencing children not to initiate smoking. Varying sample size, age groups and sampling methods used in the studies may be other factors which contribute to the contradictory results of this study and those mentioned above (Albers et al., 2008). Further studies to identify the factors which give similar results to this finding are recommended.

Studies showed that respondent-perceived scores on social and parental perception affects adolescents' susceptibility to smoking. It revealed that the stronger the perceived social or parental disapproval, the less likely they become susceptible to smoking (Collins et al., 1987; Peimack et al., 2007; Kong et al., 2012; Page et al., 2012). However, the univariate analysis demonstrated that only perceived parental disapproval exerted significant effect to reduced smoking susceptibility. Nonetheless, after controlling for confounding influences, parental disapproval on adolescent smoking was found to be not associated with smoking susceptibility (Table 3). These findings are contrary to those reported by other researchers (Collins et al., 1987; Sargent and Dalton 2001; Peimack et al., 2007; Kong et al., 2012; Page et al., 2012; Vazquez-Rodrigues et al., 2012). As early as in 1987, Collins et al. surveyed 3,295 urban teenagers aged 12 to 13 years and found that social disapproval was one of the significant predictors of future smoking. Moreover, in a cross-sectional and longitudinal study conducted by Sargent and Dalton (2001) amongst the rural Vermont (United States) students aged 9-16 years, they reported that approximately two-thirds of students who perceived that their parents strongly disapproved of smoking were 'non-susceptible never smokers', compared with those who did not perceive strong parental disapproval. Additionally, in the subsequent two years, the 'non-susceptible never smokers' were less than half as likely to become established smokers. Besides, Forrester et al. (2007) and Ozturk et al. (2013) also reported that relaxed parental attitude towards youth smoking was significantly associated with smoking susceptibility amongst the non-smoking students aged 12-14 years. Furthermore, Primack et al. (2007). also reported that a 1-level increase in response to family or peer disapproval of smoking caused 13% decrease in the odds of being susceptible to smoking. Recently, Page et al. (2012) elucidated that parental disapproval was the most robust normative beliefs associated with smoking susceptibility among Vietnamese adolescents. The opposing findings from the present study might be attributed by the differences in socio-economic, socio-demographic and cultural background between countries. Of note, data was collected from only one district and hence it might not reflect and represent the actual general characteristics of the Malaysian adolescent population on the predictive and protective factors of smoking susceptibility. However, the present findings suggest that neither social nor parental disapproval acts as protective factors against smoking susceptibility among the adolescents in Kota Tinggi. Hence, future country-representative survey should investigate these associations in order to provide consistent and reliable findings to policy-makers and stakeholders in the design and evaluation of smoking prevention programmes.

This study has several limitations, vis a vis, data were obtained from Wave 1 only, and longitudinal studies allowed only for associations between dependent and independent variables to be identified. Besides, receptivity to tobacco advertisement (direct or indirect), self efficacy,

social image, socio-economic status, exposure and access to health information, all previously shown to be associated with susceptiblility to smoking were not investigated in the current study. Answers given by the respondents were accepted without any biochemical verification. This study, however, had guaranteed the anonymity of respondents, and the absence of school staff in the study area enabled the respondents to answer the questions without fear and stress; findings in previous study (Kentala et al., 2004; Wilson et al., 2011) indicated a high level of consistency between questionnaire answers and biochemical verification of smoking status if the anonymity of respondents was protected. Despite the limitations, we feel confident that the study provides adequate information on factors associated with susceptibility to smoking among the adolescents in the country and that, it may provide useful cues for the development of effective strategies within future programmes designed to stem out the smoking scourge among our adolescents.

In conclusion, the result from the study suggests that proactive action should be implemented to reduce the risk of smoking among adolescents in the future, by reducing all the factors connected with the susceptibility to smoking. Early prevention of smoking programmes should begin before students proceed to secondary school, and emphasis should be stressed more on: *i*) Male students rather than female students; *ii*) All students who are not yet smokers but susceptible to smoking, that is, 'ever-smoker'; and *iii*) Non-smoker with friend/s who smoke. The programme should also actively promote the idea that tangible rewards always await those who achieve academic success. Proper implementation must include all stakeholders namely, parents, school authority and enforcement agencies, that is, a multi-prong strategy to be adopted to achieve optimum results in the campaign to reduce smoking initiation among adolescents in the future.

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