RESEARCH ARTICLE

Systematic Review of Smoking Initiation among Asian Adolescents, 2005-2015: Utilizing the Frameworks of Triadic Influence and Planned Behavior

Tajidah Talip*, Zaidah Murang, Nurolaini Kifli, Lin Naing

Abstract

Background: A recent WHO data report on mortality attributable to tobacco use including cigarette smoking indicated a very high burden of deaths in Asia and that people often initiate smoking as early as young adolescents. The objectives of this study were to systematically review peer-reviewed articles on cigarette smoking initiation among Asian adolescents and to develop a conceptual model of factors influencing smoking initiation by integrating all relevant factors based on existing data. Materials and Methods: Following a PRISMA guideline, a systematic review of articles published between 2005 and June 2015 was conducted using 5 databases on cigarette smoking initiation among adolescents (aged 10-19 years) living in Asia. We summarized the main findings of each study according to our research questions and data that emerged during the data extraction process. Analysis and categorization were based on the TTI and TPB models and classification of factors extracted from the study, were as follows: personal factors, social factors, broader environmental factors, mediators, and intention to initiate smoking and smoking behavior. Results: Of 1,227 identified studies, only 20 were included in this review. Our findings found that the mean age of cigarette smoking initiation ranged from 10 to 14 years and those who are more likely to initiate smoking are male, older adolescents, adolescents with low parental SES, individuals with low parental monitoring, low parental education level and having no discussion on smoking at home, those living in public housing and those exhibiting health-risk behavior. Our study also revealed that the risk of smoking initiation increased when they are exposed to smokers, influenced by peers, exposed to tobacco advertisements, receive pocket money, have lack of knowledge about smoking, have poor school performance, have a family conflict and have psychological problems. The conceptual model developed demonstrated complex networks of factors influencing initiation. Conclusions: This systematic review presents various factors influencing smoking initiation of the Asian adolescents and provides a conceptual framework to further analyze factors. Future studies should have a standard measure of smoking initiation, should analyze interactions and the intensity of relationships between different factors or variables in the conceptual model. This will in turn consolidate the understanding of the different factors affecting smoking initiation and will help to improve interventions in this area.

Keywords: Smoking initiation - systematic review - conceptual model - adolescents - Asians

Asian Pac J Cancer Prev, **17 (7)**, 3341-3355

Introduction

Cigarette smoking is one of the leading global causes of avoidable death worldwide (World Health Organization, 2008). Around 5.4 million of mortalities each year are due to smoking-related diseases such as cardiovascular disease, chronic obstructive pulmonary disease and some cancers (World Health Organization, 2008). A recent report by the World Health Organization (WHO) in 2012 on mortality attributable to tobacco use including cigarette smoking indicates that a very high burden of deaths was in ASIA and data indicates that they often initiate smoking as early as young adolescents (World Health Organization, 2012). Apparently, it is also estimated that every day between 3000 and 5000 adolescents try their first cigarette (World Health Organization, 2003). This is of concern, as the initiation of smoking in adolescence has been associated with higher addiction rates in adulthood and increases the risks of non-communicable diseases (NCDs) such as cancer, chronic heart and lung diseases (Tyas and Pederson, 1998).

Understanding factors associated to smoking initiation is felt to help and enable our policy makers and health professionals to develop and design culturally efficient and proactive measures to reduce the smoking incidence rate, and hopefully contribute to lowering smoking initiation

*Pengiran Anak Puteri Rashidah Sa'adatul Bolkiah (PAPRSB) Institute of Health Sciences, Universiti Brunei Darussalam, Gadong, Brunei Darussalam *For correspondence: 14h8402@ubd.edu.bn.*

among adolescents in the future. Ample of studies investigated factors associated with cigarette smoking initiation among the adolescents were documented (Tjora et al., 2011; O'Loughlin et al., 2014; Reidpath et al., 2014). However, despite the increased interest in studying adolescents smoking initiation behavior, we found no systematic review of published research on this area that focusing on Asian adolescents. Thus, the objectives of this systematic review were (1) to systematically review peer-reviewed articles on cigarette smoking initiation among the Asian adolescents, and (2) to develop a conceptual model of factors influencing smoking initiation by integrating all relevant factors based on existing data.

A visual overview of the current knowledge, through the development of a conceptual model, is particularly beneficial, in which it helps to illustrate the complex relationships at multiple levels (e.g. personal, social and environmental level) and the relationship between the various factors that are involved (Galea et al., 2010). To aid in developing conceptual model of factors contributing to adolescents smoking initiation, two health education models were applied; theory of planned behavior (TPB) and theory of triadic influence (TTI). The TPB is designed to explain human behavior in specific contexts, and in recent years a growing body of research has applied this theory to smoking behavior (Harakeh et al., 2004; Van De Ven et al., 2007). TPB assumes that attitude, behavioral control (self-efficacy), and subjective norm may predict and explain intention to initiate smoking and smoking behavior. While TTI, a tobacco-specific behavioral theory, does not only explain smoking behavior from an individual and socio-environmental factor, but also from broader contextual factors (e.g. school environment) (Murnaghan et al., 2008). Thus, both these theories were used as organizing theories for comprehensive and integrative analysis of smoking initiation process.

Understanding all the factors that might influence the initiation of adolescent smoking through a critical review of the literature and development of a conceptual model will potentially enable the development of effective public health program preventions and specific interventions for the Asian adolescents.

The following 3 search questions guided our research: (1) at what age does the Asian adolescents initiate smoking? (2) which young Asian adolescents initiate smoking? and (3) under what circumstances does smoking initiation among Asian adolescents commonly take place?

Materials and Methods

Data Sources

Following Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines, we searched 5 electronic computer indexed databases: MEDLINE/Pubmed, Web of Science, EBSCOhost, ERIC and Proquest. These databases were chosen as they are comprehensive and achieve articles that are most closely related to our topic. We limited our search to articles published from 2005 to June 2015 to ensure the most up-to-date research studies of the topic. We used the medical subject headings (MeSH) and free search terms 'cigarette (AND) smoking (AND) tobacco' crossed with terms identifying our population of interest, "adolescent OR young adult OR youth OR teenagers" (AND) "initiation OR uptake OR onset". Here, 'AND' was used in order to make the search results narrow and more specific, while 'OR' was used to broaden the search and combine words with the same or similar meaning. Hence, in this review we also included variations of the original search terms, for example, "adolescent smoking AND initiation OR uptake" to ensure our search was comprehensive. The search was performed from June 2015 till September 2015.

In this review, we applied the World Health Organization (WHO) definition as young people being aged between 10 and 19 years as 'adolescents'. However, since we were less clear on a definition of "smoking initiation", we therefore accepted other terms, especially when authors used the terms 'initiation' to describe the occurrence of smoking onset or the transition from non-smoker to experimental smoker or regular smoker.

Study Selection

Inclusion criteria specified that studies must be: (1) in Full-text, (2) English language literature - to ensure no bias in translation, (3) Research studies only - to ensure the articles retrieved had gone through the research process and (4) Publication year from 2005 to June 2015 - to ensure the most up-to-date research studies of the topic, (5) Focused on adolescents aged between 10 to 19 years old; living in ASIA, (6) Exposure is not controlled by the investigator; through self-reported survey or self-reported interview, (7) Analysis and outcome must be on cigarette smoking initiation.

We excluded studies that (1) took place outside Asian countries, (2) studies focusing on other forms of tobacco apart from cigarette, such as e-cigarette, beedi, hookah, pipe, cigars, ganja, chillum, charas, gutka, khaini and zarda, (3) studies dealing with smoking cessation and (4) Grey literature, review papers and articles in the form of abstracts, letters, commentaries, newsletter articles or editorials.

Figure 1 depicts the number of records identified and excluded at each step. The initial combined search identified 1227 articles; from which 258 were removed as duplicates. Titles and abstracts were then reviewed for the remaining articles, from which 823 were excluded as they focused on other types of tobacco or non-tobacco and did not focus on smoking initiation. Two reviewers (T.T., Z.M.) then independently read the remaining 146 articles and coded them for inclusion or exclusion. Following the independent review, the two reviewers met to discuss preliminary findings and to reach a consensus on studies to be included. Of the 146 reviewed, we excluded 123 for the following reasons: 109 did not focus on Asian adolescents, 10 findings did not relevant to our target study population and research questions, and 4 rooted from biomedical and/or genetic research. Thus, we had a total of 23 articles for further analysis.

Data Extraction

Following data extraction process, study details were extracted into table. This was done by the previous two

reviewers (T.T., Z.M.). Both the reviewers discussed each articles to reach consensus regarding the study details. For each study the following information were extracted: study year, location, title of study, study design, objectives and results from the 23 selected articles. The information extracted were then organized into the following categories: study population, sampling technique, sample size, age range of sample population, evaluation tools used, measure of smoking initiation, age range of initiation and main results of each study. As for the measures of initiation, sub-categories were created whenever patterns developed. The primary results of each study were then extracted and summarized according to each of our research questions and noted any significant results (P≤0.05).

Assessment of Study Quality

The quality of the identified studies was then appraised or assessed using Reporting of OBservational studies in Epidemiology (STROBE) (Von Elm et al., 2007), using a rating scheme from weak to medium to strong. Only the articles that were rated as moderate to strong quality were included to inform the findings. In the process of appraising the articles, evaluation of the appropriateness of the study design for the research question and a careful assessment of the key methodological features of this design were the first and most important inclusion or components in the process, this then followed by assessment of other factors such as the suitability of the statistical methods used and their subsequent interpretation and etc. For descriptive studies, the appropriateness of the research design, recruitment strategy and data collection, potential researcher bias, ethical considerations, data analysis and reporting of study findings was reviewed for each individual study (Russell and Gregory, 2003; Curry et al., 2009). As a result, 5 studies were assessed as being high-quality studies; 15 studies were assessed as being of moderate quality and there were 3 low quality studies found and therefore were not include in the final findings.

Model Formulation

To meet the last objective of this review, all data that have been extracted were analyzed and then categorized based on the two existing models (TTI and TPB) and classification of factors extracted from the study, such as follows: personal factors, social factors, broader environmental factors, mediators, and intention to initiate smoking and smoking behavior. The development of this conceptual model was an iterative process based on discussion and re-examination by the reviewers (T.T., Z.M.). This will be further described in the following section below.

Results

Characteristics of study

Overall, 20 articles were included in this review. Studies reporting smoking initiation are summarized in Table 1. Of the included studies, 17 were cross-sectional, 2 were prospective studies and 1 was qualitative study. Study

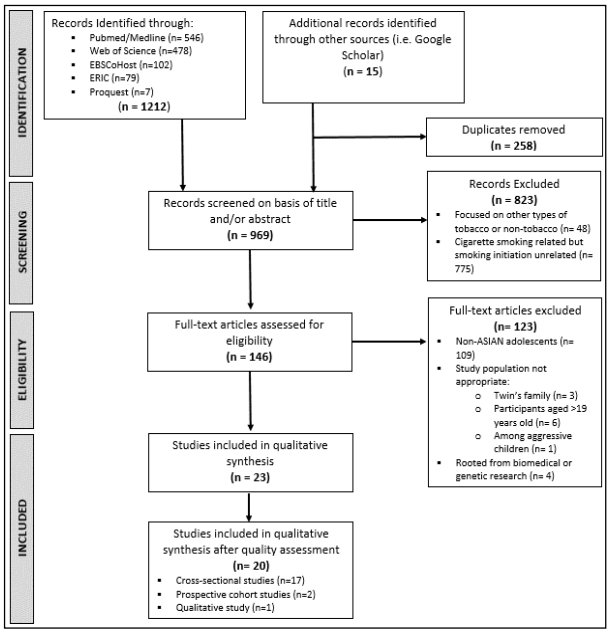

Figure 1. Search Strategy for Identification and Selection of Studies Relating Smoking Initiation among Asian Adolescents (PRISMA Flowchart)

Table 1. Overall Summary of Studies Reporting Smoking Initiation

Author /Year	Location	Type Of Study	Study Population & Age Of Study Population	sample size	Measure Of Initiation Used In Study	Key Findings Related To Smoking Initiation		Data Source
						Age of Initiation	Factors Associated With Smoking Initiation	
(Rahman et al., 2011)	Bangladesh	Cross-sectional Study	Secondary school students Age ranged: 13-16 Mean age: 14.1 years old	6563	"How old were you when you first tried a cigarette?"	10-11 years Mean: 10.8 ± 2.7 years	Multivariate logistic regression analysis: Important predictors (P<0.005): 1. Age: 1.79 times higher in students aged ≥16 2. Sex: Boys are 2.28 times likely to smoked than girls 3. Exposure to smoking at school: - Seeing ≥3 persons smoking (1.99x higher) - Smoking by teachers (2.14x higher)	1. GYTS) (WHO; CDC) 2. Additional: Bangladesh-specific policy options for tobacco free school.

Table 1. (Continued) Overall Summary of Studies Reporting Smoking Initiation

Author /Year	Location	Type Of Study	Study Population & Age Of Study Population	sample size	Measure Of Initiation Used In Study	Key Findings Related To Smoking Initiation		Data So urce
						Age Of Initiation	Factors Associated With Smoking Initiation	
(Li et al., 2010)	China	Cross-sectional study	Government secondary school students Age ranged: n/a[1] Mean age: 15.2 years old	995	"How old were you when you smoked a whole cigarette for the first time?"	<13 years	Strong association of adolescent smokingwith: 1. Advanced age 2. Male gender 3. Low family SES 4. Low school performance 5. Low education aspiration 6. Parental monitoring 7. Peer and family smoking 8. Approval of smoking from parents and friends 9. Psychological factors: depression, social alienation, low self-esteem.	U.S Youth Risk Behavior Survey, 2000.
(Mak et al., 2012)	Hong Kong	Cross-sectional study	Grammar and vocational secondary school students Age ranged: 13-18 years old	6533	"I don 't smoke now but I will smoke in future"	n/a	1. Having smoking parents 2. Having a smoking best friend	Health Related Behavior General (HRBG) Survey, 2000 – 2001
(Tang and Loke, 2013)	Hong Kong	Cross-sectional study	Secondary school students Age ranged: 11-18 years old	644	"Age at smoking initiation"	10-14 years	1. Having smoking parents 2. Having smoking friends 3. Type of residence: living in a poor environment 4. Lower behavioral control 5. Strongest predictor of smoking initiation was self-efficacy (low self-efficacy, lack of refusal skills) and smoking intention.	Study Specific: 1. The Restraint-Weinberger adjustment inventory (WAI) . 2. The Adolescent Coping Scale. 3. The Sociability Scale. 4. The Internal, Chance and Powerful Others Scale. 5. The Rebellious Scale. 6. The Rosenberg Self-esteem Scale 7. The Self-efficacy Scale related to adolescent smoking.
(Narain et al., 2011)	India	Cross-sectional study	Secondary school students Age ranged: 11-19 Mean age: 14.8 ± 1.6 years old	4786	"How old were you when you first tried a cigarette?"	<11 years Mean age of initiation was 12.4 years	n/a[3]	Global Youth Tobacco Survey (GYTS)
(Das et al., 2011)	India	Cross-sectional study	Secondary school students Age range: 14-19	2535	"Age of starting" and "Never smoked, never experimented, may try a cigarette soon"	14.7±1.4 years	Smoking initiation was found to be considerably influenced by: 1. Seen best friend smoke 2. Having seen father smoke 3. Having seen sibling smoke 4. Pocket money.	Questionnaires, prepared by Adolescent Health Clinic of Calcutta Medical College.

Table 1. (Continued) Overall Summary of Studies Reporting Smoking Initiation

Author /Year	Location	Type Of Study	Study Population & Age Of Study Population	sample size	Measure Of Initiation Used In Study	Key Findings Related To Smoking Initiation		Data Source
						Age Of Initiation	Factors Associated With Smoking Initiation	
(Bagchi et al., 2014)	India	Cross-sectional study	Co-educational high school students Age ranged: 15-19	526	"Age at initiation of cigarette smoking"	8 -9 years Mean age of initiation: 13.6 ± 2.4 years	1. Gender: Male 2. Having a smoking father 3. Having a smoking friend 4. Family conflict 5. Pornography addiction	Adolescent health screening questionnaires, prepared by Adolescent Health Clinic of Calcutta Medical College.
(French et al., 2014)	Indonesia	Cohort-prospective study	High school students Age ranged: 15-19	875	n/a	n/a	1. Friends' use of tobacco 2. Network affiliates' use of tobacco (only for boys)	Study specific
(Jafarabadi et al., 2012)	Iran	Cross-sectional study	High school students and employed and unemployed youth Age ranged: 14-19	850	n/a [4]	13.9 ± 2.21 years	1. Smoker friend 2. Substance-user friend	Study specific
(Karimy et al., 2013)	Iran	Cross-sectional study	High school male students Aged ranged: 16.5 ± 1.11 years .	365	"How old were you when you first tried a cigarette?"[2]	13.2 ± 1.9 years	1. Having parents who smoke (OR=4.75; 95% CI: 1.38-12.4) 2. Having smoking siblings (OR=4.21; 95% CI: 1.17-11.2) 3. Having smoking friends (OR=3.76; 95% CI: 1.20-11.8) 4. Knowledge about smoking (OR=0.75; 95% CI: 0.59-0.97) 5. Attitude towards smoking (OR=0.75; 95% CI: 0.65-0.86) 6. Self-efficacy (OR=0.82; 95% CI: 0.71-0.95) 7. Subjective norms (OR=0.84; 95% CI:0.72-0.98)	Study specific
(Ozawa et al., 2008)	Japan	Cross-sectional study	High school male students Aged ranged: 15 - 18	2012	n/a	n/a	1. Paternal (fathers) and parental (both mothers and fathers) smoking status 2. Academic education level 3. Time of first drinking experience and the frequency of drinking	Study specific
(McKelvey et al., 2013)	Jordan	Prospective study	High school students Aged ranged: 12.7 ± 0.61 years.	1781	Never smokers at wave 1 (2008) but began smoking cigarette by wave 4 (2011) Definition: Age at which a student experimented with cigarette for the first time"	11-14 years	n/a	Study specific

sample size ranged from 365 to 73, 850 participants for quantitative studies, while sample size for qualitative study was 27 participants. Participants consisted of secondary school students from government, non-government, grammar, vocational and co-educational schools, as well as employed and unemployed adolescents. Mean age of the participants and the measure of smoking initiation varied among the studies (Table 1).

Age of Cigarette Smoking Initiation

Out of twenty studies, eleven studies investigated age of smoking initiation of the participants (Li et al., 2010;

Table 1. (Continued) Overall Summary of Studies Reporting Smoking Initiation

Author /Year	Location	Type Of Study	Study Population & Age Of Study Population	sample size	Measure Of Initiation Used In Study	Key Findings Related To Smoking Initiation		Data Source
						Age Of Initiation	Factors Associated With Smoking Initiation	
(So and Yeo, 2015)	Korea	Cross-sectional study: Secondary analysis	High school students Aged ranged: 12-18 years	73, 850	n/a	n/a	1.Age 2. Sex: male students had a 2.31-fold higher risk of early smoking than female student 3. Health-risk behaviors such as alcohol intake, suicidal ideation, and sexual activity 4. Individual factors such as health status, subjective body image, and academic grades (low academic grades) 5. Family factors: Parental education level and having a family that approves of smoking at home. 6. Psychological variables such as self-esteem, self-efficacy, and self-control	Study specific
(Lim et al., 2010)	Malaysia	Cross-sectional study	Secondary school students Age ranged: 15-17 Mean age: 16 years	1045	"Age at which smoked first cigarette"	12-14 years	1. Sex: being male 2. Having more than 40% friends who smoke 3. Having a brother/s who smoke 4. Having poor academic achievement	Study specific
(Jeganathan et al., 2013)	Malaysia	Cross-sectional study	Secondary school students Age ranged: 12-18 Mean age: 16 years	2552	n/a	n/a	1. Sex: being male 2. Ethnicity 3. Peer pressure 4. Having a smoking best friend 5. Having a number of relatives who smoked 6. Parent-teen conflict 7. Absence of home discussion on smoking	Study specific
(Hock et al., 2013)	Malaysia	Cross-sectional study	Secondary school students Age ranged: 13-16	2301	n/a	n/a	Greater susceptibility to smoking initiation: 1. Sex: Male (aOR 2.27, 95%CI 1.22-4.44) 2. Having a smoking friend (aOR 1.76, 95%CI 1.10-2.83) 3. Unsatisfactory academic performances (C-E) [aOR 1.60 (1.05-2.44)]	Study specific
(Lim et al., 2014)	Malaysia	Cross-sectional study	Secondary school students Age ranged: 12-17	18, 870	n/a	n/a	Greater susceptibility to smoking initiation: 1. Sex: Male (aOR 3.36, 95% CI 2.70-4.18) 2. Ethnicity: Indigenous Sabahan and Sarawakian (aOR 1.62, 95% CI 1.21-2.18) 3. Had father/male guardian or both parents who smoked (aOR 1.48, 95% CI 1.21-1.82; aOR 2.32, 95%CI 1.22-4.44, respectively) 4. Stress (aOR 1.31, 95% CI 1.02-1.70) 5. Anxiety (aOR 1.19, 95% CI 1.01-1.40) 6. Depression (aOR 1.56, 95%CI 1.25-1.96).	Global School-Based Student Health Survey (GSHS), 2012

Table 1. (Continued) Overall Summary of Studies Reporting Smoking Initiation

Author /Year	Location	Type Of Study	Study Population & Age Of Study Population	sample size	Measure Of Initiation Used In Study	Key Findings Related To Smoking Initiation		Data Source
						Age Of Initiation	Factors Associated With Smoking Initiation	
(Pradhan et al., 2013)	Nepal	Cross-sectional study	Secondary school students Age ranged: 14-19	1312	"How old were you when you first tried a cigarette?"	13-15 years Mean: 13.8 ± 2.21 years	1. Curiosity 2. To relieve tension 3. Peer pressure	Global Youth Tobacco Survey (GYTS) 2001
(Lin et al., 2008)	Taiwan	Cross-sectional study	Secondary school students Age ranged: 14-19	3307	n/a	n/a	1. Curiosity 2. Stress 3. Friends: source of the participant's first cigarette. 4. Parents' marital status 5. Having classmate who offered cigarettes 6. Stronger attitudes against smoking and refusal self-efficacy were more likely to protect participants against initiating a smoking habit.	Study specific
(Ho et al., 2007)	China	Qualitative study (FGD)	High school girls Age ranged: 16-19 years	27	n/a	n/a	Factors influencing smoking initiation: 1. Appearance of cigarette brand logos on television. 2. Cigarettes advertised at sporting event. 3. Smoking beliefs: Participants believed celebrities who smoke look more glamorous and elegant. 4. Smoking in movies contributes to images of increased female glamour and sophistication. 5. Smoking friends at school. 6. Smoking teachers at school. 7. Misconceptions of the health effects of smoking. 8. Part of stimulations: smoking inspire and increases creativity when composing music.	Study specific

*[1] Age range was not clearly identified by the authors. [2] This study used a definition of smoking experimentation instead of initiation. [3] This study did not address specifically on 'cigarette smoking'. [4] Measure of age of initiation was not stated by the authors. n/a Data are not available.

Lim et al., 2010; Das et al., 2011; Narain et al., 2011; Rahman et al., 2011; Jafarabadi et al., 2012; Karimy et al., 2013; McKelvey et al., 2013; Pradhan et al., 2013; Tang and Loke, 2013; Bagchi et al., 2014). Overall, the mean age of initiation of cigarette smoking reported ranged from 10 to 14 years (Table 1), with a considerable number starting even earlier. A remarkably young age of smoking initiation reported was in Malaysia and Bangladesh, where students started smoking very early at the age of 5 and 7 years, respectively (Lim et al., 2010; Rahman et al., 2011). In one of the studies conducted in Japan, it was reported that over 30% of participants had their first smoking experience in the elementary school (Ozawa et al., 2008). All these findings show that all first use of cigarette occurs before they complete high school.

Asian Adolescents Who Initiate Smoking

Table 2 presents our findings associated with which Asian adolescents initiate cigarette smoking. Our findings revealed that gender, age, ethnicity, socio-economic status, level of education, type of residence and involvement in health-risk behaviors influenced smoking initiation. Those who are more likely to initiate smoking are male (Li et al., 2010; Lim et al., 2010; Rahman et al., 2011; Hock et al., 2013; Jeganathan et al., 2013; Bagchi et al., 2014; Lim et al., 2014; So and Yeo, 2015) and older adolescents

Table 2. Studies Addressing Research Questions on Which Asian Adolescents Initiate Smoking

Study	Primary Result
AGE	
Older adolescents are at risk for initiating smoking	
Li et al. (2010)	There is a strong association of cigarette experimentation/initiation with advanced age ($p \leq 0.05$).
Rahman et al. (2011)	Among Bangladesh government and non-government school students, those who aged 16 years and above are 1.48 times higher to initiate smoking than their younger counterparts.
So and Yeo (2015)	The proportion of youth who had experienced smoking in their lifetime increased with age.
GENDER	
Male adolescents are more likely to have initiated smoking compared to female adolescents	
Rahman et al. (2011)	In Bangladesh, male students were 2.28 times as likely to start smoking as were female students.
Li et al. (2010)	There is a strong association of cigarette experimentation/initiation with male gender ($p \leq 0.05$).
Bagchi et al. (2014)	It was reported that male students starting at a mean age of 13.5 years, which was 1.2 years earlier than the female students with mean age of initiation 14.7 years.
So and Yeo (2015)	In Korea, male students had a 2.31-fold higher risk of early smoking than female students did.
Lim et al. (2010)	The proportion of susceptibility to smoking among male students is higher than the female students, where male were 2.27 times as likely as female to initiate smoking.
Jeganathan et al. (2013)	In Malaysia, male participants were predominant in all the stages of smoking, including susceptible never smokers and experimenter stage, and had the highest odds of being a current smoker (aOR=8.00, 95% CI=4.03, 15.9)
Lim et al. (2014)	In another study in Malaysia, male adolescents were reported to be more susceptible to smoking; i.e. 3.36 times more likely than the female students.
Hock et al. (2014)	Male was found to have a greater susceptibility to smoking initiation, i.e. 2.27 times as likely to initiate smoking as were females.
ETHNICITY	
In Malaysia, Indigenous Sabahan and Serawakian are more likely to have initiated smoking	
Lim et al. (2014)	Indigenous Sabahan and Serawakian had higher likelihood of susceptibility to smoking; i.e.1.62 times as likely as other ethnic groups to initiate smoking. One possible explanation stated by the author could be easy accessibility of tobacco products as a result of smuggling from neighboring tobacco producing countries across the extensive maritime and inland borders of these Borneo states.
EDUCATION	
Majority had their first experienced with smoking in junior high school	
Ozawa et al. (2008)	Among the male high school students, majority (50%) had their first experienced with smoking in junior high school.
FAMILY CHARACTERISTICS	
Adolescents with low parental SES, low parental monitoring, low parental education level and having no home discussion on smoking are more likely to initiate smoking	
Li et al. (2010)	*Low parental SES and low parental monitoring:* Study analysis among secondary school students in China showed that there is a strong association of cigarette experimentation/initiation with those students with lower parental socioeconomic status (SES) and lower parental monitoring ($p \leq 0.05$).
So and Yeo (2015)	Parental education level: Parental education was found to be a stronger determinant of household socioeconomic status than household income was for smoking initiation among Korean adolescents.
Jeganathan et al. (2013)	Absence of home discussion on smoking: It was reported that absence of home discussion on smoking increase the odds of being a susceptible never smoker (aOR=1.62, 95% CI=1.23, 2.15)
TYPE OF RESIDENCE	
Adolescents who initiated smoking early are more likely living in a public housing	
Tang and Loke (2013)	Living in public/temporary housing (OR=1.92, 95% CI=1.24–2.97) was identified as one of the factors contributing to adolescent smoking initiation.
HEALTH-RISK BEHAVIOURS	
Health-risk behaviors such as drinking alcohol, sexual and suicidal ideation are significantly associated with smoking initiation among adolescents	
Ozawa et al. (2008)	*Use of alcohol:* A study conducted in Japan reported that an increased frequency of drinking was associated with starting smoking (OR=14.0, 95% CI = 8.08-24.3; 2-3 times/week vs. never).
Bagchi et al. (2014)	Pornography addiction of student: Those student who reported addicted to pornography were 3.1 times as likely to initiate smoking as students who did not report addicted to it.
So and Yeo (2015)	*Alcohol intake, suicidal ideation, sexual ideation:* Among health behaviors, health-risk behaviors such as alcohol intake, suicidal ideation, and sexual activity were found to be significantly associated with the risk of early smoking initiation in a Korean study.

(Li et al., 2010; Rahman et al., 2011; So and Yeo, 2015), adolescents with low parental socio-economic status (SES) (Li et al., 2010), low parental monitoring (Li et al., 2010), low parental education level (So and Yeo, 2015) and those having no discussion on smoking at home (Jeganathan et al., 2013). Those adolescents living in a public housing are also at greater risk of early smoking initiation (Tang and Loke, 2013). Apart from that, involvement of adolescents in health-risk behaviors such as drinking alcohol, sexual and suicidal ideation were also significantly associated with smoking initiation (Ozawa et al., 2008; Bagchi et al., 2014; So and Yeo, 2015). However, only one study reported that ethnicity has an association with smoking initiation. In Malaysia, the Indigenous Sabahan and Serawakian had a higher likelihood of susceptibility to smoking initiation that is 1.62 times as likely as other ethnic groups to initiate smoking (Lim et al., 2014).

Circumstances Under Which Smoking Initiation Took Place

Table 3 presents our findings associated with circumstances under which smoking initiation took place. Our findings revealed that adolescents who are exposed to smokers (e.g. family members, (best) friends, teachers and other social contacts) are more likely to initiate smoking than adolescents who were not exposed to smoking (Ho et al., 2007; Ozawa et al., 2008; Li et al., 2010; Lim et al., 2010; Das et al., 2011; Rahman et al., 2011; Jafarabadi et al., 2012; Mak et al., 2012; Karimy et al., 2013; Tang and Loke, 2013; Bagchi et al., 2014; French et al., 2014; Lim et al., 2014). Those reported seeing three or more persons smoking at school are also at increased risk of initiating smoking (Rahman et al., 2011).

Peer influence also plays a significant role in adolescents smoking initiation (Lim et al., 2010; Rahman et al., 2011; Jeganathan et al., 2013; Pradhan et al., 2013). Other reported circumstances where adolescents initiated smoking are when exposed to tobacco advertisements such as in the movies and sporting events (Ho et al., 2007), receiving pocket money (Das et al., 2011), having lack of knowledge about smoking (Ho et al., 2007; Karimy et al., 2013), having poor school performance (Li et al., 2010; Lim et al., 2010; Hock et al., 2013; So and Yeo, 2015), having a family conflict (Jeganathan et al., 2013; Bagchi et al., 2014) and having psychological problems such as stress (Lin et al., 2008; Pradhan et al., 2013; Lim et al., 2014; So and Yeo, 2015), depression (Lim et al., 2014; So and Yeo, 2015), anxiety (Lim et al., 2014), social alienation (Li et al., 2010) and low self-esteem (Li et al., 2010; So and Yeo, 2015).

While some studies examined factors leading to smoking initiation, some have investigated and reported several mediators of the relationship (Lin et al., 2008;

Table 3. Studies Addressing Research Questions on circumstances under which ASIAN Adolescents Initiate Smoking.

Study	Primary Result
EXPOSURE TO SMOKERS	
Adolescents who are exposed to smokers (family members, friends, teachers and other social contacts) who smoke are more likely to initiate smoking	
Li et al. (2010) Mak et al. (2012) Tang and Loke (2013) Das et al. (2011) Bagchi et al. (2014) Karimy et al. (2013) Ozawa et al. (2008) Lim et al. (2010) Lim et al. (2014)	*Exposure to smoking parents (father/mother/sibling(s) smoking):* § Students who initiate smoking are more likely to have family smoking. § Among never smoker adolescents in Hong Kong, it was reported that the presence of smoking parents have independent associations with their intention to initiate smoking. § In Japan, it was found that there was a significant increased risk to become a smoker when one parent is a smoker (OR=1.67, 95% CI=1.18-2.37) or when both parents are smokers (OR=2.94, 95% CI=1.66-5.18) compared to both parents being non-smokers. § Whereas in India, those adolescents having seen their sibling smoke were 2.4 times more likely to initiate cigarette use, as compared to those who didn't have or see their sibling smoke.
Rahman et al. (2011) Ho et al. (2007)	*Exposure to smoking teachers:* Exposure to smoking teachers appeared to be the strong predictor for students smoking behaviour (OR=2.21, 95% CI=1.58, 3.09). Analysis showed that smoking initiation was 2.14 times higher among the students who saw teacher's smoking compared to students not seeing teachers smoking.
Mak et al. (2012) Tang and Loke (2013) Das et al. (2011) Bagchi et al. (2014) Karimy et al. (2013) Lim et al. (2010) French et al. (2014) Jafarrabadi et al. (2012) Hock et al. (2013) Ho et al. (2007)	*Exposure to smoking friends:* § Students who are exposed to friends or best friends who smoke are more likely to initiate smoking. § Among never smoker adolescents in Hong Kong, it was reported that the presence of smoking friend have independent associations with intention to initiate smoking and intention to reinitiate smoking among ex-smoker. § In one of the studies conducted in Malaysia, it was reported that those students having more than 40% friends who smoke were 1.76 times as likely susceptibility to cigarette smoking.
Rahman et al. (2011)	*Seeing three or more persons smoking at school:* Student reported seeing three or more persons smoking at school were 1.988 times more likely to smoke than who does not.

Table 3. (Continued) Studies Addressing Research Questions on circumstances under which ASIAN Adolescents Initiate Smoking.

Study	Primary Result
PEER INFLUENCE	
Peer influence plays a significant role in adolescents smoking initiation	
Rahman et al. (2011) Jeganathan et al. (2013) Pradhan et al. (2013) Lim et al. (2010)	Peer influence (OR=1.99, 95% CI=1.18-3.36) known to influence students initiation of smoking. Having a best friend who smokes and high peer pressure to smoke not only increased the odds of being an ever smoker but also had higher odds of being a susceptible never smokers. Owing to peer pressure is one of the major reasons why the Nepalese secondary school students initiate smoking. In Malaysia, most of the current smokers started smoking in the company of friends followed by in the company of relatives.
EXPOSURE TO TOBACCO ADVERTISEMENT AT TELEVISION AND SPORTING EVENT	
Adolescents who are exposed to tobacco advertisements such as in the movies and sporting events are more likely to initiate smoking	
Ho et al. (2007)	In a qualitative study conducted in China, appearance of cigarette brand logos and, smoking in movies and cigarettes advertised at sporting events influenced female adolescents to initiate smoking.
RECEIVING POCKET MONEY	
Adolescents who receiving pocket money are more likely to initiate smoking	
Das et al. (2011)	Compared to adolescents who did not receive pocket money, adolescents receiving pocket money were 2.1 times as likely to initiate smoking.
POOR SCHOOL PERFORMANCE	
Adolescents having poor school performance are more likely to initiate smoking that those who do not	
Lim et al. (2010) Li et al. (2010) So and Yeo (2015) Hock et al. (2013)	In one of the studies in Malaysia, it was reported that students with unsatisfactory academic performances were 1.60 times more likely to initiate smoking than students with better performance. Study analysis among secondary school students in China showed that there is a strong association between cigarette experimentation or initiation and students having poor performance. Low academic grades significantly associated with early smoking initiation in Korean adolescents. Adolescents having poor academic achievement (obtain mostly C-E grades) 1.60 times as likely to be susceptible to initiate smoking as compared to adolescents achieving better grades (mostly A-B).
POOR KNOWLEDGE ABOUT SMOKING	
Lack of knowledge about smoking could be one of the most significant factors in predicting cigarette smoking initiation	
Karimy et al. (2013) Ho et al., (2007)	In a study conducted in Iran, non-smokers scored higher on the knowledge variable compared to the current smokers. Lack of knowledge could be one of the most significant factors in predicting cigarette smoking initiation, where adolescent smokers have less knowledge about the negative consequences than their nonsmoking counterparts, discount the addictive property, and negate the risks of experimental smoking. It was also reported that misconceptions on the health effects of smoking is one of the main factors influencing smoking initiation among female adolescents in China.
ATTITUDE TOWARDS SMOKING BEHAVIOR	
Attitudes towards smoking behavior could act as a motivating and/or mediating factor influencing smoking initiation	
Karimy et al. (2013)	*Positive attitude toward smoking:*
Lin et al. (2008) Li et al. (2010)	Male students who reported a more positive attitude toward smoking were more like likely to initiate smoking (OR=0.75; 95% CI=0.65-0.86). In turn indicates that stronger attitudes against smoking more likely to protect against initiating a smoking habit. Proved in a study conducted in Nepal.
So and Yeo (2015)"	Students perceiving their parents and friends approve of smoking are more likely to initiate smoking. Having a good subjective health status compared to an average status was significantly associated with experiencing smoking early in life in a study conducted in Korea. There was an association of having a thin or average body image with smoking initiation.
Ho et al., (2007)	A qualitative study conducted in China found that positive belief that smoking can improve self-image has influenced the adolescents to initiate smoking, where participants perceived that celebrities or those who smoke will look more glamorous, elegant and increased sophistication.
Ho et al., (2007)	In China, it was also found that positive belief that smoking inspire and increases creativity when composing music has influenced the adolescents to initiate smoking.

Table 3. (Continued) Studies Addressing Research Questions on circumstances under which ASIAN Adolescents Initiate Smoking.

Pradhan et al. (2013) Lin et al. (2008)	Majority of the secondary school students participating study in Nepal (41.1%) and Taiwan (49.4%) reported that they started smoking out of curiosity.
Study	Primary Result
HAVING SUBJECTIVE NORMS TOWARDS CIGARETTE SMOKING	
Subjective norms could also significantly predict intention to initiate smoking	
Karimy et al. (2013)	Having subjective norms towards cigarette smoking: It was reported that subjective norms of the adolescents on smoking could significantly predict intention to initiate smoking (OR=0.84, 95% CI=0.72-0.98).
HAVING PSYCHOLOGICAL PROBLEMS	
Having psychological problems such as being stress, depress, anxious and having low self-esteem are significantly associated with adolescents smoking initiation	
Li et al. (2010)	Depression, social alienation and lower self-esteem: reported as vulnerability factors in the process of smoking initiation. Smoking as a means of coping associated with lack of self-esteem.
So and Yeo (2015)	Having a low self-esteem was also reported to be associated with factors motivating or mediating smoking initiation. Having a low level of happiness and high level of stress were significantly associated with smoking initiation among Korean youth. Stress and depression were found to be two of the main motivational factors for smoking initiation.
Lim et al. (2014)	Adolescents who reported symptoms of stress, anxiety, or depression were found to be more susceptible to smoking than those without, even after statistically adjusting for other independent variables; (aOR=1.31;95% CI=1.02-1.70), (aOR=1.19;95% CI=1.01-1.40), (aOR=1.56;95% CI=1.25-1.96), respectively.
Pradhan et al. (2013)	Stress
Lin et al. (2008)	The second major reasons reported why the Nepalese and Taiwanese secondary school students initiated cigarette smoking was to relieve tension or stress.
HAVING LOW BEHAVIORAL CONTROL	
Behavioral control can acts as a motivating or mediating factor influencing smoking initiation	
Tang and Loke (2013)	Study conducted in Hong Kong proved that there is interaction between the level of behavioral control and smoking intention (OR=2.08, 95% CI=1.31–3.31). Basically, adolescents' decision on whether to take up smoking depends on their level of behavioral control over their smoking intention. This means that even in situations where adolescents have the intention to smoke, they may not smoke if their level of behavioral control is high.
So and Yeo (2015)	*Having low self-control:* Having a low self-control was reported to be associated with factors motivating or mediating smoking initiation.
HAVING LOW SELF-EFFICACY	
Adolescents having low self-efficacy and lack of refusal skills are more likely to initiate smoking	
Tang and Loke (2013) Lin et al. (2008)	Low level of self-efficacy to resist smoking was identified as one of the most significant factor contributing to adolescent smoking initiation (OR=6.32, 95% CI=2.63–15.2) in a study conducted in Hong Kong. It was reported that adolescents who are confident of their ability to resist the pressure to smoke may be better able to avoid smoking than those who are not confident; it was also found that refusal skills can be taught effectively. This therefore indicates that stronger refusal self-efficacy was more likely to protect them against initiating a smoking habit. This has been proved in a study conducted in Nepal.
Karimy et al. (2013)	In Iran, having a low self-efficacy was also identified as one of the most important predictors of smoking initiation (OR=0.82; 95% CI=0.71-0.95).
So and Yeo (2015)	*Having low self-efficacy:* Having a low self-efficacy was also reported to be associated with factors motivating or mediating smoking initiation in Korea.
FAMILY CONFLICT	
Adolescents having a family conflict are more likely to initiate smoking	
Bagchi et al. (2014)	Family conflict was found to be associated with smoking initiation at an early age. Adolescents with family conflicts were 5.6 times more likely to initiate smoking, compared to those who did not have any family conflict.

Karimy et al., 2013; Tang and Loke, 2013; So and Yeo, 2015), which in turns used to explain the influence of the factors on intentions to initiate smoking. Based on our findings, attitudes towards the behaviour (Ho et al., 2007; Lin et al., 2008; Li et al., 2010; Karimy et al., 2013; Pradhan et al., 2013; So and Yeo, 2015), subjective norms of smoking (Karimy et al., 2013; So and Yeo, 2015), perceived behavioral control (Tang and Loke, 2013; So and Yeo, 2015) and perceived self-efficacy (Lin et al., 2008; Karimy et al., 2013; Tang and Loke, 2013; So and Yeo, 2015), besides from being identified as direct influential factors of smoking initiation, they were also identified as mediators to smoking initiation and its intention.

It was found that adolescents having more positive attitude toward smoking were more like likely to initiate smoking (Lin et al., 2008; Karimy et al., 2013). This in turns indicates that stronger attitudes against smoking are more likely to protect them against initiating smoking. Those who perceived that their parents and friends approve of smoking were also more likely to initiate smoking (Li et al., 2010; So and Yeo, 2015). Having a good subjective health status (So and Yeo, 2015), a thin or average body image (So and Yeo, 2015), poor self-image (Ho et al., 2007), curiosity (Lin et al., 2008; Pradhan et al., 2013) and having a belief that smoking could inspire and increases creativity (Ho et al., 2007) were also associated with smoking initiation.

Having subjective norms of cigarette smoking could also significantly predict intention to initiate smoking (Karimy et al., 2013). On the other hand, adolescents' decision on whether to initiate smoking also depends on their level of behavioral control over their smoking intention. This means that even in situations where they have the intention to initiate smoking, they may not smoke if their level of behavioral control is high, otherwise, low level of behavioral control may enhance smoking initiation (Tang and Loke, 2013; So and Yeo, 2015). Finally, another most significant factor identified contributing to adolescent smoking initiation was when they have a low level of self-efficacy to resist smoking (Lin et al., 2008). Adolescents who are confident of their ability to resist the pressure to smoke reported they may be better able to avoid smoking than those who are not confident (Lin et al., 2008). This therefore indicates that stronger refusal self-efficacy was more likely to protect them against initiating a smoking habit.

Smoking Initiation Conceptual Model

A conceptual model of smoking initiation was developed based on the joined constructs of TTI and TPB. Initially, all data that have extracted were analyzed and classified based on three constructs of TTI; personal factors, social factors and broader environmental factor (Figure 2). Within each domain of influence, all variables were further categorized based on the classification of factors reported from the studies (e.g. demographics, psychological, familial factors, etc.) and discussions among reviewers. Secondly, as our findings encompassed several mediators (self-efficacy behavioral control, subjective normative beliefs about smoking and attitudes

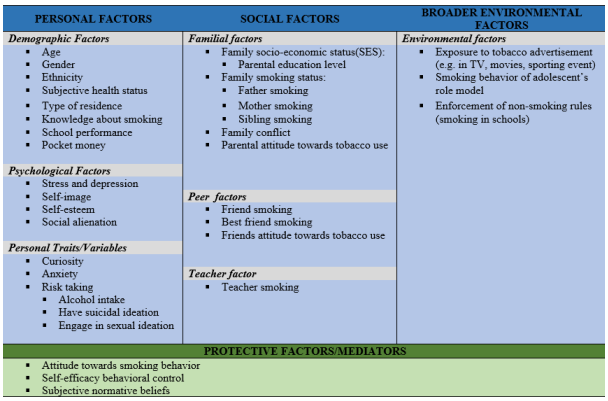

Figure 2. Personal, Social and Environmental Factors Influencing Smoking Initiation among Adolescents in Asian Countries

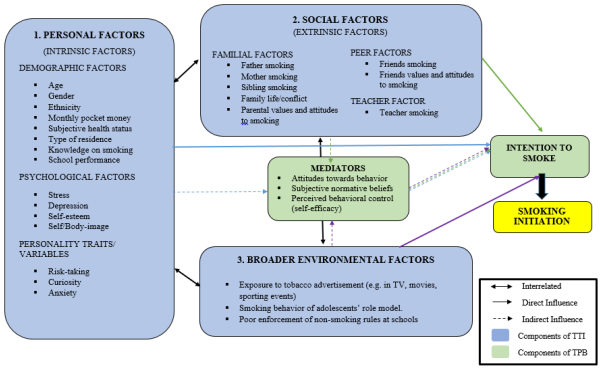

Figure 3. Integrative Conceptual Model on Factors Influencing Cigarette Smoking Initiation by Asian Adolescents. This model encompasses the 'big picture' of personal, social and environmental effects on behaviour, dividing them into three separate but interconnected streams

towards the behavior) consisted of construct TPB, we therefore incorporated these mediators into the existing model. 'Intention to smoke' was deliberately included as one of the variables in the model. As it is widely informed, 'intention' usually represents a decision to exert effort to perform the actual behavior (Ajzen and Madden, 1986; Higgins and Conner, 2003). Although there is a gap between intention and behavior, a measure of 'intention' remains a useful construct and is widely used in researches (Tickle et al., 2006; Brown et al., 2010). Furthermore, intention to smoke is considered to be the major or primary predictor of smoking behavior (initiation and progression) since numerous theories in social and health psychology assume that intention cause behaviors (Burton et al., 1989; Tickle et al., 2006). Thus, with the recognition of all those variables and two integrated models, a conceptual model of smoking initiation was developed (Figure 3). This model covers all factors influencing smoking initiation described in this review.

Discussion

Despite a considerable amount of research on adolescent smoking behavior, only few studies focused on the initiation of smoking among Asian adolescents. As the 20 articles reviewed here varied widely in their research methods, ages studied, sample population, and measure of initiation, we found direct comparisons among the

studies are difficult to establish. However, in spite of these challenges, this review however provides information on what is known about adolescents who initiate smoking and the circumstances under which they initiate smoking.

Similar to results from most non-Asian studies (Gilman et al., 2009; Tjora et al., 2011; Freedman, 2012), our findings found that familial and peer factors remain as predominant factors reported to influence adolescents smoking initiation. Kumar et al. in 2014 explained that family members, especially parents, who smoke is likely to influence adolescents; they are more likely to perceive smoking as a positive and acceptable behavior. This in turns helps them to develop favorable personal beliefs and subjective norms on towards cigarette smoking (Kumar et al., 2014). Empirical evidence also showed that adolescents with more smoking friends have a higher tendency to smoke (Kobus, 2003), where they can be influenced through two ways, through implicit influence such as through imitation and through direct influence such as direct pressure to smoke from his/her peers (Mercken et al., 2009).

Apart from age, most other factors did not differ significantly from factors influencing smoking initiation found in most non-Asian studies. Interestingly, we found that the mean age of initiation of cigarette smoking ranged from 10 to 14 years. This finding significantly indicates early age of initiation as compared to the age of initiation of adolescent living in other parts of the globe. The cross-country comparison of Global Youth Tobacco Survey (GYTS) conducted in most European countries such in Romania, Serbia and Hungary found that most adolescents initiated smoking at the age of 13 to 17 years old (Warren et al., 2000). Likewise, a systematic review conducted in Canada and United States revealed that the age of initiation ranged from 12 and 14 years (Freedman, 2012). One of the most possible explanations for this might be caused by cultural and geographical differences between these countries.

Based on our findings, it is suggested that future prevention efforts to reduce smoking initiation among Asian adolescents should target male students and should begin before they proceed to, and when they are in, high school. Proper implementation must include all stakeholders, especially parents, peers, school authority and enforcement agencies, making it a multi-prong approach to be adopted to achieve optimal outcomes in reducing smoking initiation among adolescents in the future. Prevention through health education should put a high priority among all school and community, such as how to help these young adolescents to learn to control their behaviors, to gain skills to refuse smoking and to change the social norms especially to those young adolescents with pro-smoking perceptions (e.g. those who think that smoking is not harmful). Adults should set better example to discourage this harmful habit among the adolescents by not smoking themselves. The prevention programs should also focus on students from poorer socio-economic backgrounds.

In spite of all the influencing factors stated, there are some factors that have not been considered in this review due to the limited amount of evidence available. These include policy-related factors such as price, accessibility of cigarettes and genetic factors (Pentz et al., 1997; Wolfson and Hourigan, 1997; Pierce et al., 1998). Another important issue arising from an examination of the literature concerns the nature of protective factors, i.e. the mediators. Are these protective factors more than simply an absence or they do really affect the relationship? Is it really possible that some factors function directly (in the absence of mediators) and others in alternate way (indirectly; in the presence of mediators). Future studies should clearly address this issue and questions concerning the presence and functioning of these factors.

On the other hand, to our knowledge, this study is the first to propose a systematic literature review-based conceptual model of smoking initiation taking into account a broader context of various influencing factors. Conceptual models are useful for summarizing and integrating current body of knowledge. The information generated from the model will lead to an understanding of the smoking initiation process. In our model, we have attempted to integrate all the findings obtained from our review. It assumes that smoking initiation is a dynamic phenomenon depending on several factors, such as personal, social and broader environmental factors. As we obtained some mediators or protective factors in our findings, we decided these factors should be taken into account, as they are part of the causal mechanism leading to smoking initiation. However, it has yet to be verified. A future statistical validation of the model could help to verify this.

Indeed, a statistical validation of the model is particularly needed, where the validation will be used to assess the interactions between the different factors and measure the size of the effect of each factor. This can be done by conducting a prospective cohort of non-smokers to observe them for at least a year to determine whether or not they progressing as smoker and examined the associative factors. The statistical technique use to deal with this is structural equation modelling, in which the number of observations is based on the number of variables (Hoyle, 1995; Ullman and Bentler, 2003). The strength of using this technique would be that it allows evaluating the effect of each single factor and consequently quantifying the effect of the components (Rothman and Greenland, 2005).

One important limitation of our review is that it is difficult to synthesize and conclude results from the myriad of relevant studies due to the wide variation in methods, measures, and analyses used. Moreover, outcomes have also varied across studies and, even when an outcome is labelled in similar way, the definitions might be different. For instance, because regular smoking starts with initiation, we require a measure of initiation that predicts progression to establish smoking. Therefore, public health researchers are suggested to work on and identify a standard measure of smoking initiation that specifically indicates progression from initiating smoking to established smokers. It is believed that re-analysis of the data employing these specific definitions and measures would improve greatly to the body of knowledge. Also, most of the studies included are cross-sectional. Therefore limits the establishment of causal relationships between

the factors and smoking initiation behavior. On the other hand, the strengths of our study are that, our model is more comprehensive compared to other models focusing on specific factors such as social factors (Tickle et al., 2006) or psychological factors (Sun et al., 2011), and interestingly, our model specifically focused on adolescents aged range between 10-19 years. Although it is believed that the major factors influencing smoking initiation will probably similar among the general population, the effect size can actually differ. For example, in certain case, additional factors may appear in some population.

In conclusion, This review presents various factors influencing smoking initiation of the Asian adolescents and provides a conceptual framework to further analyze factors influencing smoking initiation. However, future studies should have a standard measure of smoking initiation, should analyze the interactions and the intensity of the relationship between the different factors or variables of the conceptual model. It will also be essential to validate the model and to assess its quality. We believe that, in the future, the conceptual model of smoking initiation may help to have a global view of factors influencing smoking initiation. This will be a key to target interventions for smokers. The proposed model may also be useful in the elaboration of future research that aims to understand the different mechanisms linked to smoking initiation.

References

Ajzen I, Madden TJ (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *J Experimental Social Psychol*, **22**, 453-74.

Bagchi NN, Ganguly S, Pal S, et al (2014). A study on smoking and associated psychosocial factors among adolescent students in Kolkata, India. Indian J Public Health, 58, 50-3.

Brown AK, Moodie C, Hastings G, et al (2010). The association of normative perceptions with adolescent smoking intentions. *J Adolescence*, **33**, 603-14.

Burton D, Sussman S, Hansen WB, et al (1989). Image attributions and smoking intentions among seventh grade students. *J Applied Social Psychol*, **19**, 656-64.

Curry LA, Nembhard IM, Bradley EH (2009). Qualitative and mixed methods provide unique contributions to outcomes research. *Circulation*, **119**, 1442-52.

Das S, Ghosh M, Sarkar M, et al (2011). Adolescents speak: why do we smoke? *J Trop Pediatr*, **57**, 476-80.

Freedman KS (2012). Smoking initiation among young adults in the United States and Canada, 1998-2010: A systematic review. *Preventing Chronic Disease*, **9**.

French DC, Purwono U, Rodkin P (2014). Indonesian Muslim Adolescents' Use of Tobacco and Alcohol: Associations With Use by Friends and Network Affiliates. *Merrill-Palmer Quarterly*, **60**, 385-402.

Galea S, Riddle M, Kaplan GA (2010). Causal thinking and complex system approaches in epidemiology. *Int J Epidemiol*, **39**, 97-106.

Gilman SE, Rende R, Boergers J, et al (2009). Parental smoking and adolescent smoking initiation: an intergenerational perspective on tobacco control. *Pediatrics*, **123**, 274-81.

Harakeh Z, Scholte RH, Vermulst AA, et al (2004). Parental factors and adolescents' smoking behavior: an extension of The theory of planned behavior. *Prev Med*, **39**, 951-61.

Higgins A, Conner M (2003). Understanding adolescent smoking: The role of the Theory of Planned Behaviour and implementation intentions. *Psychol Health Med*, **8**, 173-86.

Ho MG, Shi Y, Ma S, et al (2007). Perceptions of tobacco advertising and marketing that might lead to smoking initiation among Chinese high school girls. *Tobacco control*, **16**, 359-60.

Hock LK, Ghazali SM, Cheong KC, et al (2013). Correlates of susceptibility to smoking among secondary school students in Kota Tinggi district, Johor, Malaysia. *Asian Pac J Cancer Prev*, **14**, 6971-8.

Hoyle RH 1995. Structural equation modeling: Concepts, issues, and applications, Sage Publications.

Jafarabadi MA, Allahverdipour H, Bashirian S, et al (2012). Modeling the Underlying Predicting Factors of Tobacco Smoking among Adolescents. *Iran J Public Health*, **41**, 46-57.

Jeganathan PD, Hairi NN, Al Sadat N, et al (2013). Smoking stage relations to peer, school and parental factors among secondary school students in Kinta, Perak. *Asian Pac J Cancer Prev*, **14**, 3483-9.

Karimy M, Niknami S, Heidarnia AR, et al (2013). Prevalence and determinants of male adolescents' smoking in iran: an explanation based on the theory of planned behavior. *Iran Red Crescent Med J*, **15**, 187-93.

Kobus K (2003). Peers and adolescent smoking. *Addiction*, **98**, 37-55.

Kumar V, Talwar R, Roy N, et al (2014). Psychosocial determinants of tobacco use among school going adolescents in Delhi, India. *J Addict*, **2014**.

Li X, Mao R, Stanton B, et al (2010). Parental, behavioral, and psychological factors associated with cigarette smoking among secondary school students in Nanjing, China. *J Child Family Studies*, **19**, 308-17.

Lim KH, Chong Z, Khoo YY, et al (2014). Parental Smoking Status, Stress, Anxiety, and Depression Are Associated With Susceptibility to Smoking Among Non-Smoking School Adolescents in Malaysia. *Asia Pac J Public Health*, **26**, 81-90.

Lim KH, Sumarni MG, Kee CC, et al (2010). Prevalence and factors associated with smoking among form four students in Petaling District, Selangor, Malaysia. *Trop Biomed*, **27**, 394-403.

Lin P-L, Tzeng L-C, Lu K-Y, et al (2008). Factors related to tobacco use among adolescents in southern Taiwan. *J Nursing Res*, **16**, 243-51.

Mak K-K, Ho S-Y, Day JR (2012). Smoking of parents and best friend-independent and combined effects on adolescent smoking and intention to initiate and quit smoking. *Nicotine Tobacco Res*, **14**, 1057-64.

McKelvey KL, Wilcox ML, Madhivanan P, et al (2013). Time trends of cigarette and waterpipe smoking among a cohort of school children in Irbid, Jordan, 2008–11. *European J Public Health*, **23**, 862-7.

Mercken L, Candel M, Willems P, et al (2009). Social influence and selection effects in the context of smoking behavior: Changes during early and mid adolescence. *Health Psychol*, **28**, 73.

Murnaghan D, Leatherdale S, Sihvonen M, et al (2008). A multilevel analysis examining the association between school-based smoking policies, prevention programs and youth smoking behavior: evaluating a provincial tobacco control strategy. *Health Education Res*, **23**, 1016-28.

Narain R, Sardana S, Gupta S, et al (2011). Age at initiation & prevalence of tobacco use among school children in Noida, India: A cross-sectional questionnaire based survey. The *Indian J Med Res*, **133**, 300.

O'Loughlin JL, Dugas EN, O'Loughlin EK, et al (2014). Incidence and determinants of cigarette smoking initiation

in young adults. *J Adolesc Health*, **54**, 26-32.
Ozawa M, Washio M, Kiyohara C (2008). Factors related to starting and continuing smoking among senior high school boys in Fukuoka, Japan. *Asian Pac J Cancer Prev*, **9**, 239-45.
Pentz MA, Sussman S, Newman T (1997). The conflict between least harm and no use tobacco policy for youth: ethical and policy implications. *Addiction*, **92**, 1165-74.
Pierce JP, Choi WS, Gilpin EA, et al (1998). Tobacco industry promotion of cigarettes and adolescent smoking. *Jama*, **279**, 511-5.
Pradhan PMS, Niraula SR, Ghimire A, et al (2013). Tobacco use and associated factors among adolescent students in Dharan, Eastern Nepal: a cross-sectional questionnaire survey. *BMJ Open*, **3**, 2123.
Rahman MM, Ahmad SA, Karim MJ, et al (2011). Determinants of smoking behaviour among secondary school students in Bangladesh. *J Community Health*, **36**, 831-8.
Reidpath DD, Davey TM, Kadirvelu A, et al (2014). Does one cigarette make an adolescent smoker, and is it influenced by age and age of smoking initiation? Evidence of association from the U.S. Youth Risk Behavior Surveillance System (2011). *Prev Med*, **59**, 37-41.
Rothman KJ, Greenland S (2005). Causation and causal inference in epidemiology. *American J Public Health*, **95**, 144-50.
Russell CK, Gregory DM (2003). Evaluation of qualitative research studies. *Evidence Based Nursing*, **6**, 36-40.
So ES, Yeo JY (2015). Factors associated with early smoking initiation among Korean adolescents. *Asian Nursing Res*, **9**, 115-9.
Sun J, Buys N, Stewart D, et al (2011). Mediating effects of coping, personal belief, and social support on the relationship among stress, depression, and smoking behaviour in university students. *Health Educat*, **111**, 133-46.
Tang SM, Loke AY (2013). Smoking initiation and personal characteristics of secondary students in Hong Kong. *J Advanced Nurs*, **69**, 1595-606.
Tickle JJ, Hull JG, Sargent JD, et al (2006). A structural equation model of social influences and exposure to media smoking on adolescent smoking. *Basic Applied Social Psychol*, 28, 117-29.
Tjora T, Hetland J, Aaro LE, et al (2011). Distal and proximal family predictors of adolescents' smoking initiation and development: a longitudinal latent curve model analysis. *BMC Public Health*, **11**, 911.
Tyas SL, Pederson LL (1998). Psychosocial factors related to adolescent smoking: a critical review of the literature. *Tob Control*, **7**, 409-20.
Ullman JB, Bentler PM 2003. Structural equation modeling, Wiley Online Library.
Van De Ven MO, Engels RC, Otten R, et al (2007). A longitudinal test of the theory of planned behavior predicting smoking onset among asthmatic and non-asthmatic adolescents. *J Behav Med*, **30**, 435-45.
Von Elm E, Altman DG, Egger M, et al (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Preventive Med*, **45**, 247-51.
Warren CW, Riley L, Asma S, et al (2000). Tobacco use by youth: a surveillance report from the Global Youth Tobacco Survey project. *Bulletin World Health Organization*, **78**, 868-76.
Wolfson M, Hourigan M (1997). Unintended consequences and professional ethics: criminalization of alcohol and tobacco use by youth and young adults. *Addict*, **92**, 1159-64.
World Health Organization (2003). Adolescent friendly health services: an agenda for change.
World Health Organization (2008). WHO report on the global tobacco epidemic, 2008: the MPOWER package.