Predicting students’ intention to smoke by theory of planned behaviour variables and parental influences across school grade levels

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Predicting students’ intention to smoke by theory of planned behaviour variables and parental influences across school grade levels

Mary Hassandraa*, Symeon P. Vlachopoulosb, Evdoxia Kosmidoua, Antonis Hatzigeorgiadisa, Marios Goudasa and Yiannis Theodorakisa

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Differences were examined in Theory of Planned Behaviour determinants of students' intention to smoke including parents' attitudes towards smoking and parents' current cigarette use among Greek students of different school grade levels. Students (N = 763) aged 10–18 years reported their attitudes towards smoking, subjective norms, perceived behavioural control, self-identity and intention to smoke while their parents (N = 525) reported their attitudes towards smoking and their current cigarette use. All the TPB variables increased from lower to higher school grade level. Multi-sample path analyses showed that parent’s attitudes towards smoking positively predicted students’ intention to smoke only for elementary school children. Parents’ current cigarette use did not contribute significantly. Students’ attitudes, perceived behavioural control and self-identity predicted systematically intention to smoke in contrast to the subjective norm that did not contribute at all. Perceived behavioural control contributed to a higher degree in intention to smoke for senior high school students compared to the junior high school and elementary students. Self-identity contributed to a higher degree in intention to smoke for elementary compared to the junior high school students. The results of this study suggests that the determinants of smoking vary between early and late adolescence.

Keywords: theory of planned behaviour; smoking; Greek youth; parents

Introduction

During the early adolescent years, individuals experience major biological, cognitive, social and emotional changes that influence their behavioural choices such as experimentation with unhealthy behaviours like smoking. Health risks by early initiation of smoking are severe and adolescents’ unhealthy behavioural patterns often extend into adulthood (Paavola, Vartianinen, & Puska, 1996). According to de Vries, Mudde, et al. (2003, p. 611) ‘in Europe, smoking among adults has
declined, but adolescents' smoking behaviour remains unchanged'. Hublet et al. (2006) have also pointed out that although a converging trend among adult smokers has been observed before 2004, this trend was not observed among adolescents. Research among Greek adolescents has revealed that 32.2% of 13–15 years old students in Greece have ever smoked (Kyrlesi et al., 2007). Also, the proportion of young people (15–24 years) in Greece who smoke has been high (44.9%) and in fact greater than the mean of the EU (41%) (Eurostat Yearbook, 2002). The loose antismoking policy and the lack of educational antismoking programmes in schools may have been some of the causes of these disappointing statistics.

Adolescents' smoking behaviour has been described as a complex phenomenon which is affected by many interrelated factors. Several theories have been proposed to explain the initiation of unhealthy behaviours during the early adolescence years (Collins & Ellickson, 2004). Early smoking initiation has been connected to personal factors such as one's intention (Ajzen, 1991) as well as the behaviour of peers and parents (de Vries, Engels, Kremers, Wetzel, & Mudde, 2003).

Theory of planned behaviour

The Theory of Planned Behaviour (TPB; Ajzen, 1991) has been widely used to predict health behaviours and related intentions (Armitage & Conner, 2001) such as adults' smoking (McMillan & Conner, 2003), adolescents' smoking (McMillan, Higgins, & Conner, 2005), healthy eating (Bebetsos, Chroni, & Theodorakis, 2002) and alcohol consumption (Kam, Matsunaga, Hecht, & Ndiaye, 2008). In brief, the TPB proposes that any behaviour is codetermined by behavioural intention and perceived behavioural control and that the intention to smoke can be predicted by attitudes towards smoking, subjective norms and perceived behavioural control. Ajzen (1991) suggested that TPB is open to further expansion and that suggestion has led to a consideration of a number of additional predictors of intention and behaviour (for a review, see Conner & Armitage, 1998). One of these predictors is self-identity that denotes how individuals describe themselves using large-scale social categories (Sparks, 2000). This concept is based on Burke's (1980) identity theory in which an individual's self-concept is organised into a hierarchy of role identities that correspond to one's position in the social structure such as parent, spouse or employee (Charng, Piliavin, & Callero, 1988). According to TPB, individuals are likely to initiate smoking if they believe that smoking will lead to particular outcomes which they consider valuable; that significant others approve of their smoking; and that they have opportunities to smoke compared to those who do not intend initiating smoking. Consequently, when someone smokes, he/she holds more positive attitudes towards smoking, has greater perceived behavioural control upon smoking, believes that significant others expect him/her to smoke and conceives of smoking as part of his/her identity (Ajzen, 1991; van den Putte, Yzer, Willemsen, & de Bruijn, 2009). Therefore, it would be interesting to examine how these constructs affect students' intention to smoke when they are at school age where experimentation with smoking begins.

Several studies have examined smoking through TPB in children and adolescents. For instance, intention to smoke among early adolescents was the most powerful predictor of future smoking behaviour (de Vries, Backbier, Kok, & Dijkstra, 1995). Further, according to McMillan et al. (2005), smoking behaviour and intention...
to smoke can be also predicted by moral norms over and beyond TPB variables (e.g. attitudes, subjective norms, perceived behavioural control). The results of a cross-sectional study of Ter Doest, Dijkstra, Gebhardt, and Vitale (2009), which compared the explanatory power of planned behaviour constructs assessed in relation to ‘smoking’ and ‘not smoking’ in a sample of 248 Dutch secondary students (12–17 years), indicated that attitudes towards smoking, subjective norm and perceived behavioural control over both smoking and not smoking, best explained adolescents’ smoking intentions and smoking behaviour. An earlier study by O’Callaghan, Callan, and Baglioni (1999) found that significant predictors of intention to smoke for high school students were attitudes towards smoking, past behaviour in relation to smoking, and perceptions of what significant others think they should do.

**Parental influences on adolescents’ smoking behaviour**

Family plays a vital role in adolescents’ behaviour and consequently in smoking experimentation and smoking continuation. Moreover, parents often communicate their habits to their children and control their children’s exposure to sources of information (Solomon, Warin, & Lewis, 2002). Previous studies explaining parental influence on adolescent intention to smoke have reported ambiguous findings (Bauman, Carver, & Gleiter, 2001; Kodl & Mermelstein, 2004). Goddard (1990) reported a positive relationship between children’s smoking behaviour and parental smoking. A review study showed that there are weak and inconsistent associations between parents’ and adolescents’ smoking behaviour and that the findings for parental effects sometimes vary in accordance to the operationalisation of parental smoking behaviour measured (Avenevoli & Merikangas, 2003). Rosendahl, Galanti, Gilljam, and Ahlbom (2003) concluded that parental smoking greatly increases the possibility of tobacco experimentation by their children. Further, Otten, Engels, van de Ven, and Bricker (2007) suggested that children whose parents are former smokers have an increased likelihood to smoke compared to children whose parents have never smoked. Similar results were found in studies with Greek participants (Strong & Sidira, 2006; Vardavas et al., 2007). Nevertheless, the likelihood that adolescents would take up the habit of smoking was limited if their parents maintained a strong negative attitude towards smoking (Sargent & Dalton, 2001), even if they did smoke (Cote, Godin, & Gagne, 2004). Studies investigating both the influence of parental smoking behaviour and parental attitudes report that both variables predict adolescents’ smoking behaviour (Griffin, Botvin, Doyle, Diaz, & Epstein, 1999) but the strength of these associations, when found, varies (Tyas & Pederson, 1998).

Bricker, Peterson, Sarason, Andersen, and Rajan (2007) examined changes in the influence of parents’ and close friends’ smoking on smoking transitions (never to trying, trying to monthly and monthly to daily) occurring over the course of three school grade periods (5th to 7th, 7th to 9th and 9th to 12th grade). Results showed that the influence of parents’ smoking was substantial for all three transitions during most of these periods. Delayed modelling is one explanation for these results because adolescents may have learned and remembered how to smoke by observing their parents smoking when they were younger. Parental influence and adolescent smoking have been examined from several perspectives. Findings showed that
relations between antismoking parenting practices and adolescents' smoking cognitions were mostly significant and the effects of parenting hardly varied by parental smoking status or adolescent gender (Huver, Engels, & de Vries, 2006). Harakeh, Scholte, Vermulst, de Vries, and Engels (2005) found that association between antismoking socialisation practices and adolescents' smoking was not moderated by birth order, parents' smoking or gender of the adolescent, and mothers, compared to fathers, scored lower on parental influence although they think that they use parenting practices more frequently to prevent their children from smoking.

Nevertheless, the complexity of parents' influence and students' cognitions which determine their intention to smoke during their adulthood need further investigation. Mayhew, Flay, and Mott (2000), who reviewed the predictors of smoking uptake behaviour in adolescence as progressing through a sequence of developmental stages, pointed out that few variables uniquely predicted a particular stage or transition in smoking behaviour. Additionally, according to a recent meta-analysis by McEachan, Conner, Taylor, and Lawton (in press), behaviour type and age of the sample moderate the relationships among the TPB model components. Therefore, it is considered important to investigate the relative contribution of parents' influence and constructs of TPB on students' intention to smoke across school grade levels. More specifically, it would be important to know how these variables contribute to smoking intention during adolescence when the risk of smoking initiation is high. Knowing how these variables operate within each school grade level would provide us with additional information to design more effective prevention programmes tailored to students' school grade levels. The majority of studies have used children's proxy reports of parents' smoking; however, the accuracy of this method has been questioned (Barnett, O'Loughlin, Paradis, & Renaud, 1997). In this study and in order to overcome the aforementioned limitations, we measured both self-reported parents' smoking behaviour and parental attitudes towards smoking.

Studies in Greece have shown that as adolescents grow older, they smoke more. Francis, Katsani, Sotiropoulou, Roussos, and Roussos (2007) examined the prevalence of cigarette smoking among Greek adolescents (12–18 years old). They found that the prevalence of smoking increased steeply from 1.6% in 7th graders to 31.7% in 12th graders; 57.2% of junior high school students had never smoked and from the remaining 42.8% who reported that they had smoked, 23.1% had smoked at least once, 6.7% smoked occasionally and 13% were regular smokers. Moreover, in Greece, according to Damianaki et al. (2008), there is a significant gradual increase in the prevalence of experimental and current smokers by school grade that peaks in the last grades. Therefore, it is reasonable to assume that as smoking increases in higher grade levels, a respective increase would be evident in the determinants of smoking behaviour.

Therefore, the purpose of this study was (1) to examine mean differences in TPB smoking determinants between students attending different school grade levels, hypothesising that students in higher grade levels would report higher mean levels of these determinants and (2) to examine the relative contribution of parents' attitudes towards smoking and their smoking behaviour along with TPB constructs in predicting students' intention to smoke as a function of school grade level. It was hypothesised that the predictive contribution of parental variables would gradually
decrease from the lower to the higher school grade levels, whereas the contribution of TPB constructs should gradually increase, respectively.

**Method**

**Participants**

Students (N = 763) from 11 different schools (6 urban schools; 5 rural schools) in Greece participated in this study. Among them, 203 students (26.6%) attended 5th and 6th grades of the elementary school (\(M_{age} = 11.7, SD = 0.49\)), 414 students (54.3%) attended 7th to 9th grades of the junior high school (\(M_{age} = 14.1, SD = 0.69\)) and 146 students (19.1%) attended 10th and 11th grades in senior high school (\(M_{age} = 16.7, SD = 0.38\)). In Greece, the elementary school has a 6-year cycle (7–12 years old), junior high school a 3-year cycle (13–15 years old) and senior high school a 3-year cycle (16–18 years old). In addition, 525 parents participated in the study (68.8% of students’ participants) of whom 191 were fathers (36.4%) and 334 mothers (63.6%). Ninety nine fathers (52.4%) and 150 mothers (45%) were smokers. The mean age of all parents was 44.35 (SD = 4.98), the mean age of fathers 46.2 years (SD = 4.9) and the mean age of mothers 42.5 years (SD = 5.1).

**Measures and procedure**

**Students’ measures**

Questionnaires were distributed to students that assessed attitudes towards smoking, subjective norm, perceived behavioural control, self-identity and intention to smoke. These scales were constructed in line with recommendations provided by Ajzen (2002) and have been previously used in relevant studies with Greek participants (Theodorakis, 1994; Theodorakis, Natsis, Papaioannou, & Goudas, 2003). **Attitude** was assessed using the stem ‘Smoking for me would be . . . ’ followed by six bipolar adjectives with a response scale ranging from 1 to 7 (‘good – bad’, ‘unpleasant – pleasant’, ‘useful – useless’, ‘unattractive – attractive’, ‘boring – interesting’, ‘healthy – unhealthy’; \(a = 0.76\)). **Intention** to smoke was assessed by means of three items with all responses ranging from 1 to 7 (‘I intend to smoke’: very likely – very unlikely; ‘I am determined to smoke’: absolutely yes – absolutely no; ‘I’ll try to smoke’: absolutely right – absolutely wrong; \(a = 0.84\)). **Perceived behavioural control** on smoking was assessed by means of three items, with responses ranging from 1 to 7 (‘It is totally up to me whether I will smoke or not’: strongly disagree– strongly agree; ‘For me smoking is . . . ’: very difficult – very easy; ‘I am very confident that I shall smoke’: completely correct – completely wrong; \(a = 0.77\)). **Subjective norm** was measured by means of three items with responses ranging from 1 to 7 (‘People who are important to me think that I should smoke’: very likely – very unlikely; ‘If I smoke people who are important to me will . . . ’: strongly disagree – strongly agree, and ‘In general, I like to do what people who are important to me would like me to do’: strongly disagree – strongly agree; \(a = 0.67\)). **Self-identity** was assessed via four items based on a scale previously used with Greek participants by Theodorakis (1994). Responses ranging from 1 to 7 (‘Smoking is an important part of myself’; ‘I see myself as a person who smokes’; ‘It’s in my character to be a smoker’; ‘I am the
type of the person who smokes’: strongly disagree – strongly agree; \( a = 0.82 \). For all variables, scores on items were recoded such that higher scores reflect a stronger presence of the concerned variable.

**Parents’ measures**

The parents’ questionnaire measured attitudes towards smoking and their smoking behaviour (e.g. parents’ current cigarette use) and they were completed by one parent or guardian. Each student could address the questionnaire to the parent he/she felt close to. Students’ and parents’ data were matched based on students’ gender and date of birth. Parents’ current cigarette use was measured by the question, ‘Have you smoked cigarettes for 1 day or more of the 30 days preceding the survey’. Responses were provided on a dichotomous scale (0 = no, 1 = yes). Parents’ attitude towards smoking was assessed by the same questions used for the students. Cronbach’s alpha for the parents’ attitude scale was 0.81. Conduct of the study was approved by the university’s ethics committee and informed consent provided by the participants for their participation in the study.

**Data analysis**

Initially, means, standard deviations and Pearson’s correlations were computed between the study variables (Table 1). A chi-square test of association was performed between parents’ current cigarette use and parents’ gender. Also, a one-way MANOVA was calculated to compare students who provided parents’ measures with those who did not on students’ intention, attitude, subjective norm, perceived behavioural control and self-identity. Then, a MANOVA was calculated using the three school grade levels as the independent variable and all the smoking determinants and intention to smoke as the dependent variables to examine mean differences across school grade levels.

In order to test for the moderating role of school grade level on the relationships between the determinants of intention to smoke and intention to smoke, multi-sample path analysis was used based on the three samples of elementary school, junior high school and senior high school students using the EQS for Windows 6.1 software (Bentler, 2003). The path model tested in the multi-sample analyses specified direct effects from all the determinant variables (attitude, subjective norm, perceived behavioural control, self-identity, parental attitude towards smoking and parents’ current cigarette use) on students’ intention to smoke (see Figure 1 for the path model tested). Composite subscale mean scores were used in the model given that the sample size for each group did not allow for the use of latent variables. The goodness-of-fit indexes used were the chi-square value (\( \chi^2 \)), the Comparative Fit Index (CFI) and the root mean square error of approximation (RMSEA) accompanied by its 90% confidence interval (90% CI). Given the sensitivity of the \( \chi^2 \) to sample size (Byrne, 2006), model fit assessment was based mainly on the remaining fit indexes. CFI values close to 0.95 indicate an excellent fit to the data (Hu & Bentler, 1999), whereas values of 0.90 or greater indicate a reasonable fit. A RMSEA value less than 0.05 indicates a good model fit (Hu & Bentler, 1999) while values between 0.08 and 0.10 represent an adequate fit (Browne & Cudeck, 1993; Byrne, 2000). The likely moderating role of the school grade level was examined via constraining the regression coefficients for each relationship equal across groups.
A statistically significant equality constraint as assessed via the Lagrange multiplier test (LM test) provided by EQSWIN 6.1 would mean that the constraint is not tenable in the data and one might conclude a statistically significant difference of the magnitude of the regression coefficients across the samples. Given the emergence of numerical problems related to the evaluation of the tenability of some of the equality constrains when all three samples were included in the same multi-sample analysis, three different multi-sample analyses were performed, one for each different pair of samples (e.g. elementary school sample vs. junior high school sample) to avoid estimation problems. For each pair of samples two multi-sample models were estimated – the ‘constrained model’ and the ‘group-sensitive model’. The constrained model included equality constraints on all the regression coefficients. Following evaluation of this model, we estimated the group-sensitive model in which, these equality constraints were released that proved statistically significant in the constrained model evaluation. Estimation of the group-sensitive model offered the

<table>
<thead>
<tr>
<th>Study variables</th>
<th>Elementary students</th>
<th>Junior high school students</th>
<th>Senior high school students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>1</td>
</tr>
<tr>
<td>1. Attitude towards smoking</td>
<td>1.21</td>
<td>0.44</td>
<td>–</td>
</tr>
<tr>
<td>2. Subjective norm</td>
<td>1.31</td>
<td>0.73</td>
<td>0.30*</td>
</tr>
<tr>
<td>3. Perceived behavioural control</td>
<td>1.54</td>
<td>1.00</td>
<td>0.31*</td>
</tr>
<tr>
<td>4. Self-identity</td>
<td>1.36</td>
<td>0.84</td>
<td>0.36*</td>
</tr>
<tr>
<td>5. Parental attitude</td>
<td>1.42</td>
<td>0.41</td>
<td>0.06</td>
</tr>
<tr>
<td>6. Parents’ current cigarette use</td>
<td>1.45</td>
<td>0.49</td>
<td>–0.15</td>
</tr>
<tr>
<td>7. Intention to smoke</td>
<td>1.27</td>
<td>0.74</td>
<td>0.31*</td>
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<table>
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</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>1</td>
</tr>
<tr>
<td>1. Attitude towards smoking</td>
<td>1.46a</td>
<td>0.77</td>
<td>–</td>
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<tr>
<td>2. Subjective norm</td>
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<td>0.69</td>
<td>0.33*</td>
</tr>
<tr>
<td>3. Perceived behavioural control</td>
<td>1.88a</td>
<td>1.10</td>
<td>0.52*</td>
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<tr>
<td>4. Self-identity</td>
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<td>5. Parental attitude</td>
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<td>0.61</td>
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<td>6. Parents’ current cigarette use</td>
<td>1.53a</td>
<td>0.49</td>
<td>–0.06</td>
</tr>
<tr>
<td>7. Intention to smoke</td>
<td>1.43a</td>
<td>0.78</td>
<td>0.61*</td>
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<table>
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<th>Senior high school students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>1</td>
</tr>
<tr>
<td>1. Attitude towards smoking</td>
<td>1.69ab</td>
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<td>–</td>
</tr>
<tr>
<td>2. Subjective norm</td>
<td>1.84ab</td>
<td>1.32</td>
<td>0.44*</td>
</tr>
<tr>
<td>3. Perceived behavioural control</td>
<td>2.50ab</td>
<td>1.70</td>
<td>0.65*</td>
</tr>
<tr>
<td>4. Self-identity</td>
<td>2.35ab</td>
<td>1.66</td>
<td>0.62*</td>
</tr>
<tr>
<td>5. Parental attitude</td>
<td>1.70ab</td>
<td>0.90</td>
<td>0.09</td>
</tr>
<tr>
<td>6. Parents’ current cigarette use</td>
<td>1.57ab</td>
<td>0.49</td>
<td>–0.12</td>
</tr>
<tr>
<td>7. Intention to smoke</td>
<td>2.05ab</td>
<td>1.49</td>
<td>0.65*</td>
</tr>
</tbody>
</table>

Notes: Elementary students ($n = 197$); junior high school students ($n = 412$); and senior high school students ($n = 146$).

*p < 0.05.
magnitude of the regression coefficients per sample when not constrained to be equal.

### Results

**Preliminary analyses**

In general, all the study variables displayed low mean values (Table 1). All variables were positively and moderately correlated except parental attitude towards smoking and parents’ current cigarette use that emerged either uncorrelated or very weakly correlated with the remaining variables of students’ attitude towards smoking, subjective norm, perceived behavioural control, self-identity and intention to smoke (Table 1). This pattern of correlations was consistent across the three school grade levels. Further, in elementary school, self-identity was positively correlated with parental attitude towards smoking and negatively correlated with parents’ current cigarette use. In junior high school, self-identity was uncorrelated with parental attitude and parents’ current cigarette use, whereas in senior high school, self-identity was uncorrelated with parental attitude towards smoking and negatively correlated with parents’ current cigarette use.

A chi-square test for independence (with Yates Continuity Correction) was calculated to explore the association of parents’ current cigarette use with parents’ gender. There were no significant associations between gender and parents’ current cigarette use [$\chi^2 (1, n = 522) = 2.31, p = 0.13, \phi = -0.07$]. A one-way between-groups multivariate analysis of variance was performed to investigate the differences between students who provided parents’ measures and those who did not on...
intention, attitude, subjective norm, perceived behavioural control and self-identity. There was a statistically significant multivariate but small effect (Wilk’s lambda = 0.98, $F_{5,713} = 2.52$, $p = 0.028$, $\eta^2 = 0.017$). When the results for the dependent variables were considered separately, the only difference to reach statistical significance, using a Bonferroni adjusted alpha level of 0.008, was attitude ($F_{1,717} = 7.06$, $p = 0.008$, $\eta^2 = 0.010$) with a small effect size indicating no differences between the groups.

**Mean differences in TPB constructs across school grade levels**

In order to test for differences in attitudes towards smoking, subjective norm, perceived behavioural control, self-identity and intention to smoke between students belonging in different school grade levels, a multivariate analysis of variance was performed. The results showed a significant multivariate effect for grade level (Wilk’s lambda = 0.87, $F_{10,1448} = 9.89$, $p < 0.001$, $\eta^2 = 0.064$). Univariate tests showed significant differences for all dependent variables, that is, attitudes towards smoking ($F_{2,728} = 18.19$, $p < 0.001$, $\eta^2 = 0.048$); subjective norm ($F_{2,728} = 18.94$, $p < 0.001$, $\eta^2 = 0.049$); perceived behavioural control ($F_{2,726} = 24.57$, $p < 0.001$, $\eta^2 = 0.063$); self-identity ($F_{2,728} = 33.42$, $p < 0.001$, $\eta^2 = 0.084$); and intention to smoke ($F_{2,728} = 30.56$, $p < 0.001$, $\eta^2 = 0.077$). Scheffe post hoc tests ($p < 0.05$) for the three grade levels showed that all variable means increased gradually and statistically significantly from the elementary to the senior high school grade except the intention and subjective norm means that increased from elementary to junior high school only. Means and standard deviations are presented for each school grade level in Table 1.

**Differences in regression coefficients of the smoking intention determinants on intention to smoke across school grade levels**

Given the use of Likert-type scales, the path models were evaluated based on the Satorra–Bentler (S–B) $\chi^2$ values and related goodness of fit indices. All multi-sample path models had a good fit to the data (Table 2). The smoking determinants that systematically appeared to be statistically significant and having a small to moderate relationship with intention to smoke in all three samples were students’ attitude towards smoking, perceived behavioural control over smoking and self-identity. Subjective norm, parental attitude towards smoking and parents’ current cigarette use systematically emerged as very weak and non-significant effects (Table 2). In comparing elementary school and junior high school students, a difference emerged in the regression coefficient of the relationship of self-identity with smoking intention. This association was considerably stronger in the elementary students compared to the junior high school students. In comparing junior high school students to senior high school students, a difference was found in the association of perceived behavioural control with intention to smoke. This association was considerably stronger among the senior high school students compared to the junior high school students. No statistically significant difference on any regression coefficient was found in the comparison between the elementary school and senior high school students (Table 2).
Table 2. Differences in regression coefficients of the relationships of smoking determinants with intention to smoke across school grade levels.

<table>
<thead>
<tr>
<th>Smoking intention determinants</th>
<th>Elementary/junior high</th>
<th>Group-sensitive model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constrained model</td>
<td>Group-sensitive model</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>J</td>
</tr>
<tr>
<td>Student attitude</td>
<td>0.17*</td>
<td>0.26*</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>0.13</td>
<td>0.10</td>
</tr>
<tr>
<td>Perceived behavioural control</td>
<td>0.25*</td>
<td>0.24*</td>
</tr>
<tr>
<td>Self-identity</td>
<td>0.29*</td>
<td>0.29*</td>
</tr>
<tr>
<td>Parental attitude</td>
<td>0.08*</td>
<td>0.12*</td>
</tr>
<tr>
<td>Parents’ current cigarette use</td>
<td>-0.02</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

Constrained model: S–B $\chi^2 = 9.49$, df = 6, $p > 0.05$, robust CFI = 0.986, robust RMSEA = 0.038, RMSEA 90% CI = 0.000--0.081.

Group-sensitive model: S–B $\chi^2 = 8.16$, df = 5, $p > 0.05$, robust CFI = 0.988, robust RMSEA = 0.039, RMSEA 90% CI = 0.000--0.086.

<table>
<thead>
<tr>
<th>Smoking intention determinants</th>
<th>Junior high/senior high</th>
<th>Elementary/senior high</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J</td>
<td>S</td>
</tr>
<tr>
<td>Student attitude</td>
<td>0.29*</td>
<td>0.19*</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>Perceived behavioural control</td>
<td>0.29*</td>
<td>0.28*</td>
</tr>
<tr>
<td>Self-identity</td>
<td>0.27*</td>
<td>0.30*</td>
</tr>
<tr>
<td>Parental attitude</td>
<td>0.08</td>
<td>0.06</td>
</tr>
<tr>
<td>Parents’ current cigarette use</td>
<td>-0.00</td>
<td>-0.00</td>
</tr>
</tbody>
</table>

Constrained model: S–B $\chi^2 = 11.05$, df = 6, $p > 0.05$, robust CFI = 0.988, robust RMSEA = 0.046, RMSEA 90% CI = 0.000--0.088.

Group-sensitive model: S–B $\chi^2 = 2.54$, df = 5, $p > 0.05$, robust CFI = 1.000, robust RMSEA = 0.000, RMSEA 90% CI = 0.000--0.047.

Notes: E, elementary school; J, junior high school; S, senior high school.
Values represent completely standardised regression coefficients derived from the path model estimation. Constraint significance, significance of equality constraints based on the LM test. The ‘constrained model’ column presents the path coefficients after equality constraints have been imposed in the model. The ‘group-sensitive model’ column presents the path coefficients after particular equality constraints have been relaxed due to significance for that equality constraint.

No regression coefficients are reported for the group-sensitive model in the elementary/senior high school comparison, given no cross-group differences for any regression coefficient. *$p < 0.05$; $p$ is based on the S–B $\chi^2$ models.
Discussion

The purpose of this study was to examine the differences in smoking determinants in the context of TPB between students of different school grade levels and to investigate the relative contribution of parents’ attitudes towards smoking and parents’ current cigarette use along with TPB constructs in students’ intention to smoke as a function of school grade level. The analyses showed that students’ attitudes, subjective norm, perceived behavioural control, self-identity and intention gradually increased across the three grade levels with higher means corresponding to higher grade levels. Attitudes towards smoking were generally negative for all students regardless of school grade level and this finding is consistent with other studies (McMillan et al., 2005). Moreover, the increases in TPB smoking determinants across school grade levels may explain the increased prevalence of students’ smoking behaviour documented in studies with Greek adolescents (Francis et al., 2007; Giannakopoulos, Panagiotakos, Mihas, & Tountas, 2008).

The role of parents’ current cigarette use and parental attitudes towards smoking

Most studies include parents’ smoking behaviour and not other parental socio-psychological variables such as attitudes. In this study, parents’ current cigarette use was found to play no significant role in the prediction of intention to smoke and this was the case for all three school grade levels. However, parental attitude towards smoking was found to play a weak role in the prediction of intention to smoke only for the elementary children. When parental smoking behaviour was examined in other studies, it seemed to increase the odds of an adolescent being a smoker (Francis et al., 2007; Tyc et al., 2004) and influenced both children’s initiation and escalation of smoking (Bricker et al., 2006). Overall, according to some studies, parental smoking has a direct effect on adolescents’ smoking behaviour (Harakeh et al., 2004) or both a direct and indirect effects (Madarasová-Gecková et al., 2005). Interesting findings have been reported by de Vries, Engels, et al. (2003) who found that although children and adolescents spend more time with peers and less time with family members, onset and prevention of smoking are strongly influenced by parental behaviour at home. The present findings may be in agreement with the aforementioned studies given that we did not presently examine the direct influence of smoking determinants on students’ smoking behaviour but only on intention. That is, it may be that the influence of smoking determinants may be direct on behaviour and not indirect via intention. Thus, future studies may also include, among others, measures of students’ smoking behaviour to provide a more complete picture of the relationship and mechanisms of smoking determinants in leading to smoking behaviour.

Smoking determinants and intention to smoke across grade levels

According to the multi-sample path analysis results, the contribution of parents’ measures to students’ intention to smoke gradually decreased from lower to higher school grade levels. The contribution of parental measures in students’ intention to smoke was low, and declines further as children develop preferences for other sources of information such as siblings and peers (John, 1999; Strong & Sidira, 2006). The present finding is not in agreement with several studies, suggesting that there is a
strong family influence on children’s smoking behaviour. The influence of family declines as children get older, and this may be a consequence of striving for greater independence.

Parents’ attitudes towards smoking contributed to the prediction of students’ intention to smoke only in the elementary school level. This finding implies that when students are younger, parental attitudes do contribute to their intention to smoke but as students get older this effect wanes and is possibly replaced by parents’ actual smoking behaviour (Cote et al., 2004; Francis et al, 2007; Sargent & Dalton, 2001). An alternative explanation is that of the ‘delayed modelling’ hypothesis which states that students learn and remember to enact certain behaviours from seeing them modelled by their parents. However, the opportunity to actually enact that learned behaviour may not arise until long time later (Bandura, 1986; Wiium, Breivik, & Wold, 2006). Therefore, interventions against smoking for students in the elementary level should include parents by strengthening parental negative attitudes towards smoking independent of their smoking behaviour and smoking status.

Further, the constructs of perceived behavioural control and self-identity but not subjective norm emerged as moderate in magnitude and significant predictors of intention to smoke and this was the case consistently for all three school grade levels. As mentioned above, TPB is a widely used theory and smoking is a behaviour that has been successfully examined using this theory. Although, in general, intention to smoke can be predicted by TPB variables, there are different variables that may also contribute to this prediction. Additionally, according to McEachan et al. (in press), the TPB constructs predicted intention in regard to abstinence behaviours better in adolescent samples (59.1% intention) than in student population samples (43.6% intention). In agreement with present findings, similar studies with children and adolescents have also found that intention to smoke was predicted by attitudes towards smoking, perceived behavioural control and subjective norms (Guo et al., 2007; McMillan et al., 2005).

The present results reveal that different TPB constructs contribute to explaining students’ intention to smoke in elementary school, junior high school and senior high school. In elementary school, students’ attitudes towards smoking represent the (unquestioned) adoption of the attitudes of significant others more and usually such attitudes are very negative resulting to a ceiling effect. In junior high school, the formation of personal attitudes takes place via behavioural experiences. Besides, in this grade level, Greek students report greater experimentation with smoking (Damianaki et al., 2008). In senior high school, the power of students’ attitudes in predicting their intention decreases and other factors become stronger such as the instrumental value of smoking, that is, the extent to which students expect smoking to elicit positive social responses (Tyc et al., 2004).

Perceived behavioural control contributed significantly to students’ intention to smoke in all grade levels but that contribution was greater for the senior high school students. This finding is in accordance with McEachan et al. (in press) who claimed that in adolescent samples, perceived behavioural control was the strongest predictor of abstaining compared to student populations. According to Notani (1998), perceived behavioural control represents perceptions of control and not actual control. When the target behaviour is familiar to the individual, perceived behavioural control can predict intention better than when behaviour is unfamiliar. That seems to happen because being familiar with the behaviour in question may
result in greater interest and motivation. This could explain the present findings because younger students have no or little experience of smoking behaviour, whereas older students have more direct or indirect smoking experiences, which may increase their perceived control on smoking behaviour.

Subjective norm did not make any significant prediction to students’ intention to smoke and this was the case for all three school grade levels. Subjective norm has been criticised as the weakest predictor in the TPB (Hagger, Chatzisarantis, & Biddle, 2002); however, its role varies depending on behaviour type. Nevertheless, in this study, this may be justified given that the construct was measured in relation to significant others in general. This is a limitation of this study because ‘significant others’ may be different persons across different school grade levels. For instance, elementary students may consider their parents as ‘significant others’ but junior and high school students may consider their peers and/or friends. Subjective norm is a social factor that refers to the perceived social pressure to enact or not enact a behaviour (Ajzen & Madden, 1986). This social factor changes through the lifespan and its measurement should be focused more specifically either on parents or peers or best friend or boyfriend/girlfriend. Several researchers have suggested that the measurement of subjective norm should be reconsidered in different ways to improve its contribution to the prediction of intention and behaviour (Armitage & Conner, 2001). For example, McMillan and Conner (2003), while examining smoking intention and behaviour, also included the constructs of descriptive, injunctive and moral norms in their study.

The self-identity construct seemed to be the most stable and powerful predictor of intention to smoke in all three grade levels. Self-identity contributed to a higher degree in intention to smoke for the elementary students compared to the junior high school. Self-identity contributes to different health behaviours significantly such as alcohol consumption in students (Conner, Warren, Close, & Sparks, 1999) and exercise in young women (Theodorakis, 1994). Students form their self-identity by internalising behaviours in order to become accepted by certain social groups such as peers. Smoking is one such behaviour. Thus, anti-smoking interventions should emphasise the development of a non-smoker identity for adolescents in which smoking would be meaningless.

**Strengths and limitations**

Besides policies, health education programmes should be developed and applied in Greek schools to enhance the impact of education on public health. Therefore, research on determinants of Greek students’ intention to smoke can make a significant contribution to designing more effective antismoking programmes. A strength of this study is the collection of data regarding parents’ smoking behaviour from parents themselves rather than from students to achieve a more valid assessment of parents’ smoking behaviour.

Given the cross-sectional nature of the study no causal inferences can be made. Clearly, the present associations should be replicated using longitudinal or experimental designs that may allow inferences of causal relationships between the variables of interest. Further, students’ smoking behaviour was not presently measured but rather students’ intention to smoke. A meta-analysis (Webb & Sheeran, 2006) which examined whether changes in behavioural intention engender
behaviour change showed that a medium-to-large-sized change in intention engenders only a small-to-medium change in behaviour. Therefore, the results of this study must be interpreted carefully given that intention does not fully reflect behaviour.

Further, although a large sample of Greek students was used no random sampling took place. However, we expect that some generalisation of the findings may be in order given efforts to represent schools from both urban and rural areas, several socio-economic strata, and geographical regions. Also, the self-report nature of the measures of parents’ smoking behaviour has been criticised as liable to social desirability. However, as Ajzen and Fishbein (2004) pointed out, even when the behaviour is observed rather than reported, prediction of behaviour in the context of TPB is highly significant and according to Armitage and Conner’s (2001) meta-analysis, the TPB model accounts for considerable variance in behaviour. Besides that, self-report is a method that is difficult to replace when assessing large samples.

**Future directions**

The relationships found in this study should also be studied using longitudinal designs to investigate the degree to which smoking determinants may contribute to the development of intention to smoke. Future studies would also be important to examine additional social influences (e.g. peers, friends) on students’ intention to smoke and the extent to which these social factors may contribute to the formation of smoking intention in different age groups over the course of early to late adolescence.

Moreover, there was an overrepresentation of mothers in the sample of parents who returned the completed questionnaires that led to the difficulty to explain this as if it was either because of their greater availability or because students choose the non-smoking parent to fill in the questionnaire about smoking in order to avoid conflicts. As a result, we suggest that in future studies researchers request students to ask one parent about the smoking behaviour of the other parent in order to obtain complete information for both parents’ smoking behaviour.

In addition, measuring students’ smoking behaviour could shed more light on the prediction of behaviour by the TPB variables and parental influences towards smoking. Measurement of students’ smoking behaviour may also help to investigate how experimentation with smoking may interact with self-identity. According to Moan and Rise (2006), there is an interaction between self-identity and TPB variables; so it is assumed that in regular smokers, self-identity and intention to smoke may be strongly related. Further, future antismoking interventions should consider not only intrapersonal factors such as attitudes, subjective norms and behavioural control, but also the different paths through which these factors relate to significant others’ smoking behaviour. Overall, the results of this study provide an insight into factors related to smoking in Greek adolescents, suggesting that the determinants of smoking vary between early and late adolescence and that these differences must be taken into account when designing antismoking health education programmes in schools.
References


