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Intentions to smoke and conventional cigarettes smoking among Malaysian adolescents: The mediating effect of experiencing alternative tobacco products

According to the 2011 survey conducted by the World Health Organization, about 23% of adults in Malaysia are smokers (about 44% male and 1% female). The estimated prevalence of smoking among Malaysian adolescents is between 11.7% to 21.4% (Ministry of Health, 2016). Most smokers start smoking during their early adolescent years (Lim *et al.*, 2017). Therefore, the prevention of smoking among adolescents is important to reducing national prevalence rates in smoking (Abidin *et al.*, 2014).

Besides conventional smoking, the consumption of alternative tobacco products among Malaysian adolescents is about 9.1% for e-cigarettes and vapour products, and 4.6% for shisha (Ministry of Health, 2016). Awareness of such alternative tobacco products was higher among male, younger, more educated and wealthier respondents (Gravelly *et al.*, 2014; Palipudi *et al.*, 2016). Since studies among Dutch youths and adolescents in Jordan have suggested that the use of alternative tobacco products can be a gateway to smoking (Chatterjee, Alzghoul, Innabi, & Meena, 2016; Jaber *et al.*, 2015; Treur, Rozema, Mathijssen, Oers, & Vink, 2017), it is therefore especially important to know whether the use of alternative tobacco products would mediate the effect of smoking intention on Malaysian adolescents' conventional cigarette smoking.

Accordingly, this study adopted the Reasoned Action Approach (Fishbein & Ajzen, 2010) as a framework to examine the relationships between the influence of significant others, intention of

smoking, the behaviours of experiencing alternative tobacco products and the smoking of conventional cigarettes. The Reasoned Action Approach is one of the most widely used theoretical frameworks to apprehend an individual's behaviour according to social and attitude factors.

The Reasoned Action Approach claims that an individual's attitude toward a behaviour could affect intention towards a particular behaviour, which will eventually affect the individual's behaviour. The attitudes can be formed through subjective norms or identified referents, which can be further categorised into injunctive and descriptive norms (Ajzen, 2012).

Consequently, it is expected that the smoking behaviours of adolescents' significant others would positively associate with their intention to smoke and their conventional cigarettes smoking. We focus on the influence of subjective norm as family is an important factor for the development of adolescents in Asian culture (Chao, 2001). In addition, as studies have revealed the significant effects of belief and perceived benefits of tobacco use on smoking behaviours (Al-Dubai *et al.*, 2014; Klein, Sterk, & Elifson, 2014), it is expected that adolescents' knowledge of alternative tobacco products would also affect their intention to smoke and their conventional cigarettes smoking. Moreover, it is expected that the experiencing of alternative tobacco product would statistically mediate the effects of intention to smoke on smoking of conventional cigarettes.

Therefore, the hypotheses and conceptual framework of this study (see Figure 1) are as follows:

- H1. The smoking among significant others is positively associated with the intention of smoking among adolescents.
- H2. Knowledge of alternative tobacco products is positively associated with the intention to smoke among adolescents.
- H3. Intention to smoke is positively associated with the experiencing of alternative tobacco products.
- H4. Intention to smoke is positively associated with the conventional cigarettes smoking.
- H5. The experiencing of alternative tobacco products is positively associated with the conventional cigarettes smoking.
- H6. The experiencing of alternative tobacco products is the statistical mediator for the effects of intention to smoke on the conventional cigarettes smoking.

Method

Participants and procedure

A total of 1100 respondents participated in the study. This sample size is larger than the sample size recommended by using the Raosoft sample size calculator, which is 377.

57.1% of them were males. The mean of their ages was 16.56 (SD = 0.71). 19.9% reported that they had tried conventional cigarettes and 7.7% had tried at least one type of alternative cigarettes. After getting approval from both the Ministry of Education and the Perak State Education Department to conduct the study at public secondary schools, the principals of secondary schools in Perak states were contacted based on the information collected from the webpage of the Ministry of Education.

Emails were sent to all schools in Perak states in order to inform schools about the details of the research and obtain permission to carry out the research. Eight schools agreed to participate in the survey. A researcher then visited the school based on the date and time arranged by contact teachers at these schools. Purposive sampling method was then used to recruit participants. The criteria for selecting the participants were that the participants must be secondary year one to year four students. Year five and year six students are excluded due to the possible interruption of their examination preparation as

indicated by Ministry of Education. Participants were informed about the purpose of the study, their right to not participate in the study and that all the data they provided would be kept confidential. After that, they were briefed about the guidelines to fill in the questionnaires. It took about 10 minutes for them to complete the questionnaire. The completed questionnaires were then collected and a token was given to participants. A total of 1600 questionnaires were distributed but the collected and valid questionnaires numbered 1100; thus, the response rate is 68.75%.

Measurements

Smoking behaviours of significant others.

Participants were asked to tick a box to indicate whether or not their parents are smokers.

Intention to smoke. Four items were used to measure participants' intention of smoking, which are "have you ever tried cigarette smoking, even one or two puffs?", "do you think you will smoke a cigarette in the next year?", "do you think that you will try a cigarette soon?" and "would you try to smoke if your good friends offer you a cigarette?". Participants needed to answer the items according to a four-point Likert scale, in which a higher score indicated a stronger intention to smoke.

Conventional cigarette smoking. Participants were asked to tick a box to indicate the ways they get cigarettes (Yes/No). Three items were used, including "somebody gave me cigarette, even if I did not ask for it", "I bought cigarettes on my own", and "I get cigarettes from a store or others". A higher summation score indicates that they are more likely to smoke conventional cigarettes.

Knowledge of alternative tobacco products.

Participants were asked to tick a box to indicate whether they had heard about alternative tobacco products or not, and whether or not they had come to know of the alternative tobacco products from friends or the internet.

Experiencing alternative tobacco products.

Participants needed to tick a box to indicate the products they have tried, including roll-your-own cigarettes, flavoured cigarettes, cigars, electronic cigarettes and water pipe smoking.

Statistical analysis

All the data were then keyed into an Excel file and were analysed by using Structural Equation

Modelling with the SmartPLS software.

Results

Construct reliability. The composite reliability values of all the scales ranged from 0.76 to 0.87, while the average variance extracted was from 0.51 to 0.63 (see Table 1), exceeding the recommended value of 0.7 for the former and the recommended value of 0.5 for the latter (Hair Jr, Hult, Ringle, & Sarstedt, 2016). Correspondingly, the findings suggested that the latent constructs of the four scales are acceptable.

Discriminate validity and collinearity Statistics (VIF). The Fornell-Larcker criterion was used to examine the discriminant validity of the measurements. As all the indexes of other measurements are lower than the square root of the measurement, the discriminant validity of the measurements is acceptable (see Table 2) (Hair Jr *et al.*, 2016). In addition, the results of VIF are all below 2, thus, there is no collinearity issue for the measurements (Hadi, Abdullah, & Sentosa, 2016) (see Table 3).

Path coefficients and mediating effect. As shown in the table 4, those whose significant others are smokers and those have more knowledge of alternative tobacco products are more likely to have a stronger intention to smoke, $p < 0.001$, and those with stronger intention to smoke are more likely to smoke conventional cigarettes and alternative tobacco products, $p < 0.001$. In addition, those who have experienced alternative tobacco products are more likely to smoke conventional cigarettes, $p < 0.001$.

Also, as shown in Table 4, the results showed a significant indirect effect of intention to smoke on the conventional cigarette smoking, $p < 0.001$, which indicates the experience of alternative tobacco products is a statistical mediator of the relationship. In addition, since the direct effect of intention to smoke on the conventional cigarette smoking is also significant, $p < 0.001$, it indicates a complementary mediating effect (Zhao, Lynch Jr, & Chen, 2010).

Discussion

Due to concerns that alternative tobacco products could function as a gateway, inducing adolescents to become smokers, the use of such products among adolescents in Malaysia has gained the attention of both the Malaysian government and some NGOs. The main aim of

this study is to examine whether or not experiencing alternative tobacco products would statistically mediate the effects of intention to smoke on conventional cigarettes smoking. In other words, whether intention to smoke would increase the likelihood of experiencing alternative tobacco products and thus leads adolescents smoke to smoke conventional cigarettes.

Firstly, similar to the findings of other studies (Hum, 2016; Lim *et al.*, 2017), the findings show the significant effects of significant others on the intention to smoke. Respondents would have a stronger intention to smoke if their parents were smokers. This result is consistent with the expectation of the reason action approach, which indicates the importance of the subjective norm for intention (Fishbein & Ajzen, 2010).

Secondly, adolescents with more knowledge of alternative tobacco products are more likely to have a stronger intention to smoke. These results are also consistent with other studies (Al-Dubai *et al.*, 2014; Klein *et al.*, 2014). As most knowledge of alternative tobacco smoking is learnt from the internet, this indicates a gap in in the current policy for controlling the promotion of alternative tobacco products.

Thirdly, the intention to smoke affects the experience of alternative tobacco smoking and also conventional cigarette smoking. These findings are also consistent with the expectation of the reason action approach, which claims the importance of the effects of intention on behaviours.

Fourthly, importantly, experiencing alternative tobacco products did statistically mediate the effects of intention to smoke on conventional cigarette smoking. In other words, respondents who have a stronger intention to smoke are not only more likely to experience alternative tobacco products but also conventional cigarettes smoking. However, the effect size suggested that adolescents are more attracted to alternative tobacco products than conventional cigarettes smoking, and the experience of alternative tobacco products leads adolescents to smoke conventional cigarettes. This could be because such adolescents believe that the use of these alternative tobacco products is less harmful than the use of conventional cigarettes (Wong, Shakir, Alias, Aghamohammadi, & Hoe, 2016), leading them to try the alternative products first.

However, once they are addicted to nicotine, they will subsequently turn to conventional cigarettes to meet the needs of their biological addiction (Primack, Soneji, Stoolmiller, Fine, & Sargent, 2015).

Conclusion

In conclusion, these findings indicate that the use of alternative tobacco products could be a gateway to the smoking of conventional cigarettes for adolescents who have a stronger intention to smoke, especially amongst those whose significant others are smokers and have more knowledge about alternative tobacco products. Accordingly, the concerns that the use of alternative tobacco products may renormalize smoking and, thus, increase the number of smokers should not be neglected (Chatterjee *et al.*, 2016).

Nonetheless, caution is required with regard to the interpretation of the current findings. The use of a cross-sectional design may have confounded the results with certain historical events (Shaughnessy, Zechmeister, & Zechmeister, 2015), such as the increased discussion of alternative tobacco products in media. Future studies can use a longitudinal design or intervention study to further examine the cause-effect explanation.

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Table 1: Composite reliability and Average Variance Extracted of measurements.

	Items	Composite reliability	Average Variance Extracted
Intention to smoke	4	0.87	0.64
Smoking behaviours of significant others	1	1	1
Conventional cigarette smoking	3	0.83	0.63
Knowledge of alternative tobacco products	3	0.76	0.53
Experiencing alternative tobacco products	5	0.84	0.51

Table 2: Discriminant validity of the measurements

	1	2	3	4	5
1. Intention to smoke	0.79				
2. Smoking behaviours of significant others	0.36	1.00			
3. Conventional cigarette smoking	0.42	0.21	0.79		
4. Knowledge of alternative tobacco products	0.27	0.26	0.14	0.73	
5. Experiencing alternative tobacco products	0.67	0.27	0.48	0.22	0.71
EATP					

Table 3: Coefficient of determination and effect size of measurements

Dependent variable	Predictors	R2	F2	VIF
Intention to smoke		0.16		
	Smoking behaviours of significant others		0.11	1.07
Experiencing alternative tobacco products	Knowledge of alternative tobacco products		0.04	1.07
	Intention to smoke	0.45	0.82	1.01
Conventional cigarette smoking		0.24		
	Intention to smoke		0.02	1.82
	Experiencing alternative tobacco products		0.09	1.82

Table 4: Path coefficients of the structural model

Hypotheses	Expectations	β	Standard Error	t-value	P Values
Direct effect					
H1	Smoking behaviours of significant others → Intention to smoke	0.31	0.03	9.38	< 0.001
H2	Knowledge of alternative tobacco products → Intention to smoke	0.19	0.02	7.91	< 0.001
H3	Intention to smoke → Experiencing alternative tobacco products	0.67	0.03	21.38	< 0.001
H4	Intention to smoke → Conventional cigarette smoking	0.19	0.02	7.91	< 0.001
H5	Experiencing alternative tobacco products → Conventional cigarette smoking	0.36	0.09	3.73	< 0.001
Indirect effect					
H6	Intention to smoke → Experiencing alternative tobacco products → Conventional cigarette smoking	0.24	0.07	3.56	< 0.001

Figure 1. Conceptual framework