The influence of tobacco marketing on adolescent smoking intentions via normative beliefs

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Abstract

Using cross-sectional data from three waves of the Youth Tobacco Policy Study, which examines the impact of the UK’s Tobacco Advertising and Promotion Act (TAPA) on adolescent smoking behaviour, we examined normative pathways between tobacco marketing awareness and smoking intentions. The sample comprised 1121 adolescents in Wave 2 (pre-ban), 1123 in Wave 3 (mid-ban) and 1159 in Wave 4 (post-ban). Structural equation modelling was used to assess the direct effect of tobacco advertising and promotion on intentions at each wave, and also the indirect effect, mediated through normative influences. Pre-ban, higher levels of awareness of advertising and promotion were independently associated with higher levels of perceived sibling approval which, in turn, was positively related to intentions. Independent paths from perceived prevalence and benefits fully mediated the effects of advertising and promotion awareness on intentions mid- and post-ban. Advertising awareness indirectly affected intentions via the interaction between perceived prevalence and benefits pre-ban, whereas the indirect effect on intentions of advertising and promotion awareness was mediated by the interaction of perceived prevalence and benefits mid-ban. Our findings indicate that policy measures such as the TAPA can significantly reduce adolescents’ smoking intentions by signifying smoking to be less normative and socially unacceptable.

Introduction

The rekindling of interest in social norms is partly attributable to the increasing application of public health approaches to a plethora of health risk behaviours [1]. As social norms act as influential moderators in the norm–behaviour relationship [2], normative information can be used as a tool for altering behaviours [3]. However, despite the recent tendency to adopt social norms marketing campaigns to address behaviours ranging from conservation [4] to reducing HIV [5], mixed results have been found [4]. This may be due to the tendency of normative marketing to only focus on descriptive norms [6], without considering injunctive norms [7] or other potential moderating variables [8]. Descriptive norms, or perceived prevalence, are beliefs about what most people in one’s social group do [9]. Higher levels of perceived prevalence of smoking, which are most commonly derived from exposure to peer or family smokers [10] and the media [11], are known to increase both smoking intentions and uptake among teenagers [12]. However, focussing exclusively on descriptive norms may be insufficient to elicit behaviour change. Rimal and Real [9] have addressed this by developing the Theory of Normative Social Behaviour (TNSB), a model assessing descriptive norms and moderators of descriptive norms (injunctive norms, outcome expectations and group identity) on intentions. Multifaceted models such as the
TNSB, allowing the delineation of factors that moderate the influence of descriptive norms on behaviour, are necessary given the multidimensional nature of normative influences. The TNSB was developed using a survey examining normative influences on intentions to consume alcohol among incoming college students. Of the 2000 surveys distributed, 1352 (67.6%) were returned, representing 19% of the total first year population [9]. It was found that each mechanism independently predicted intentions with the model explaining 63% of the variance. The strength of the interaction between descriptive norms and group identity, however, was not significant, only explaining 5% of the variance. Indeed, it has been subsequently reported that the group identity moderator requires further conceptual clarification, [13] and other research, investigating the relationship between the Theory of Planned Behaviour [14] and intentions, has also failed to find support for the moderating role of group identity [15].

In contrast to the poor performance of group identity within the TNSB, Rimal and Real [9] found that outcome expectancies (perceived benefits and anticipatory socialization) explained 48% of the variance, highlighting the importance of perceived benefits and its moderating effect with perceived prevalence, on intentions. Perceived benefits are therefore central to the TNSB, and indeed Social Learning Theory [16] and the Theory of Reasoned Action [17], increasing the likelihood that individuals will engage in a particular behaviour. Tobacco marketers are cognizant of the power of perceived benefits and present tobacco use as a solution for adolescents’ insecurities about their image, appearance and popularity [18].

As perceived benefits and descriptive norms are separate normative measures, the influence of perceived benefits on behaviour is not indicative of the influence of descriptive norms. However, when perceived benefits interact with descriptive norms, the extent of influence on behaviour becomes stronger [9]. So, engaging in a specific behaviour such as smoking becomes more attractive when individuals perceive this behaviour to be both prevalent and holding benefits.

Injunctive norms are the third moderating variable within the TNSB, known to moderate the relationship between descriptive norms and behavioural intentions, thus helping determine the acceptability of behaviour [19]. Descriptive and injunctive norms appear to have a monotonic relationship, where the influence of descriptive norms on intentions is heightened when injunctive norms are also strong and weakened when they are weak [20]. Research suggests that the relationship between injunctive norms (measured as approval) and behaviour (specifically student gambling) varies with reference group [21]. Approval from proximal reference groups, e.g. peers and family, was positively associated with gambling frequency and expenditure, whereas approval from distal groups, e.g. students, was not. Similar findings have been obtained in earlier gambling research [22], as it has for adolescents’ use of alcohol, cigarettes and marijuana [23]. It is important therefore to assess approval by proximal reference groups rather than distal groups [24] because smoking (and approval) among peers, siblings and parents consistently predict smoking initiation [25].

Researchers have attempted to extend the purview of the TNSB by assessing other moderators of descriptive norms such as group orientation and peer communication [13]. Our study focusses instead on the impact that a policy measure (an advertising and promotions ban) has on intentions via a similar, but not identical, model. Specifically, we investigate the impact of advertising and promotion awareness on intentions via descriptive norms and two moderators (perceived benefits and injunctive norms), but without the third moderator in the TNSB, group identity, given problems with its measurement and conceptualization [9]. This allows us to examine, from a theoretical perspective, whether a policy change at the collective (societal) level appears to affect normative influences at the individual level.

Collective and perceived norms are conceptually distinct although a change at societal level would likely have an impact at the individual level. For example, comprehensive tobacco control measures aimed at making non-smoking the norm at the collective level may filter down to the individual level, helping rectify adolescent’s misperceptions of.
smoking prevalence and increasing pressure to conform to this non-smoking norm. Information regarding descriptive and injunctive norms at the collective level can be obtained for the former via observing media depictions of trends surrounding an issue [26] and from observing or hearing about policy changes that proscribe or promote certain behaviours for the latter. In the current climate, where tobacco control in the UK is the most stringent in Europe [27], strong disapproval cues from authority figures concerning smoking are evident.

Pivotal to the UK’s tobacco control strategy is the Tobacco Advertising and Promotion Act (TAPA), implemented between February 2003 and July 2005, prohibiting most forms of tobacco marketing. Specifically, between February and July 2003 the TAPA banned advertising on billboards, cinemas and in print media, as well as prohibiting direct mail and on-pack promotions and domestic tobacco sponsorship. In December 2004, restrictions were placed on point-of-sale advertising (limiting the size of advertising in-store to A5) and finally a ban on brand sharing and international sponsorship came into effect in July 2005. The TAPA is intended to reduce tobacco consumption and might additionally convey disapproval cues about smoking and is important given the dose–response relationship between adolescent tobacco marketing awareness and smoking uptake [28]. Aside from the direct influence tobacco marketing has on smoking intentions, it also has an indirect influence, as knowledge of peers’ tobacco use mediates decisions on future smoking [29]. Evidence suggests that tobacco companies target youngsters with positive lifestyle images and covert messages [30], which possibly shape and reflect social norms [31]. Indeed, research suggests that tobacco marketing bans significantly lower smoking intentions [32], perhaps by communicating non-smoking norms among peers. The International Agency of Research on Cancer provides a model for evaluating tobacco control policies, in which policy measures are mediated by normative beliefs [33].

To date, research assessing the mechanisms underlying the indirect effect of tobacco marketing on smoking intentions, mediated through normative influences, has considered the mass media in isolation [34], ignoring other forms of tobacco marketing such as advertising and promotions. This study, using a model similar to the TNSB, investigates: (i) the effect of tobacco advertising and promotion awareness on smoking intentions before, during and after the TAPA, through the effect of perceived prevalence, approval and benefits and (ii) the indirect effects of tobacco advertising and promotion awareness on intentions, via the moderation of perceived prevalence by benefits. To the extent that these normative influences mediate the relationship between tobacco marketing awareness and intentions, the mediation of perceived prevalence, hypothetically, is heightened by perceived benefits in these normative mechanisms. From the preceding discussion, the following hypotheses are proposed:

- P1: Higher awareness of promotions (H1a) and advertising (H1b) will positively affect perceived prevalence and in turn intentions (H2a).
- P2: Higher awareness of promotions (H1c) and advertising (H1d) will positively affect perceived approval and in turn intentions (H2b).
- P3: Higher awareness of promotions will positively affect perceived benefits (H1e) and moderation of perceived prevalence by benefits (H1f) and both perceived benefits and moderation of perceived prevalence by benefits will, in turn, independently affect intentions (H2c and H2d, respectively).
- P4: Higher awareness of advertising will positively affect perceived benefits (H1g) and moderation of perceived prevalence by benefits (H1h) and each of these will independently affect intentions (H2e and H2f, respectively).
- P5: Higher awareness of promotions (H2e) and advertising (H2f) will positively affect intentions.

**Methods**

**Design**

Three waves of the Youth Tobacco Policy Study (YTPS) were used to examine the impact of the
TAPA. The first wave was conducted in Summer 1999 (three and a half years pre-ban), the second in Summer 2002 (6 months prior to the main advertising ban) and the third in Summer 2004 [13 months after the promotion ban and 16 months after the advertising ban, but 6 months before point of purchase (POP) restrictions]. The fourth wave was conducted in Summer 2006 (12 months after the final phase of the ban on international sponsorship, 18 months after POP restrictions, 37 months after the promotion ban and 40 months after the advertising ban). This study uses data from Waves 2 to 4. The fieldwork comprised face-to-face interviews conducted in-home, by professional interviewers, accompanied by a self-completion questionnaire. Parental permission and participant consent were secured prior to each interview. The study was approved by the Ethics Committee at the University of Stirling.

Sample
A cross-sectional sample of 11- to 16-year olds across the UK was employed at each wave. Random location quota sampling involved random selection of electoral wards stratified by Government Office Region and ACORN classification (a geodemographic classification system describing demographic and lifestyle profiles of small geographic areas) to ensure coverage of a range of geographic areas and socio-demographic backgrounds [35]. Within each of the 92 selected wards, a quota sample, balanced across gender and age, was obtained. A total of 1121 adolescents participated in Wave 2 (W2), 1123 in Wave 3 (W3) and 1159 in Wave 4 (W4).

As a guide to the ward boundary, interviewers were supplied with a list of the streets and specific addresses which were within their ward. Interviewers approached households within their ward, seeking respondents who met the quota requirements and who lived there all or most of the time. A gap of at least four doors was left between achieved interviews. Within blocks of flats, a maximum of two interviews were permitted on any one landing. No more than one interview per household was permitted. In households where more than one person met the quota requirements, the person whose birthday was closest to the date of interview was selected.

The final stage of sampling had to rely on non-probability sampling due to the absence of reliable and accessible sampling frames for 11- to 16-year olds. As a result of this, interviewers had limited discretion over the selection of participants however. While they had a ward area to work within, the very specific age group being sought meant that they sometimes had difficulty in finding eligible respondents. In some cases, the ward area was exhausted before the quota of 15 interviews was obtained. Where this occurred, the interviewers were instructed to gradually work outwards of the ward boundary to a maximum radius. Nevertheless, despite the reliance on quota selection for the final stage of sampling, we believe that the samples obtained can still be generalized to the UK adolescent population. To support this point, smoking prevalence in the YTPS (not assessed in this paper) across the three waves is very similar to that of a large national sample, drawn from schools, in comparable years. Among 11- to 15-year olds in our surveys, the proportion of regular smokers was 9%, 10% and 9%, respectively, in 2002, 2004 and 2006 compared with estimates of 10%, 9% and 9% obtained from a large school-based sample of 11- to 15-year olds in respective years [36].

Measures

Intentions

Intentions to smoke: Measured with the item ‘Which of these best describes whether or not you think you will be smoking cigarettes when you are 18 years old?’ with four response categories; when I’m 18, I definitely will not be smoking, I probably will not be smoking, I probably will be smoking and I definitely will be smoking.

Descriptive norms

Perceived prevalence: Measured via three items; ‘How many 11- (13 and 15 for subsequent items) year olds do you think smoke at least one cigarette
a week?” This was measured on a seven-point scale: none, very few, a few, about half, most, almost all and all. Alpha was 0.83, 0.83 and 0.84, respectively, for the three waves.

**Injunctive norms**

**Older sibling approval:** Measured via one item, with a score of 1 for ‘In general, my older brothers/sisters approve of smoking’ and a score of 5 for ‘In general, my older brothers/sisters disapprove of smoking’. Only respondents with older siblings were included in the analysis. The number and percentage of respondents with older siblings for each of the three waves were 659 (58.6%) for Wave 2, 685 (61%) for Wave 3 and 679 (58.6%) for Wave 4.

**Outcome expectancies**

**Perceived benefits:** Five items relating to stress relief, relaxation, weight control, attractiveness and image, all measured on a five-point scale. Alpha was 0.60, 0.59 and 0.58 for the three waves.

**Policy measures**

**Tobacco marketing awareness:** Seventeen items were employed to assess awareness of cigarette advertising and promotions. It should be noted that although all the items assess cigarette advertising and promotion, the terms cigarette and tobacco advertising are used synonymously, consistent with past research employing youth populations [37, 38], given that tobacco use by young people is largely confined to cigarettes. All 17 items had dichotomous responses (Yes/No), with the items highlighted in bold employed in the final model (see Table I). Confirmatory factor analysis revealed that the initial measurement was unsatisfactory. As five indicators measuring awareness of promotion had very low $r^2$ (<0.10), these were deleted in each wave, and a revised measurement model, with 12 items, was tested and provided good model fit. Alpha was 0.62, .062 and 0.59 for promotion and 0.60, 0.58 and 0.59 for advertising for the three waves. Despite Cronbach alphas suggesting that reliabilities might be low among these constructs as well as perceived benefits, analysis of convergent reliabilities and average variance extracted showed that these constructs are appropriate for structural equation modelling (SEM).

**Data analysis**

SEM with Analysis of Moment Structures (AMOS) was utilized to analyse the hypothesized model. SEM permits modelling with a set of relations among constructs and allows for simultaneous estimation of all hypothesized paths and also estimation of mediation or indirect effects [39].

As normality of each observed variable is a prerequisite for maximum likelihood estimation (MLE) in SEM, the skewness and kurtoses of indicators with four or more categories across the three waves were computed. Normality among these variables was found to be acceptable excluding three variables whose critical ratios exceeded the cut off point of ±1.96 [40, 41]. Appropriate transformation (square root and logarithm) employed did not correct normality for these variables. Hence, the original variables were used on account of the reasonably large sample size used across the three waves [42, 43]. The dichotomous variables were also considered appropriate for MLE in SEM as the split was <90:10.

A test for linearity using analysis of variance between outcome and predictor variables also indicated that across the three waves there was a significant linear relationship between these variables ($P < 0.05$). The correlation matrix showed that correlations among predictor variables were <0.80 and a collinearity diagnostics test also revealed the condition index to be <0.30, which indicates that there was no multicollinearity [44]. Regarding outliers, univariate and bivariate assessment of variables revealed no outliers across the three waves.

Model fit was evaluated using comparative fit index (CFI), Tucker Lewis index (TLI), incremental fit index (IFI) and root mean square error of approximation (RMSEA) [39, 45]. Values >0.90 on the CFI, TLI and IFI and <0.06 on the RMSEA indicate good fit [39]. Chi square is interpreted as the test of the difference between the hypothesized model and
the models identified, with smaller values indicating better fit [39, 45].

As the results obtained from the analyses are only meaningful against the statistical model specified, model specification is crucial within SEM [39]. The first step in SEM with latent variables is to define a measurement model specifying the pattern of relationships between the observed variables and the latent variables [45]. Prior to testing the structural models, the viability of our proposed model was established using confirmatory factor analysis [46]. Having confirmed the overall fit of the measurement model, the validity of the structural models for each wave (Waves 2, 3, and 4) was established separately, and subsequently, invariance tests were performed using multigroup analyses to examine the consistency of the model across waves [47]. Following findings that the models are significantly different across waves, all further analyses are considered independently for each wave.

### Results

Table II shows the descriptive statistics of adolescents by age and gender for the three waves. The means, standard deviations, Cronbach’s alphas, convergent reliabilities and average variance extracted of constructs are shown in Table III. Results of the hypothesized SEM for these models are presented in Table IV.

### Reliability and validity

To test the measurement models for each wave, confirmatory factor analysis (CFA) with MLE method was conducted [45]. The W2 model revealed good fit ($\chi^2_{165} = 429.35$, $P < 0.001$, CFI = 0.92, IFI = 0.92, TLI = 0.90, RMSEA = 0.038) in accordance with the usual conventions [48]. All regression paths from constructs to indicators were significant ($P < 0.001$). Convergent reliability (CR) and average variance extracted (AVE) were

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Table I. Measures of specific forms of tobacco marketing

<table>
<thead>
<tr>
<th>Advertising</th>
<th>Promotions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Adverts for cigarettes on large posters or billboards in the street</td>
<td>4. Free trial cigarettes being given out or offers to send away for free cigarettes</td>
</tr>
<tr>
<td>2. Adverts for cigarettes in newspapers or magazines</td>
<td>5. Free gifts from the shop keeper when people buy cigarettes</td>
</tr>
<tr>
<td>3. Signs or posters about cigarettes in shops or on shopfronts: On shop windows</td>
<td>6. Free gifts when people save coupons or tokens from inside cigarette packs</td>
</tr>
<tr>
<td></td>
<td>On shop doors</td>
</tr>
<tr>
<td></td>
<td>On cigarette display units inside shops</td>
</tr>
<tr>
<td></td>
<td>On clocks inside shops</td>
</tr>
<tr>
<td></td>
<td>On staff aprons or overalls</td>
</tr>
<tr>
<td></td>
<td>On signing mats inside shops</td>
</tr>
<tr>
<td></td>
<td>Some other signs or poster about cigarettes (in shops or on shopfronts)</td>
</tr>
</tbody>
</table>

| 7. Free gifts when people save parts of cigarette packs |
| 8. Free gifts showing cigarette brand logos being given out at events (sports/festivals/concerts) |
| 9. Special price offers for cigarettes |
| 10. Promotional mail, from cigarette companies, being delivered to people’s homes |
| 11. Clothing or other items with cigarette brand names or logos on them |
| 12. Competitions or prize draws linked to cigarettes |
| 13. Famous people, in films or on TV, with a particular make or brand of cigarettes |
| 14. New pack design or size |
| 15. Internet sites promoting cigarettes or smoking (do NOT include anti-smoking sites) |
| 16. E-mail messages or mobile phone text messages promoting cigarettes or smoking (do NOT include anti-smoking messages) |
| 17. Leaflets, notes or information inserted in cigarette packs |
assessed to check construct reliabilities [49]. As Table III shows, the findings provide support for CR and AVE since the values obtained exceed the recommended levels of 0.7 for CR and 0.5 for AVE [49].

The W3 model provided good fit when assessed via CFA ($\chi^2_{165}=385.57, P < 0.001, \text{CFI}=0.93, \text{IFI}=0.93, \text{TLI}=0.91, \text{RMSEA}=0.035$) with all paths significant ($P < .001$) and AVE and CR >0.5 and 0.7, respectively. The W4 model also provided a good fit ($\chi^2_{165}=362.44, P < 0.001, \text{CFI}=0.93, \text{IFI}=0.93, \text{TLI}=0.91, \text{RMSEA}=0.032$). All paths were significant ($P < 0.001$) and both AVE and CR were >0.5 and 0.7, respectively (see Table III).

### Invariance test

Multigroup analysis was used to examine the invariance of structural models simultaneously across the three waves [50]. All path coefficients were constrained to be identical for the three waves and then compared with an unconstrained model. Results of a chi-squared difference test ($\Delta \chi^2_{58}=265.77, P < 0.01$) indicated that the unconstrained model fit the data significantly better. This revealed that there are significant differences across the three waves. Following this, an invariance test employed to examine all path coefficients between groups (i.e. Waves 2 and 3, Waves 2 and 4 and Waves 3 and 4) showed further significant differences between each group. Results of a chi-squared difference test for each group (Waves 2 and 3; $\Delta \chi^2_{29}=74.36, P < 0.001$; Waves 2 and 4; $\Delta \chi^2_{29}=178.28, P < 0.01$; and Waves 3 and 4; $\Delta \chi^2_{29}=164.03, P < 0.001$) indicated that the unconstrained models fit the data significantly better. Lastly, a test of invariance employed to examine structural paths between groups (i.e. Waves 2 and 4; and Waves 3 and 4) showed that the unconstrained models for each group fit the data significantly better.

### Table II. Descriptive statistics of adolescents’ gender by age across three waves

<table>
<thead>
<tr>
<th>Variable gender</th>
<th>Males</th>
<th></th>
<th>Females</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>Wave 2</td>
<td>Wave 3</td>
<td>Wave 4</td>
<td>Wave 2</td>
<td>Wave 3</td>
</tr>
<tr>
<td>11</td>
<td>97 (18%)</td>
<td>87 (16%)</td>
<td>104 (17%)</td>
<td>93 (16%)</td>
<td>97 (17%)</td>
</tr>
<tr>
<td>12</td>
<td>90 (17%)</td>
<td>94 (17%)</td>
<td>111 (18%)</td>
<td>92 (16%)</td>
<td>86 (15%)</td>
</tr>
<tr>
<td>13</td>
<td>110 (20%)</td>
<td>97 (18%)</td>
<td>103 (17%)</td>
<td>117 (20%)</td>
<td>110 (19%)</td>
</tr>
<tr>
<td>14</td>
<td>89 (16%)</td>
<td>98 (18%)</td>
<td>93 (15%)</td>
<td>99 (17%)</td>
<td>99 (17%)</td>
</tr>
<tr>
<td>15</td>
<td>95 (18%)</td>
<td>85 (15%)</td>
<td>102 (17%)</td>
<td>107 (18%)</td>
<td>93 (16%)</td>
</tr>
<tr>
<td>16</td>
<td>59 (11%)</td>
<td>88 (16%)</td>
<td>91 (15%)</td>
<td>73 (13%)</td>
<td>87 (15%)</td>
</tr>
<tr>
<td>Total sample</td>
<td>540 (42%)</td>
<td>549 (49%)</td>
<td>604 (52%)</td>
<td>581 (58%)</td>
<td>572 (51%)</td>
</tr>
</tbody>
</table>

Discrepancy in sample sizes of waves three and four is on account of missing data.

### Table III. Properties of measurement scales

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Mean (SD)</th>
<th>Alpha</th>
<th>Convergent reliability (average variance extracted)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wave 2</td>
<td>Wave 3</td>
<td>Wave 4</td>
</tr>
<tr>
<td>Prevalence</td>
<td>3.65 (1.17)</td>
<td>3.38 (1.06)</td>
<td>3.26 (1.08)</td>
</tr>
<tr>
<td>Benefits</td>
<td>2.40 (0.28)</td>
<td>2.36 (0.27)</td>
<td>2.33 (0.34)</td>
</tr>
<tr>
<td>Promotion</td>
<td>1.14 (0.01)</td>
<td>1.01 (0.05)</td>
<td>1.07 (0.04)</td>
</tr>
<tr>
<td>Advertising</td>
<td>1.57 (0.03)</td>
<td>1.43 (0.02)</td>
<td>1.30 (0.02)</td>
</tr>
<tr>
<td>Approval</td>
<td>3.54 (1.40)</td>
<td>2.61 (1.47)</td>
<td>3.56 (1.53)</td>
</tr>
<tr>
<td>Intention</td>
<td>1.50 (0.78)</td>
<td>1.21 (0.45)</td>
<td>1.52 (0.79)</td>
</tr>
</tbody>
</table>

### Tobacco marketing influence on adolescent smoking norms

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better than the constrained models (Waves 2 and 4; $\Delta \chi^2_{14} = 43.64, P < 0.001$; Waves 3 and 4; $\Delta \chi^2_{14} = 77.87, P < 0.001$). However, results of chi-squared test for structural paths between Waves 2 and 3 revealed no significant difference ($\Delta \chi^2_{14} = 9.94, P > 0.05$). Hence, although there were significant differences between the structural paths of Waves 2 and 4 and also between Waves 3 and 4, no significant difference was found between Waves 2 and 3. All further analyses are therefore conducted independently for each wave.

### Hypothesis testing via SEM

SEM analysis, conducted with three models, considered the mediation and moderation of norm-related variables as a result of the influence of awareness of tobacco advertising and promotion on smoking intentions. Table IV provides the path loadings, critical ratios and $P$ values. All path loadings from latent constructs to indicators were significant ($P < 0.001$). The W2 model fully supported 9 out of 14 hypotheses; H1c, H1d, H1e, H1g, H1h, H2a, H2b, H2c and H2d. The independent paths from awareness of advertising and promotions to intentions were fully mediated by perceived approval and perceived benefits. Only the path from advertising to intentions was mediated by the perceived prevalence $\times$ benefits interaction. Perceived prevalence affected intentions but had no association with advertising and promotion. The independent paths from awareness of advertising and promotions to intentions were not supported. For this model, the variance captured in intention was 24%, with the model indicating good fit ($\chi^2_{219} = 584.58, P < 0.001$, $CFI = 0.91$, $IFI = 0.89$, $TLI = 0.86$, $RMSEA = 0.039$).

To determine associations after the TAPA, W3 and W4 models were examined. The W3 model

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**Table IV. Analysis of tobacco advertising and promotion effects on intentions, via perceived prevalence, approval and benefits of smoking**

<table>
<thead>
<tr>
<th>Model Fit</th>
<th>$\chi^2$</th>
<th>d.f.</th>
<th>CFI</th>
<th>TLI</th>
<th>IFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave 2</td>
<td>584.58</td>
<td>219</td>
<td>0.91</td>
<td>0.86</td>
<td>0.89</td>
<td>0.039</td>
</tr>
<tr>
<td>Wave 3</td>
<td>514.32</td>
<td>219</td>
<td>0.92</td>
<td>0.89</td>
<td>0.92</td>
<td>0.035</td>
</tr>
<tr>
<td>Wave 4</td>
<td>531.23</td>
<td>219</td>
<td>0.91</td>
<td>0.88</td>
<td>0.91</td>
<td>0.035</td>
</tr>
</tbody>
</table>

Complete sample (with moderation effects)

<table>
<thead>
<tr>
<th>HYPO PATHS</th>
<th>Wave 2</th>
<th>Wave 3</th>
<th>Wave 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a Promo $\rightarrow$ Prevalence</td>
<td>$0.15$</td>
<td>$0.67^{**}$</td>
<td>$0.59^{***}$</td>
</tr>
<tr>
<td>H1b Advert $\rightarrow$ Prevalence</td>
<td>$-0.05$</td>
<td>$0.53^{*}$</td>
<td>$0.44^{***}$</td>
</tr>
<tr>
<td>H1c Promo $\rightarrow$ Approval</td>
<td>$0.39^{***}$</td>
<td>$1.73^{***}$</td>
<td>$0.68^{***}$</td>
</tr>
<tr>
<td>H1d Advert $\rightarrow$ Approval</td>
<td>$0.29^{**}$</td>
<td>$1.65^{***}$</td>
<td>$0.55^{***}$</td>
</tr>
<tr>
<td>H1e Promo $\rightarrow$ Benefits</td>
<td>$0.48^{***}$</td>
<td>$1.17^{***}$</td>
<td>$1.19^{***}$</td>
</tr>
<tr>
<td>H1f Promo $\rightarrow$ Preval $\times$ Ben</td>
<td>$0.09$</td>
<td>$0.54^{*}$</td>
<td>$0.29^{*}$</td>
</tr>
<tr>
<td>H1g Advert $\rightarrow$ Benefits</td>
<td>$0.30^{**}$</td>
<td>$1.11^{***}$</td>
<td>$1.13^{***}$</td>
</tr>
<tr>
<td>H1h Advert $\rightarrow$ Preval $\times$ Ben</td>
<td>$0.22^{*}$</td>
<td>$0.58^{**}$</td>
<td>$0.33^{**}$</td>
</tr>
<tr>
<td>H2a Prevalence $\rightarrow$ Intentions</td>
<td>$0.19^{***}$</td>
<td>$0.12^{**}$</td>
<td>$0.12^{**}$</td>
</tr>
<tr>
<td>H2b Approval $\rightarrow$ Intentions</td>
<td>$0.14^{***}$</td>
<td>$0.03$</td>
<td>$0.08$</td>
</tr>
<tr>
<td>H2c Benefits $\rightarrow$ Intentions</td>
<td>$0.38^{***}$</td>
<td>$0.50^{**}$</td>
<td>$0.42^{***}$</td>
</tr>
<tr>
<td>H2d Preval $\times$ Ben $\rightarrow$ Intentions</td>
<td>$0.07^{*}$</td>
<td>$0.15^{*}$</td>
<td>$-0.02$</td>
</tr>
<tr>
<td>H2e Promo $\rightarrow$ Intentions</td>
<td>$-0.04$</td>
<td>$0.09$</td>
<td>$0.34$</td>
</tr>
<tr>
<td>H2f Advert $\rightarrow$ Intentions</td>
<td>$-0.16$</td>
<td>$-0.03$</td>
<td>$0.15$</td>
</tr>
<tr>
<td>$R^2$</td>
<td>$0.24$</td>
<td>$0.36$</td>
<td>$0.39$</td>
</tr>
</tbody>
</table>

$***P < 0.001$, $**P < 0.01$, $*P < 0.05$. 

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supported 11 of the 14 hypotheses; H1a, H1b, H1c, H1d, H1e, H1f, H1g, H1h, H2a, H2c and H2d. The independent paths from awareness of advertising and promotions to intentions were fully mediated by perceived prevalence, perceived benefits and the moderation of perceived prevalence by benefits. The loadings from advertising and promotion to perceived approval were also supported but did not affect intentions. The direct paths from advertising and promotions to intentions were not supported. For the W3 model, the variance captured in intention was 36%, with the model indicating good fit ($\chi^2=514.32$, $P < 0.001$, CFI = 0.92, IFI = 0.92, TLI = 0.89, RMSEA = 0.035).

The W4 model supported 10 out of 14 hypotheses; H1a, H1b, H1c, H1d, H1e, H1f, H1g, H1h, H2a and H2c. Similar to the W3 model, the paths from promotions and advertising to intentions were fully mediated by perceived prevalence and perceived benefits although not the perceived prevalence $\times$ benefits interaction. The paths from advertising and promotions were related to approval and interaction effects of prevalence and benefits; however, these did not affect intentions. Comparable with previous models, advertising and promotions had no direct association with intentions. For the W4 model, the variance captured in intention was 39%, with the model providing good fit ($\chi^2=531.23$, $P < 0.001$, CFI = 0.91, IFI = 0.91, TLI = 0.88, RMSEA = 0.035). Overall, the findings suggest that awareness of advertising and promotions have decreased between Waves 2 and 4, i.e. pre- and post-ban.

### Discussion

Despite evidence attesting that adolescents’ normative influences are influenced by tobacco marketing [51], the processes and the extent of these influences on smoking behaviours are not well documented [52]. Our aim was to develop a conceptual model and provide empirical evidence that (i) adolescents’ normative influences mediate the association of tobacco marketing with intentions to smoke and (ii) the influence of tobacco marketing on intentions is mediated via the interaction of perceived benefits with perceived prevalence.

The W2 model shows higher levels of awareness of both tobacco advertising and promotions to be independently associated with higher levels of perceived sibling approval and, in turn, intentions. This is consistent with earlier research demonstrating that injunctive norms influence behaviour if salient at the time [23]. As the TAPA had not been implemented, greater exposure to tobacco advertising and promotions may have strengthened adolescents’ perceived sibling approval of smoking, in turn increasing smoking intentions. The findings revealed higher awareness of advertising and promotions to be independently associated with higher perceived benefits and, in turn, intentions. To the extent that perceived benefits can be thought of as beliefs that guide behaviours [53], greater exposure to tobacco marketing will likely heighten these beliefs given that tobacco advertising continues to highlight smoking as a solution for adolescents’ insecurities [21, 22].

Importantly, advertising awareness indirectly affected intentions via the interaction between perceived prevalence and benefits, rather than through the independent mediation of only perceived prevalence. This suggests that greater awareness of tobacco advertising (in print, billboards, shops) amplifies perception of prevalence through the moderation of perceived prevalence by perceived benefits, which in turn affects intentions. This finding justifies the inclusion of potential moderating variables to increase the variance explained in a normative model. We also found that perception of prevalence was independently related to intentions at W2, indicating that adolescents are likely to construe their own smoking intentions as normative if they exaggerate perceptions of peer smoking prevalence [8].

The W3 and W4 models revealed that perceived prevalence fully mediated the independent paths from advertising and promotion awareness to smoking intentions. As these models were obtained after the main advertising and promotion bans, perceptions of prevalence derived from tobacco marketing awareness might have reduced, thus reducing...
smoking intentions. The findings support this assertion as relatively smaller estimates of perceived prevalence were reported at W4 compared with W3, indicative of the indirect pathway of the TAPA on smoking intentions.

The W3 and W4 models were consistent regarding the mediation of perceived benefits on the influence of advertising and promotion awareness on intentions. Similar estimates were obtained for these two models, yet the W2 model yielded lower estimates, showing an increase in perceived benefits post-ban. Although in the opposite direction to that hypothesized, the failure to eliminate, rather than just restrict, POP provides a plausible explanation given that it is known that partial advertising bans are less effective than comprehensive advertising bans [54]. Globally, the industry response to advertising bans has been dramatic increases in expenditure at POP [51], with our findings suggesting that the same may have also happened in the UK. In support of this, an ongoing study, starting pre-ban, which examines the presence of tobacco marketing through a number of sources (print media, smokers panel and retail observation) has revealed that many tobacco marketing channels have been practically eliminated in the UK, except POP (C. Moodie et al. unpublished manuscript). Increased presence of tobacco products in retail outlets at W3, after advertising and promotions were banned but before POP was regulated, might convey to youth that tobacco use is desirable and socially acceptable. Even after the POP regulations came into effect, prior to W4, it only involved minimal restrictions on POP advertising and did not cover product display. Our findings affirm the need for a comprehensive tobacco marketing ban, one eliminating POP once and for all.

The role of the moderating and mediating effect was also demonstrated at W3 as the indirect effect of tobacco marketing on intentions was positively affected through the interaction of perceived prevalence and benefits. This highlights the emphasis placed on POP by the tobacco industry during the partial ban and thereby affecting perceived benefits which also moderately enhanced perceptions of prevalence and consequently influenced smoking intentions.

Fig. 1. Hypothesized model.
Interestingly at W3 and W4, the TAPA reduced perceived sibling approval of smoking, yet approval did not affect intentions. Conversely, all three models showed no direct relation between advertising and promotion awareness and smoking intentions, highlighting that the relationship between tobacco marketing awareness and intentions is mostly indirect. The variance explained in intentions increased from 24% in W2 to 36% in W3 and 39% at W4. Thus, the tobacco marketing ban improved the predictability of the W3 and W4 models as intentions to smoke decreased significantly mid-ban and this continued post-ban.

A number of limitations may have impacted upon the findings, e.g. cross-sectional research does not permit causality. The use of a longitudinal design would have been preferable although the YTPS still provides a long-term monitor of adolescent tobacco marketing awareness and smoking intentions. A probable drawback is that variation in smoking status might affect intention. Nonetheless, as the TAPA impact both smokers and non-smokers’ normative beliefs and intentions to smoke, our study focussed on assessing the influence of the TAPA on the entire youth population’s intentions via normative beliefs. This seemed appropriate given the fairly small sample size and small number of smokers.

The use of a single intention item, asking about behaviour at age 18, as opposed to multiple items, may have impacted upon the findings. Intention realization, especially if some time in the horizon, will be mitigated by other factors and must be maintained over time to have predictive validity [55]. This also partly explains what has been alluded to intention–behaviour gap, i.e. the failure for intentions to predict behaviours, which can be the result of intention or behaviour type, the properties of intentions or alternatively due to cognitive and personality variables [56]. Nevertheless, intentions still remain a reasonable proxy for actual behaviour [9]. Likewise, assessment of ‘liking’ to advertising and ‘image’ advertising may have increased the predictive strength of our findings.

Another limitation is the failure to examine other normative constructs such as ego involvement [26] and peer communication [16], to improve variance on intentions. Peer communication, in particular, is a mechanism for the propagation of normative information, irrespective of its accuracy. In respect to the policy measure we examined, having information on peer communication would have helped provide a more thorough understanding of the moderating role that tobacco marketing has on young people’s normative beliefs via peer communication.

There is a paucity of research examining the impact of tobacco marketing awareness on adolescents’ smoking intentions via normative influences, with our findings showing that theoretical normative frameworks, such as the TNSB, can be expanded to examine distal influences. Future research assessing the impact of pro-smoking and anti-smoking advertising as explanatory media constructs on intentions would be of value.

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**Conflict of interest statement**

None declared.

**References**


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