Youth Culture and Smoking: Integrating Social Group Processes and Individual Cognitive Processes in a Model of Health-related Behaviours

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Abstract

This article assesses four theoretical models proposed to predict future smoking. Young adults were surveyed at three six-month intervals, the first occurring three months after leaving school. Models 1 and 2 were versions of theory of triadic influence (TTI), which links a person's behavioural experience and cognitions to their future behaviour. Model 1 did not fit the data; the fit of model 2 was just adequate. Model 3 combined TTI and self-categorization theory (ST), by allowing norms of the individual's peer group to influence cognitions and future behaviour. It fitted the data well. Model 4, which extended model, provided the best fit. Strength of identification to the peer group was found to enhance the effect of the peer group norm.

Keywords

self-categorization theory, smoking, social identity, theory of triadic influence, young adults

Introduction

THIS ARTICLE investigates the interplay between social group processes and individual cognitive processes in relation to smoking among young adults. The rich and complex iconology of smoking suggests that we must search well beyond health-related knowledge and motivations for explanations of tobacco use. The theoretical question posed in this article is whether behaviour-related cognitions mediate the normative influence of social groups on behaviour entirely or whether the norm of the social group has an independent association with behaviour.

The theory of triadic influence

The theory of triadic influence (TTI) (Flay & Petraitis, 1994; Petraitis, Flay, & Miller, 1995) was derived from the theory of reasoned action (Fishbein & Ajzen, 1975). Flay and colleagues (Flay, Hu, Siddiqui, Day, Hedeker, Petraitis, Richardson, & Sussman, 1995; Flay & Petraitis, 1994) argued that a complete understanding of a behaviour requires consideration of three streams of influence: the environment, the situation and the person. Information from the environment is processed and a global attitude about the behaviour is shaped. The individual's situation or immediate social context triggers evaluated social normative beliefs or social norms that influence behaviour. These social norms represent a perception that other people are *encouraging* the individual to perform the behaviour. Personal influences represent personality characteristics that will contribute directly to the individual's self-efficacy in relation to the behaviour.

Attitudes, social norms and self-efficacy in relation to the behaviour will independently contribute to the individual's intention or decision to perform the behaviour. TTI also asserts that the direct personal experiences gained from initial behaviour will play a dominant role in repeated behaviour. Hence, when considering the predictors of smoking involvement, TTI would advocate focusing on the behaviour-related cognitions and the prior behavioural experiences.

TTI postulates that social context only affects behaviour *via* the behaviour-related cognitive structure. This formulation overlooks Triandis' (1977) insight that behaviours may be constrained or encouraged by the social reality of a person's context. A central aspect of social context is the collection of social groups to which people belong.

Self-categorization theory

Self-categorization theory (ST) (Turner, Hogg, Oakes, Reicher, & Wetherall, 1987; Turner & Oakes, 1986, 1989) provides an explanation of how the social context may affect an individual's behaviour. This theory holds that all social groups have a specific collection of norms. This theoretical perspective emphasizes *voluntary* participation in collective behaviour, which assists in the identity formation of the group.

Referent informational influence is a process articulated by ST whereby individuals perceive as normative, and tend to conform to, the stereotypical attributes of their primary or salient social group. There are three integrated but ordered stages to the process. First, individuals define themselves as members of a particular social group or category. Second, they observe or form the stereotypical norms of that group. And third, they assign these norms to themselves, thus their behaviour becomes normative.

Essentially, people actively participate in creating and activating the social norms of the groups to which they belong. This interpretation of social influence stands in contrast to subjective norm as articulated by TTI which measures subjectively experienced *pressures* to conform behaviourally to the expectations of important social referents. Several researchers have recently questioned the theory of reasoned action (TRA) description of social normative influence on behaviour (e.g. de Vries, Backbier, Kok, & Dijkstra, 1995; Kashima & Gallois, 1993; Terry & Hogg, 1996; White, Terry, & Hogg, 1994). It is argued that norms are better conceptualized as *shared expectations* about the behaviour, attitudes and beliefs of significant referents or group members. Indeed, the uptake of smoking among adolescents is strongly influenced by whether or not their peers smoke (e.g. Chassin, Presson, Sherman, & Edwards, 1991; Conrad, Flay, & Hill, 1992; de Vries et al., 1995; Ennett & Bauman, 1994; Flay & Petraitis, 1994; Hu, Flay, Hedeker, Siddiqui, & Day, 1995; Jessor, Donovan, & Costa, 1991; Stein, Newcomb, & Bentler, 1996).

ST posits that social groups are a product of cognitive classification, that is, people categorize themselves as identical (similar, equivalent, interchangeable) to the members of one social group in contrast to members of other groups (Turner & Oakes, 1986). The theory also holds that the influence of the peer group norm on people's behaviour is moderated by the strength of identification with their peer group. From the perspective of ST, the group norm may be expected to influence behaviour-related cognitions and behavioural patterns among those who strongly identify with their social group. Conversely, the group norm would be expected to have less impact on intention and behaviour than behaviour-related cognitions among the weak identifiers.

Terry and colleagues (Terry & Hogg, 1996; Terry, Hogg, & White, 1999) tested a behaviour-related cognitions model (similar to TTI) and ST, which permitted both the social group norm and the strength of identification to vary between individuals. In both studies, they found that social group norm influenced intention among those who strongly identified with their social group. Conversely, group norm had less impact on intention among weak identifiers. Among this group, perceived behavioural control (a personal not group-based factor) had a greater influence on intention. They did not find an effect of group norm on reported behaviour. This may have been because they used perceived behavioural attitude of group members to measure peer group norm but did not include an assessment of group members' behaviour.

Previous research using the current cohort has demonstrated the utility of ST in understanding young adult smoking involvement (Schofield, Pattison, Hill, & Borland, 2001). Results showed that particular young adult peer groups (such as those characterized as *rebels*, *users of illegal drugs* and *motor bike riders*) were associated with extensive smoking within peer groups. In line with the process of referent informational influence, an individual's smoking status was found to be related to a pro-smoking norm in the peer group. This relationship was found to be greater among those who identified with their peer group compared with those who were weakly identified. Hence, existing evidence suggests that the best determinants of young adult smoking are smoking-related cognitions such as are specified in TTI (Chassin et al., 1991; Gibbons & Gerrard, 1995; Morrison, Gillmore, Simpson, & Wells, 1996; O'Callaghan, Callan, & Baglioni, 1999) and favourable social context (Chassin et al., 1991; Jessor et al., 1991), especially the social group norm (Schofield et al., 2001).

Aims of the study

This research is focused on young adults with experience of smoking. This is because initial smoking behaviour will be predicted by unstable and poorly assessable cognitive factors. Arguably, it is also of greater interest from a public health perspective to understand the progression from early experimentation to greater smoking involvement. In order to test the influence of social group norm on behaviour, the sample was limited to those with a primary social group or main group of friends. Hence, the aim of this article is to explore the manner by which social influences and personal cognitions affect smoking behaviour among young adults with previous experience of smoking. A series of four, increasingly complex, theoretical models is proposed to predict smoking involvement. Model 1, the simplest version of TTI, posits that smoking results from a decision or intention to smoke. Intention is determined by the person's attitude, subjective norm and self-efficacy. These three factors are influenced by prior experiences of the behaviour. Model 2 is the same except that prior experiences of smoking are expected to have a direct influence on the behaviour. Models 3 and 4 incorporate the peer group norm. In model 3, the peer group norm is not only expected to influence the person's attitudes, subjective norm and self-efficacy related to smoking, but also behaviour directly. Invoking referent informational influence, it is expected that peer group norms will have greater impact on attitudes, subjective norms, self-efficacy, intention and behaviour for those who have strong identification with the group compared with the weak identifiers. Conversely, it is expected that intentions will have a comparatively greater influence on behaviour among the weak identifiers. Model 4 includes links from the peer group norm and prior experience to smoking intentions. Models 3 and 4 are presented diagrammatically in Fig. 1.

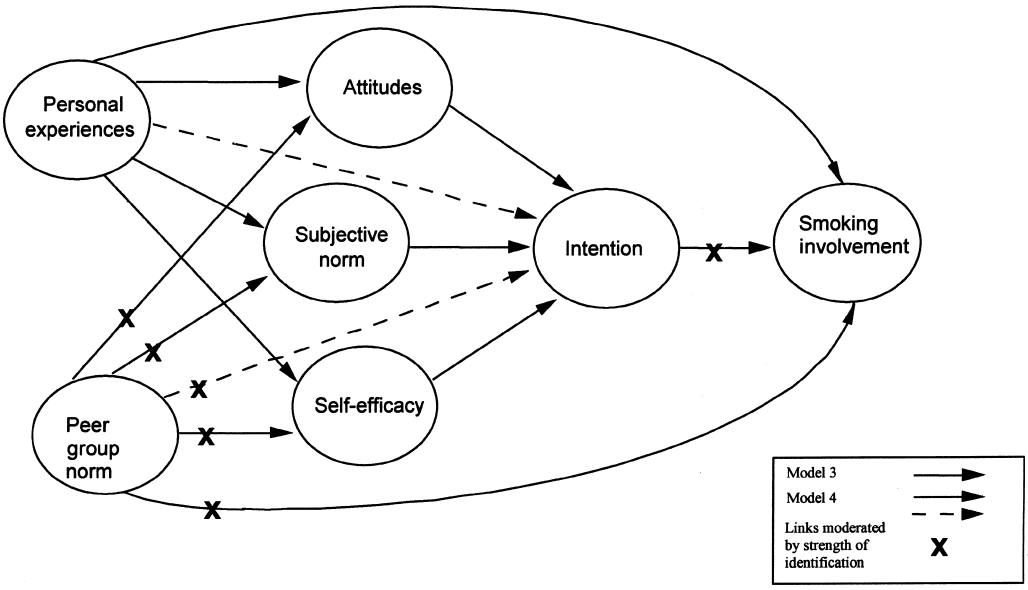

Figure 1. Theoretical models 3 and 4.

The four theoretical models are used to explain prospectively the level of smoking involvement at nine months and at 15 months after the end of school. It is expected that model 4, the most complex of the combined TTI and ST models, will account for substantially more variance than the other models. Further, it is predicted that the peer group smoking norm will have a comparatively stronger influence on smoking involvement (and TTI cognitive precursors) among those with strong identification.

Method

Design and procedure

This article draws from a large cohort study of young adults investigating health-compromising behaviours. Year 12 students were recruited into the study in mid-1993 from 93 secondary schools, strata sampled from all schools in Victoria. They completed a recruitment questionnaire (wave 1) in class.

From a pool of 6176 recruited participants, 3300 randomly drawn people formed the base sample who were posted wave 2 questionnaires in February 1994 and 2589 questionnaires were returned completed. Respondents who had not moved out of state, withdrawn from the study or died, were then sent the wave 3 questionnaire in August 1994 and 2215 questionnaires were returned completed. For wave 4, in February 1995, 2007 of the 2369 eligible participants returned completed questionnaires. Overall, the response rate was 62 per cent over the last three waves of data collection. The interwave response rates were 82 per cent, 87 per cent and 87 per cent for waves 2, 3 and 4 respectively.

Sample

The sample comprised respondents who had experience of smoking and a main group of friends. Data relevant to this article were collected in waves 2, 3 and 4. All analyses were performed on people who said that they had *a main group of friends* of at least three people whom they *regularly* saw and they reported experiences of smoking a cigarette. Over 90 per cent of the sample reported having a main peer group at each time period and 67 per cent, 72 per cent and 76 per cent of respondents had experience of smoking at waves 2, 3 and 4 respectively. The resulting sample sizes were 1584 for wave 2, 1423 for wave 3 and 1379 for wave 4. The age of

respondents in wave 2 ranged from 17 to 20 years and 70 per cent were 18 years old.

Measures

The measures are described in Table 1. Items were either adapted from previously established measures of TTI constructs or developed from preliminary qualitative interviews. Most items were pilot tested with 138 first-year psychology students. Test–retest reliability was assessed over one week.

Smoking involvement (SMK) of the individual comprised three items. Each scale score was converted into z-scores then summed for the path analysis. The reliabilities for the items and scale were high.

Strength of group identification was measured with a single item assessing perceived similarity to other group members (Turner & Oakes, 1986). The test–retest reliability for this variable was moderate.

The *peer group norm* (PGN) was characterized as the presence of and general acceptability of smoking within the main friendship group. Each variable was converted into a z-score and summed for the path analysis. Test–retest reliabilities for items ranged from moderate to high and the overall internal consistency of the scale was high.

Two items were used to measure *behavioural intention* (INT). The scale demonstrated high internal consistency and test–retest reliability and good construct validity (Messick, 1995) as compared with smoking involvement. The theory of planned behaviour recommended wording for the *self-efficacy* (SE) item was used; however, the test–retest reliability was low. *Subjective norm* (SN) was measured with two items. Reliability was moderately high for both items and the scale but the construct validity using intention was poor. A semantic differential was used to assess *global attitude* (GA). The internal consistency of the scale was high, the test–retest reliability was moderate and the construct validity as compared with intention was very good. *Personal experience of smoking* (EXP) comprised a list of six items and the test–retest reliabilities ranged from modest to high. Internal consistency and test–retest reliability for the scale were high, and the construct validity as determined by global attitude was excellent.

Treatment of data

Respondents were divided into two groups. The *no experience group* comprised non-smokers who consistently responded *can't say* to all six items in the experience of smoking scale at wave 2 and 3 for the wave 2 to 3 analyses and at waves 3 and 4 for the wave 3 to 4 analyses. Remaining respondents were defined as the *experience* group. According to TTI, people with no experience of smoking may interpret and respond to smoking-related items in a different way compared with those with experiences of smoking.

Analyses modelling future smoking involvement were conducted on the respondents who had experienced smoking and had a valid score for smoking involvement.

Sex differences within the data were investigated using a three-staged approach. There were few sex differences in the means of variables and correlations between the variables, and the few existing differences were relatively small in size and mostly unstable over time. Hence, male and female respondents were combined for the analyses.

Data analysis

First, a confirmatory factor analysis was performed to evaluate the measurement model, then to compare the relative fit of the series of models and determine which best explains the data, path analytic techniques were used. The confirmatory factor analysis was performed on covariance matrices collected at wave 2. Then path models were fitted on the wave 2 to wave 3 data, then on the wave 3 to wave 4 data using covariance matrices formed from the aggregated scores of the items constituting the latent variables. The statistical program used was AMOS 4.0.

Model fit was judged by two means. First, overall fit was assessed using the statistics of goodness of fit index (GFI) and adjusted goodness of fit index (AGFI), which overcomes distortions in fit indices resulting from large sample sizes, non-normality in the data and the use of additional parameters to improve fit. Lack-of-fit statistics used were root mean square residual (RMS) and RMSEA.

Second, each element of the model was inspected for fit. A well-fitting model should exhibit low unexplained variance coefficients or

Table 1. Measures and reliabilities from the pilot testing

Scale and items (Response options)	*Test–test reliability*	*Alpha reliability (Pilot tests 1 & 2)*	*Construct validity (Pilot tests 1 & 2)*
Smoking involvement of individual (SMK)	.97	.81 .79	
At the present time do you consider yourself?[a]	.96		
When did you smoke your last cigarette?[b]	.89		
How soon after you wake up do you smoke your first cigarette?[c]	.91		
Strength of group identification			
How similar are you to people in this group?[d]	.68		
Peer group norm (PGN)	na	.87‡	
My closest friends regularly offer me cigarettes[e]	.82		
How would you descibe the smoking habits of each person?[a]*	na		
When you are out with friends how often would at least one of them have a packet of cigarettes?[f]	.65		
What sorts of things are your friends into? – smoking cigarettes[g†]	.85		
My friends think that smoking cigarettes is:[h]	na		
Behavioural intention (INT)	.80	.95 .93	.72 .71
In six months' time I intend to smoke regularly[e]	.74		
In six months' time I expect to smoke regularly[e]	.84		
Self-efficacy (SE)			
How easy or difficult would it be for you to smoke regularly?[i]	.58		
Subjective norm (SN)	.77	.83 .85	.27 .43
Most people important to me would look down on me if I smoked[e]	.68		
My friends would look down on me if I smoked[e]	.77		
Global attitude towards smoking (GA)	.86	.80 .80	.66 .51
For me smoking cigarettes is/would be:[h]			
Personal experiences (EXP)	.88	.82 .82	.75 .72
Smoking a cigarette:			
– makes me cough[j]	.71		
– leaves a bad taste[j]	.77		
– makes me feel good[j]	.78		
– makes me feel more confident[j]	.60		
– gives me a burning throat[j]	.72		
– makes me feel relieved[j]	.51		

[a] **1** non-smoker, **2** ex-smoker, **3** occasional smoker, **4** light smoker, **5** heavy smoker

[b] **1** non-smoker, **2** more than two years ago, **3** 1–2 years ago, **4** 7–12 months ago, **5** 1–6 months ago, **6** last month, **7** last week

[c] **1** non-smoker, **2** after dinner, **3** after lunch, **4** before lunch, **5** first hour after waking, **6** first 15 minutes after waking

[d] high identification = very similar, quite similar; low identification = a little similar, not similar

[e] **1** strongly disagree, **2** disagree, **3** in between, **4** agree, **5** strongly agree, **6** can't say

[f] **1** rarely/never, **2** sometimes, **3** usually, **4** half the time, **5** almost always

[g] **1** none of them, **2** a few of them, **3** some of them, **4** most of them, **5** all of them

[h] Semantic differential with seven-point response scales anchored by bad–good; unpleasant–pleasant; punishing–rewarding; unattractive–attractive

[i] **1** very difficult, **2** difficult, **3** neither easy nor difficult; **4** easy, **5** very easy, **6** can't say

[j] **1** always, **2** usually, **3** sometimes, **4** rarely/never, **5** can't say/never smoked

* To determine the proportion of friends in the group who smoke respondents were asked to list up to six closest friends and indicate which smoke and which were in the group

† A list of descriptors and activities were provided but only this one is relevant here

‡ Using wave 2 data

na = Not available

psi values for outcome variables and display path coefficients (non-standardized estimates) at least double the corresponding standard error.

A two group analysis was used to test whether the magnitude of path coefficients differed between those who were strongly identified and those weakly identified with their peer group. Covariance matrices were generated separately for the two groups: the strong identifiers and the weak identifiers. To formally test whether paths are equal or different in size between these two groups, Breckler (1990) recommends testing the model twice, once with the paths constrained to be equal and once with the paths unconstrained, relaxing the constraint on each path separately, then inspecting the difference in the overall fit statistics of the respective models.

Results

Confirmatory factor analyses

Using confirmatory factor analysis, the TTI model was tested on wave 2 data to evaluate the latent constructs, their inter-correlations and their hypothesized factor loadings. The factor structure may be termed *pure* as each observed variable was permitted to load on to one factor only.

The statistical fit of the initial model was adequate but not very good, (χ^2 (211, N = 1423) = 1784.47, $p < 0.0001$, GFI = 0.88, AGFI = 0.84 RMR = 0.121, RMSEA = 0.077 (90% CIs 0.073, 0.080)). Lack of fit was in part due to the violation of multivariate normality. Inspection of the residuals revealed that the largest residuals were associated with one item: *Smoking a cigarette gives me a burning throat.* A second model was tested which excluded this item. To correct a problem with the theta delta (residual variances) matrix not being positive definite, the residual variances for two items (*In the next six months, I expect to be smoking regularly* and *How easy or difficult would it be for you to smoke regularly*?) were assigned values and fixed. This model fitted the data better (χ^2 (190, N = 1423) = 1331.69, $p < 0.0001$, GFI = 0.91, AGFI = 0.88 RMR = 0.130, RMSEA = 0.069 (90% CIs 0.065, 0.72)) and was accepted as the factor structure used for the path models which follow. Table 2 displays the factor loadings for each item on the latent variable and fit statistics. Inspection of the factor loadings revealed that the factor loadings were all high for the constructs smoking involvement and intention, they were predominantly high with one or two moderate loadings for global attitude, subjective norm and peer group norm. Three of the five factor loadings for personal experience were acceptable but moderately low.

Theory of triadic influence: models 1 and 2

Model 1 The first model tested was the simplest interpretation of TTI. This model comprised within time structural paths from personal experiences of smoking (EXP) to global attitude (GA), subjective norm (SN) and self-efficacy (SE), and from these three cognitive constructs to intention (INT). There was one across time structural path from intention to smoking involvement six months later (SMK). The parameters for the TTI path models 1 and 2 are displayed in Table 3.

The overall fit indices suggested that model 1 displays poor fit to data. The unexplained variance in smoking involvement was .58 at wave 3 and .51 at wave 4. As predicted by the TTI model, the experience of smoking was strongly related to the person's global attitude and, to a lesser degree, their self-efficacy and subjective norm in relation to regular smoking. Global attitude was moderately related to intention; there was a lower association between self-efficacy and intention. The path from subjective norm to intention was close to zero. Intention to smoke in six months' time predicted smoking involvement measured six months later.

Model 2 According to TTI, a person's personal experience of smoking may also make a direct contribution to the uptake of regular smoking. This addition improved the overall fit of the model; however, the overall fit was still poor for model 2. The unexplained variance for wave 3 smoking involvement decreased from .58 to .49 and from .51 to .42 for wave 4 smoking involvement with the addition of the path. The experience of smoking significantly predicted future smoking involvement, the inclusion of this path reduced the intention to smoking involvement path-coefficient. This suggests that the individual's personal experience of smoking makes a substantial and independent

Table 2. Factor loadings for the confirmatory factor analysis for TTI

	Factor loading		
Factors and indicators	*Estimate*	*(se)*	*Standardized estimate*
Smoking involvement (SMK)			
Time to first cigarette	.31	(.01)	.90
Self-classification	.30	(.01)	.97
Recency of last cigarette	1.00		.98
Intention (INT)			
Intend to smoke	.71	(.01)	.86
Expect to smoke	1.00		.99
Global attitude (GA)			
Good–bad	.74	(.02)	.79
Pleasant–unpleasant	1.00		.86
Rewarding–punishing	.81	(.02)	.82
Attractive–unattractive	.60	(.02)	.66
Subjective norm (SN)			
Important people	.78	(.05)	.68
Friends	1.00		.92
Self-efficacy (SE)			
Easy–difficult to smoke	1.00		.99
Personal experiences (EXP)			
Cough	.80	(.04)	.54
Bad taste	.76	(.04)	.51
Feel good	1.00		.85
Feel confident	.56	(.03)	.58
Feel relieved	.94	(.03)	.78
Peer group norm (PGN)			
Friends offer cigarettes	.79	(.03)	.68
Smoking status of group members	.22	(.01)	.75
Have a packet of cigarettes	1.127	(.04)	.72
Friends described as into smoking	1.00		.85
Friends' attitude to smoking	.75	(.03)	.63

contribution to future smoking involvement but also shares variance with intention.

Theory of triadic influence and self-categorization theory

Models 3 and 4 incorporate peer group norm into the model and hence represent the combined ST and TTI models. Models were tested using respondents who had experience with smoking and had a main group of friends. The sample was divided into strong identifiers and weak identifiers. The classification into strong and weak identifiers was based on responses given in the earlier time period, that is, wave 2 for wave 2 to 3 analysis and wave 3 for wave 3 to 4 analysis.

The paths specified in models 3 and 4 were varied under two conditions: constraining all paths to be equal in the two samples (the constrained version) and allowing all paths from peer group norm to other variables, and the path from intention to behaviour to be free to vary (the unconstrained version). In the latter condition each path was independently assessed by comparing the constrained model with the model in which that path alone was free to vary between the two groups.

Model 3

This model contains links from peer group norm to global attitude, subjective norm, self-efficacy and smoking involvement. Table 4 presents the path coefficients; psi values and model fit statistics for the constrained and unconstrained versions of model 3 fitted on wave 2 to 3 and wave 3 to 4 data. Focusing first on the overall fit statistics, constrained and unconstrained models show adequate fit to the data according to the

Table 3. Parameters for TTI path models: models 1 and 2

	Wave 2 to wave 3		*Wave 3 to wave 4*	
	Model 1	*Model 2*	*Model 1*	*Model 2*
Path co-efficients				
INT to SMK	2.47 (.08) .65	1.71 (.08) .46	2.86 (.08) .70	2.11 (.08) .53
GA to INT	.21 (.01) .52	.21 (.01) .52	.22 (.01) .59	.23 (.01) .59
SN to INT	.31 (.03) .03	.03 (.02) .03	.04 (.02) .05	.04 (.02) .05
SE to INT	.31 (.02) .21	.31 (.03) .21	.16 (.03) .11	.16 (.03) .11
EXP to GA	.83 (.03) .69	.83 (.03) .69	.89 (.03) .66	.89 (.03) .67
EXP to SN	.13 (.02) .23	.13 (.02) .23	.17 (.02) .28	.17 (.02) .23
EXP to SE	.15 (.01) .42	.15 (.01) .23	.08 (.01) .23	.08 (.01) .23
EXP to SMK	—	.73 (.04) .38	—	.73 (.04) .37
Unexplained variance				
SMK	.58	.49	.51	.42
INT	.62	.62	.61	.61
GA	.55	.55	.56	.56
SN	.95	.95	.92	.92
SE	.82	.82	.95	.95
Model fit statistics				
χ^2	489	247	476	221
d.f.	8	7	8	7
GFI	0.90	0.93	0.89	0.94
AGFI	0.73	0.79	0.73	0.81
RMR	3.179	1.279	2.95	1.108
RMSEA (90% Cls)	0.22 (.20, .24)	0.17 (.15, .18)	0.22 (.20, .24)	0.16 (.14, .18)
$\Delta\chi^2$	—	242	—	255
Δd.f.	—	1	—	1
ΔRMSEA	—	0.05	—	0.06
N	1423	1423	1362	1362

Notes:
1. Parameters provided for each path are the estimate (se) and standardized estimate
2. SMK = smoking involvement, INT = intention, GA = global attitude, SN = subjective norm, SE = self-efficacy, EXP = personal experience

GFI, AGFI, RMR and RMSEA in both the sets of data. This model accounted for over half of the variance in future smoking behaviour.

Model 3—constrained version Inspection of the path coefficients for the constrained model 3 revealed that peer group norm was moderately related to global attitude, subjective norm and self-efficacy. The personal experience—global attitude and experience—self-efficacy path coefficients were larger than the equivalent coefficients for peer group norm. The path coefficient for the experience—subjective norm link was not significant. The peer group norm made a modest and independent contribution to the prediction of future smoking.

Model 3—unconstrained version The difference in χ^2 values suggested an improvement in fit for the unconstrained model 3 over the constrained model, but only for the wave 2 to wave 3 data. When freed alone, two paths of the five paths tested, produced a significant improvement in fit compared with the constrained model in the wave 2 to 3 data. They were the paths from intention to future smoking ($\Delta\chi^2$ (1, N = 1260) = 7.55, $p < 0.01$) and from peer group norm to global attitude ($\Delta\chi^2$ (1, N = 1260) = 9.95, $p < 0.001$). No changes were observed in the RMSEA, which are scaled to the degrees of freedom. For the wave 2 to wave 3 data, there was a stronger association between intention and future smoking for the weak identifiers compared with the strong identifiers. There were also differences in the size of the path-coefficients from peer group norm to global attitude, subjective norm, self-efficacy and future smoking and from experience to

Table 4. Parameters for model 3 using a two group analysis

	Wave 2 to wave 3			*Wave 3 to wave 4*		
	Constrained paths	*Unconstrained paths*		*Constrained paths*	*Unconstrained paths*	
		Strong	*Weak*		*Strong*	*Weak*
Path coefficients						
INT to SMK	1.54 (.08) .42	1.40 (.09) .39	1.88 (.15) .47	1.84 (.08) .47	1.85 (.09) .47	1.81 (.19) .45
EXP to SMK	1.88 (.22) .32	C	C	.61 (.04) .31	C	C
PGN to SMK	.60 (.04) .19	2.07 (.26) .21	1.67 (.38) .17	1.92 (.21) .20	1.94 (.23) .20	1.81 (.47) .18
GA to INT	.22 (.01) .51	C	C	.22 (.01) .59	C	C
SN to INT	.03 (.02) .03	C	C	.04 (.02) .05	C	C
SE to INT	.30 (.03) .20	C	C	.17 (.03) .11	C	C
EXP to GA	.69 (.03) .56	C	C	.69 (.03) .51	C	C
PGN to GA	1.64 (.15) .25	1.90 (.17) .29	.97 (.26) .16	2.07 (.15) .31	2.03 (.17) .31	2.20 (.30) .34
EXP to SN	.03 (.02) .05	C	C	.08 (.02) .10	C	C
PGN to SN	1.18 (.09) .40	1.25 (.10) .42	.99 (.15) .32	1.11 (.09) .38	1.08 (.09) .38	1.21 (.19) .38
EXP to SE	.11 (.01) .32	C	C	.04 (.01) .13	C	C
PGN to SE	.43 (.05) .24	.45 (.06) .25	.36 (.09) .20	.37 (.05) .22	.35 (.06) .21	.43 (.11) .24
Unexplained variance						
SMK	.45	.46	.47	.39	.39	.45
INT	.61	.60	.60	.60	.60	.60
GA	.48	.46	.61	.48	.49	.46
SN	.82	.80	.88	.81	.81	.82
SE	.77	.76	.83	.91	.91	.90
Model fit statistics						
χ^2	192.35	171.88		175.06	173.86	
d.f.	28	23		28	23	
GFI	.96	.96		.96	.96	
AGFI	.91	.90		.92	.90	
RMR	1.05	.935		.72	.76	
RMSEA	0.068 (.059, .078)	.072 (.062, .082)		.067 (.057, .076)	.074 (.064, .085)	
$\Delta\chi^2$	—	20.47			1.2	
Δd.f.	—	5			5	
ΔRMSEA		–.004			–.007	
N	1260	891	369	1188	954	234

Notes:
1. Parameters provided for each path are the estimate (se) and standardized estimate. In the constrained model, the variation between the two groups in standardized estimates and unexplained variances varies less than .03,. Hence only figures for the strong identifiers group are given.
2. C means constrained to be equal across the two groups in for the model specifying unconstrained paths.
3. $\Delta\chi^2$ Δd.f. ΔRMSEA statistics were calculated by subtracting the value for the model 3 unconstrained paths from the value for model 3 constrained paths.
4. SMK = smoking involvement, INT = intention, GA = global attitude, SN = subjective norm, SE = self-efficacy, EXP = experience.

future smoking. As hypothesized, there was a consistent trend for these coefficients to be larger in the strong identification sample than the weak identification sample. Whereas for the wave 3 to wave 4 data, there was no difference in fit for the unconstrained model 3 over the constrained model: no single path coefficient was significantly different across the two groups.

Model 4 This model was similar to model 3 but included links from peer group norm and personal experience to intention. Table 5 presents the path coefficients; psi values and model fit statistics for the constrained and unconstrained versions of model 4 fitted on wave 2 to 3 and wave 3 to 4 data. The overall fit statistics show that the constrained and unconstrained models show adequate fit to the data according to the GFI, AGFI, RMR and RMSEA in both the sets of data. This model accounted for well over half of the variance in future smoking behaviour.

Model 4—constrained version This model provided a better fit to the data than the constrained simpler version, model 3. The differences in χ^2 values between models 3 and models 4 (constrained versions) were significant (waves 2 to 3: $\Delta\chi^2$ (2, N = 1260) = 55.66, $p < 0.0001$; wave 3 to 4: $\Delta\chi^2$ (2, N = 1188) = 68.02, $p < 0.0001$). The addition of the experience—intention and group norm—intention links in the constrained model improved the fit and produced a small drop in the unaccounted for variance in intention in both data sets.

Model 4—unconstrained version The difference in χ^2 value indicated that the unconstrained version of model 4 displayed better fit than the constrained version in the wave 2 to wave 3 data set only. When freed alone, only two paths of the six paths tested, produced a significant improvement in fit compared with the constrained model in wave 2 to 3 data. They were the paths from intention to future smoking ($\Delta\chi^2$ (1, N = 1260) = 6.81, $p < 0.01$) and from peer group norm to global attitude ($\Delta\chi^2$ (1, N = 1260) = 9.96, $p < 0.001$). In the wave 2 to wave 3 data, there was stronger association between peer group norm and intention for the strong identifiers compared with the weak identifiers. This was not the case in the wave 3 to wave 4 data.

Discussion

The theory of triadic influence: models 1 and 2

Model 1 was the simplest representation of theory of triadic influence with no link between prior personal experience of smoking and smoking involvement. It did not fit the data. TTI provided a sufficient explanation of future smoking involvement when personal experience was permitted to influence smoking involvement directly (model 2). The model accounted for over 50 per cent of the variance in smoking involvement. This disconfirms Fishbein and Ajzen's (1975) contention that personal experience of the behaviour is mediated by the person's cognitions and supports the contention of Flay and colleagues (1994, 1995) that direct and personal experience of the behaviour not only contributes to the formation of relevant cognitions but also plays a dominant role in the performance of future, repeated behaviours. Personal experience with the behaviour gives the person very concrete information about the behaviour upon which they can form stable cognitions. Attitudes towards the behaviour seemed to be particularly influenced by a person's prior personal experiences. Subjective norm and self-efficacy were also influenced but to a lesser degree.

For the wave 3 to wave 4 data, the relationships between self-efficacy and intention and between experience and self-efficacy were consistently lower than in the wave 2 to wave 3 data. It should be noted that the self-efficacy item displayed only marginally adequate reliability in the pilot testing. However, there is a plausible theoretical explanation. The overall mean of this item showed a movement towards one end of the scale 'very easy' to smoke regularly over the course of the study. Together, this evidence could suggest that regular smoking is more within the young adult's own control as they gain greater independence after leaving school and thus has less of an impact on a person's decisions about smoking.

The empirical support for the contribution of subjective norm to the formulation of intention was very poor. It may be that the measurement

Table 4. Parameters for model 3 using a two group analysis

	Wave 2 to wave 3			*Wave 3 to wave 4*		
	Constrained paths	*Unconstrained paths*		*Constrained paths*	*Unconstrained paths*	
		Strong	*Weak*		*Strong*	*Weak*
Path coefficients						
INT to SMK	1.54 (.09) .41	1.40 (.10) .12	1.88 (.16) .46	1.84 (.09) .46	1.85 (.10) .46	1.81 (.21) .44
EXP to SMK	.60 (.05) .31	C	C	.61 (.04) .30	C	C
PGN to SMK	1.88 (.23) .18	2.07 (.27) .20	1.67 (.38) .16	1.92 (.22) .19	1.94 (.24) .20	1.81 (.50) .18
GA to INT	.16 (.01) .37	C	C	.15 (.01) .31	C	C
SN to INT	.00 (.02) .00	C	C	.002 (.02) .002	C	C
SE to INT	.24 (.04) .16	C	C	.13 (.03) .09	C	C
EXP to INT	.09 (.02) .18	C	C	.07 (.02) .13	C	C
PGN to INT	.25 (.07) .09	.33 (.09) .12	.12 (.12) .05	.44 (.07) .18	.44 (.08) .18	.44 (.13) .18
EXP to GA	.69 (.03) .56	C	C	.69 (.03) .51	C	C
PGN to GA	1.64 (.15) .25	1.90 (.17) .29	.97 (.26) .16	2.07 (.15) .31	2.03 (.17) .31	2.20 (.30) .34
EXP to SN	.03 (.02) .05	C	C	.04 (.01) .10	C	C
PGN to SN	1.18 (.09) .40	1.25 (.10) .00	.99 (.15) .32	1.11 (.09) .38	1.08 (.09) .38	1.21 (.19) .38
EXP to SE	.11 (.01) .32	C	C	.04 (.01) .13	C	C
PGN to SE	.43 (.05) .24	.45 (.06) .25	.36 (.09) .20	.37 (.05) .22	.35 (.06) .21	.43 (.11) .24
Unexplained variance						
SMK	.43	.44	.46	.37	.37	.43
INT	.58	.56	.61	.56	.56	.56
GA	.52	.46	.61	.48	.49	.44
SN	.82	.80	.88	.81	.81	.82
SE	.77	.76	.83	.91	.91	.90
Model fit statistics						
χ^2	136.69	113.34		107.04	105.84	
d.f.	26	20		26	20	
GFI	.97	.97		.98	.98	
AGFI	.93	.93		.95	.93	
RMR	.83	.81		.40	.42	
RMSEA	.058 (.049, .068)	.061 (.050, .072)		.051 (.041, .062)	.060 (.050, .072)	
$\Delta\chi^2$	-	23.35		-	1.2	
Δd.f.	-	6			6	
ΔRMSEA		–.003		-	–.009	
N	1260	891	369	1188	954	234

Notes:

1. Parameters provided for each path are the estimate (se) and standardized estimate. In the constrained model, the variation between the two groups in standardized estimates and unexplained variances varies less than .03, hence only figures for the strong identifiers group are given
2. C means constrained to be equal across the two groups in for the model specifying unconstrained paths
3. $\Delta\chi^2$ Δd.f. ΔRMSEA statistics were calculated by subtracting the value for the model 4 unconstrained paths from the value for model 4 constrained paths
4. SMK = smoking involvement, INT = intention, GA = global attitude, SN = subjective norm, SE = self-efficacy, EXP = experience

of subjective norm is inadequate, notwithstanding the facts that the measurement of both constructs was based on previous research and recommended by Fishbein and Ajzen (1975; Ajzen, 1985) and the scale displayed good reliability. Alternatively, it may be that people have little insight into the opinions of others in relation to their own behaviour or perhaps do not like to admit that they are swayed by the approval or disapproval of others. Indeed, a search of previous literature revealed that subjective norm often fails to contribute to the prediction of intention (e.g. Doll & Orth, 1993; Kelly & Breinlinger, 1995;), and when it does contribute the effect size is found to be small (e.g. Chan & Fishbein, 1993; Kurland, 1995; Norman & Conner, 1996; Sparks & Shepherd, 1992). Social influence may not be cognitively mediated in the way specified by TTI. The high degree of fit to the data for models 3 and 4 supports this conclusion.

The theory of triadic influence and self-categorization theory: models 3 and 4

Model 3 fitted the data well. This suggests that the peer group norm of the main peer group not only contributes to the person's smoking-related cognitions (attitudes, subjective norm and self-efficacy) but also directly influences behaviour. The addition of the peer group norm to the TTI model increased the proportion of variance explained in future smoking involvement. Model 4 permitted peer group norm and personal experience to affect all smoking-related cognitions including intention and displayed better fit to the data compared with model 3. This suggests that, in line with self-categorization theory, social identification with a group impacts on the person's cognitive structure and patterns of behaviour, especially if that behaviour links people to their social group.

In the wave 2 to 3 data, there was empirical support for the contention that peer group norms have a larger impact on the personal cognitions and future behaviour among those who were strongly identified with their group compared with the weak identifiers. Conversely, the influence of intentions on future behaviour was comparatively stronger for people weakly identified with their groups, as predicted by ST. However, this pattern of results was not seen for the wave 3 to 4 data: there was no difference in the size of coefficients between the strong and weak identifiers. Studying the coefficients revealed that the patterns displayed by the strong identifiers had not changed from one transition period to the next but the coefficients exhibited in the weak identifier group had increased in size to reflect the pattern for the strong identifiers. Hence, in the later transition period, the cognitions expressed by the weak identifiers had become more similar to the peer group norm than in the previous period (as shown by the higher coefficients). A possible explanation is that to alleviate feelings of dissimilarity, the weak identifiers had altered their thoughts about smoking to mirror the peer group norm and thus enhance their sense of identification with the group and emulate the strong identifiers.

The addition of peer group norm to the TTI model enhanced the model's performance. Not only did the peer group norm act through a person's personal cognitive structure to affect their behaviour, but it also influenced behaviour directly. This upholds conclusions by Flay et al. (1994) who argued for two independent pathways for social influence to affect behaviour: indirect and direct. In line with ST, there was some evidence that the smoking norm of the main peer group seemed to have greater impact on the person's actual smoking involvement and smoking-related cognitions among those who strongly identified with their peer group than among the weak identifiers. The weakness in the previous work tackling these issues (Charng et al., 1988; Kelly & Breinlinger, 1995; Sparks & Shepherd, 1992; White et al., 1994) was that researchers presumed an invariant group norm but allowed for strength of identification to the group to vary. The model used in the present study extends the work of Terry and colleagues (1996, 1999) by testing the direct links between social normative influences, prior experiences and behaviour. Hence, these findings provide support for an integration of the three influences of personal cognitions, prior experiences and salient social identification on behaviour.

Implications for health education

When tackling smoking among school leavers, the model indicates that three elements directly

influence smoking. First, there are the person's own decisions or intentions regarding smoking. These decisions result from the person's attitudes and self-efficacy related to smoking, which in turn arise from their direct experiences of smoking and the peer group norm of the friendship group to which they belong. While health educators should focus on modifying the decision process, it must be recognized that smoking also arises from previous good experiences and a supportive social context. These influences are not entirely meditated by the cognitive processes specified in TTI: there is also a different mechanism operating. Because smoking has been a pleasurable experience in the past, then without necessarily thinking about it, the person may repeat the experience. Similarly, the peer group may influence a person's behaviour directly. Because a person is surrounded by other group members who are smoking, it may be that they imitate this behaviour without actively deciding to do so, particularly if cigarettes are present. In many peer groups, smoking serves an important function in maintaining group identification and differentiation (Schofield et al., 2001). Not smoking may have, or be feared to have, the effect of alienating the person from the group with which they identify. The power of these social processes and previous pleasurable experiences should be recognized when planning to influence smoking behaviour.

Limitations

As with most studies using a survey methodology, there are several limitations to this work. First, it is acknowledged that the sample is not initially representative and has suffered from attrition, but it does cover a large proportion of young people. For exploration of patterns of association within the sample, external validity is not of great concern unless there is reason to believe that the determinants of the behaviours in the surveyed groups are fundamentally different to most of the population, which is unlikely to be the case.

Second, the validity of self-report is another common methodological issue. Self-report of smoking in surveys of this kind has been found to be accurate using biochemical validation techniques (Velicer, Prochaska, Rossi, & Snow, 1992), even for 18 year olds (Stanton, McClelland, Elwood, Ferry, & Sliva, 1996). The measures used in this study underwent extensive pilot testing and all showed moderate to high levels of reliability. The only possible exception is the item used to assess self-efficacy, which is acknowledged. Where possible, validity coefficients were computed. Items were included only if they displayed good construct validity.

Third, it is possible that the reported attitudes and beliefs may reflect rationalizations for the respondents' own behaviour rather than cognitions determining their behaviour. It is difficult to conceive of more valid ways of accessing individuals' cognitions than by asking them. Despite the fact that measurement of cognitive factors preceded the measurement of the predicted behaviour, the proposition that cognitions are just reflections of behaviour may have some validity as there was some stability in smoking involvement from one time to the next. Along the same lines, there may be concerns that the reported peer group norm may be influenced by the person's own attitudes and behaviour in relation to smoking. However, the peer group norm measure which displayed high internal consistency included more objective measures such as proportion of friends in the group who smoke and the presence of cigarettes when out with friends. The reporting of these sorts of measures is probably less likely to be influenced by a person's own attitudes and behaviours. It should also be acknowledged that the item 'My closest friends regularly offer me cigarettes' in the peer group norm variable might constitute criterion contamination as these offers of cigarettes may occur because the individual is known to be a smoker. However, we know from qualitative research that cigarettes are often offered in young adult peer groups to non-smokers, irregular smokers and ex-smokers (Schofield, 1997).

Fourth, research on ST is generally carried out using an experimentally controlled design and the salience of particular social identities is manipulated. However, using a survey design we cannot be certain that the social identity pertaining to the person's main peer group is salient. Also, there is a very real possibility that many respondents identified with more than one peer group.

Fifth, the analyses do not to take into account clustering by schools. However, the initial

sample of 3300 was randomly drawn from a recruited sample of over 6000, which would have dissipated the effects of clustering. Moreover, there are social processes embedded within schools and the effects of friendship cliques are likely to be quite strong (Ennett &Bauman, 1994). The most appropriate way to investigate these effects would be to perform a social network study that observes and assesses the effects of interpersonal relationship ties.

Future directions

An important theoretical question is left unanswered by this research. The direct effect of the peer group norm on behaviour does not appear to be mediated by a person's behaviour-related cognitions. This research provided some evidence that the strength of normative influence is moderated by strength of identification, at least in some situations, which suggests it is a social process which, at least partly, lies outside the cognitive structure specified by TTI. However, the exact nature of this influence is yet to be clearly articulated. According to referent informational influence, a person adopts their group norm and as a result performs the behaviour. The precise mechanism that underlies the adoption of the norm which then leads to the behaviour is yet to be specified. Is it mediated by cognitions that are closely related to the group processes? ST asserts that the shared ingroup norms are perceived as having objective informational value which implies that they are cognitively processed and accessible to group members (Turner & Oakes, 1989). This conceptualization seems to imply some sort of cognitive processing of social influence by group members. Perhaps, there is a cognitive structure related to each of the social identities a person holds which processes the associated normative influences and which is separate from the more personalized cognitive structure articulated in TTI. Alternatively, other mechanisms may be operating. For instance, it may be that normative influence is driven by a mechanism that is not cognitively accessible to the person, say, imitation of other group members. This is an unresolved theoretical problem which future work relating ST to social cognition type frameworks may fruitfully address.

Conclusions

The proposed model that combines TTI and ST provides a solid understanding of smoking involvement in the transitional years after young people leave school. Three factors directly increase the likelihood of smoking involvement: a decision to smoke based on smoking-related cognitions; positive previous experiences with smoking, and peer group that is supportive of smoking. There was some equivocal evidence that the influence of the peer group is moderated by the strength of identification with the group.

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