Ogden, J., Nicoll, M. (1997) Risk and protective factors: an integration of the epidemiological and psychological approaches to adolescent smoking, Addiction Research 5, 367-377.

Risk and protective factors

in adolescent smoking

Jane Ogden and Mick Nicoll

Department of General Practice, UMDS, London University, London.

Address for correspondence:
Dr Jane Ogden
Department of General Practice,
UMDS
London University
80 Kennington Road,
London SE11 6SP

Risk and protective factors in smoking

Abstract

Research has identified parental, sibling and peer group smoking as risk factors for adolescent smoking. The present study aimed to examine the role of these risk factors in adolescent smoking and to evaluate variables which protect high risk individuals from the initiation and maintenance of this behaviour. Five hundred and thirty seven 16-19 year olds from educational, training and employment centres completed a questionnaire about their risk factors, smoking beliefs and behaviour and were categorised as either low, medium or high risk on the basis of their risk score. The results suggested that risk status was related not only to whether or not the individual smoked but also to characteristics of their smoking behaviour such as amount, smoking identity, smoking in front of parents, smoking self efficacy and intentions to quit. However, not all subjects conformed to their risk status. The results suggested that smoking was promoted in low risk subjects who believed that smoking was both relaxing and pleasurable and that some high risk individuals were protected from smoking if they were studying for either academic or vocational qualifications, if they believed smoking was unsociable and if they engaged in activities to meet people. The results are discussed in terms of the dynamic process of smoking initiation and the implications for health promotion interventions.

Key words: smoking adolescents risk protective factors

In 1954, Doll and Hill reported that cigarette smoking was related to lung cancer. Smoking has since been implicated in coronary heart disease, respiratory disorders and other cancers such as throat, stomach and bowel. However, although there has been an overall decrease in smoking behaviour, 28% of the adult population in the U.K. still smoke (GHS, 1992). Lader and Matheson (1991) reviewed the data from national surveys between 1982 and 1990 examining smoking in young people and concluded that smoking behaviour in 11 to 15 year old school boys - including those boys who had just tried a cigarette - had fallen from 55% to 44% and that smoking in school girls of a comparable age had declined from 51% to 42%. Although both these figures showed a decrease, this was less than the decrease shown in adult smoking, and the data suggested that in 1990 nearly a half of the school children had at least tried a cigarette. Indeed, many children try their first cigarette whilst at primary school (Murray et al, 1984., Swan et al, 1991). This trend in adolescent smoking is particularly important as the majority of adult smokers report initiating smoking before the age of twenty (Charlton, 1992). Furthermore, Doll and Peto (1981) reported that people whose smoking is initiated in childhood have an increased chance of lung cancer compared to those who start smoking later on in life.

In an attempt to predict and prevent smoking initiation and maintenance, research has identified several risk factors. In Britain there have been five longitudinal studies that have identified elements of the child's social world that are predictive of smoking behaviour (Murray et al, 1984., McNeil et al, 1988., Charlton and Blair, 1989., Gillies and Galt, 1990., and Goddard, 1990). The main factor that predicts smoking is parental smoking, with research showing that children are twice as likely to smoke if their parents smoke (Bewley, 1978., Charlton, 1986., Lader and Matheson, 1991). This effect may be enhanced if parents are seen

to have a positive attitude towards smoking (eg. Charlton, 1984; Murray et al, 1985). Peer group behaviour also influences smoking with reports indicating that an adolescent whose close friends smoke is up to 1.9 times more likely to become a smoker than an adolescent whose friends do not (Chassin et al, 1986; Pederson, 1986; Santi et al 1991). Further, a child with siblings who smoke is 1.56 times more likely to smoke than a child whose siblings do not (Santi et al 1991).

Therefore, such risk factors play a central role in smoking initiation and maintenance in adolescents. However, these factors only indicate risk as a probability and are not presented in terms of certainties. For example, parental smoking may predict smoking in children, but not all children with this risk factor will smoke. Peer group smoking may also be predictive but is also resisted by many children who exist within a smoking peer group without conforming to the pressure to smoke. Therefore, identification of the factors which protect high risk individuals from smoking could further the understanding of this behaviour. In addition, awareness of factors which encourage smoking in individuals with few apparent risks is also important.

Protective factors may take several forms. For example, risk factors may only express themselves in smoking behaviour if the individual holds appropriate health beliefs; negative health beliefs about smoking may be protective. Research suggests that whilst most adolescents know that cigarettes cause health problems, smoking adolescents are less aware of the negative consequences of smoking and have fewer negative attitudes about smoking than non-smoking adolescents. For example, smoking adolescents report that smoking is an enjoyable experience, is sociable, gives them confidence and helps to calm them down when

they are upset or nervous (Charlton, 1984; Charlton and Blair, 1989). Beliefs about other benefits of smoking such as weight loss may also facilitate smoking initiation and maintenance (Ogden and Fox, 1994). Models of health behaviours such as the Health Belief Model and the Theory of Reasoned Action have been used to examine the cognitive factors that contribute to smoking initiation (eg. Ajzen and Fishbein, 1970; Becker and Rosenstock, 1984; Sutton, 1982; Sherman et al, 1982). Such health beliefs may interact with risk factors to either facilitate or be protective against smoking initiation.

Protective factors may also take the form of social activities and educational achievements. Studies have suggested that individuals who were identified by themselves and others as being problem prone, doing poorly at school, lower in school grade and rarely involved in school sports were more likely to have smoked (Mosbach and Leventhal, 1988; Sussman et al, 1990). On the other hand, research has also found high rates of smoking in those defined as leaders of academic and social activities, with high self esteem and who are regarded as popular by their peers (Mosbach and Leventhal, 1988). In other words, risk factors for smoking may be tempered by social activities and education.

The aim of the present study was to examine the role of risk factors in predicting smoking in adolescents and to evaluate factors which protect high risk individuals from this behaviour.

Methodology

Subjects

Five hundred and thirty seven adolescents (male, n=249; female, n=288), aged between 16 and 19 years (mean age; 17.7 ± 1.0) completed the questionnaire. The subjects were recruited from

thirteen educational institutions and working environments in the London and home counties area. The sample was believed to be representative of 16-19 year olds as it consisted of: i) those who were working, from two large department stores (staff only), (n=34); ii) those who were unemployed, from two Youth Training Schemes centres (n=17), a community centre (n=8), a Youth Advice Centre (n=3); and iii) those who were in education / training, from a sixth form college (n=155), a further education college (n=52), a university (n=74), a medical school (n=119) and a HM Forces training centre (n=72). The ethnicity of the sample was as follows: Black African 10% (n=53); Black Caribbean 6.9% (n=36); Black other 3.6% (n=20); White Eng/Sco/Wales 44.5% (n=252); White Irish 10.6% (n=58); White other 5.7% (n=31); Indian 6.2% (n=33); Pakistani 2% (n=11); Chinese 0.4% (n=2); other 9.7% (n=52).

Procedure

Subjects who were working were approached and asked to complete the questionnaire during their lunch break. Those who were unemployed completed the questionnaire during small group sessions on smoking. Those who were in education / training completed the questionnaire as part of a teaching session.

The Questionnaire

The questionnaire consisted of the following items:

1/ **Profile factors:** This included age, sex, ethnicity and employment status. Subjects were also asked to state where they were educated (Private, Grammar, Comprehensive) which academic qualifications (eg. GCSE, A level) and vocational qualifications (eg. NVQ, City and Guilds) they were studying for.

2/ Risk factors: In order to rate their level of risk subjects were asked about their i) parental smoking (whether either of their parents smoked and if yes, who, rated as none (0), one (2) or both (3) this was scored in order to load for the importance of parental smoking), ii) sibling smoking (if they had siblings, how many smoked, rated as none (0), less than half (1), more than half (2), all (3)), iii) peer group smoking (how many of the friends who they spent most of their time with smoked, rated as none (0), less than half (1), more than half (2), all (3)).

3/ Smoking behaviour: Subjects were asked about their i) smoking initiation (whether they had ever tried a cigarette and how old they were), ii) current smoking (if they ever smoked now, how many cigarettes they smoked a day, whether they smoked in the presence of their parents, how soon after getting up in the morning they had their first cigarette), iii) smoking identity (whether they saw themselves as a smoker, if so, what age were they when they first did this). In addition, smokers also completed ratings about their beliefs about their smoking behaviour in terms of i) self efficacy (I am confident I can stop smoking), ii) behavioural intentions (I intend to stop smoking in the next six months), iii) outcome expectancies (Stopping smoking would reduce my chances of getting lung cancer; If I stopped smoking I would put on weight) on five point Likert scales from totally disagree (0) to totally agree (5).

4/ Health beliefs about smoking: Subjects rated a series of statements on a 5 point likert scale relating to the i) benefits of smoking (I think smoking relaxes people; I think that smoking is pleasurable; Smoking helps people maintain their weight), ii) costs of smoking (Smoking is bad for your health; Smoking is an unsociable behaviour), iii) perceived susceptibility (I think that I am likely to get lung cancer in the future), iv) perceived severity (Lung cancer is a serious illness), v) perceived control (I have control over my own health).

5/ **Activities:** Subjects were asked to indicate which activities they were involved in, in an average week using a list that represented: 'social activities' (eg. football, pool, netball, pubs, darts, snooker, night clubs, youth clubs), 'healthy activities' (eg. football, netball, athletics, hockey, aerobics, dance, walking, weight training), 'social and healthy activities' (eg. football, netball, hockey), and 'social and non-healthy activities' (eg. pool, pubs, darts, snooker).

Subjects also rated their reasons for doing these activities using likert scales for the statements 'to improve my health', 'to meet other people' and 'to fill my spare time' on a scale from totally disagree (0) to totally agree (5).

Results

A total risk score was computed on the basis of the risk factors: parental smoking, sibling smoking and peer group smoking. This produced a score ranging from 0 to 9. Subjects were then categorised as low risk (0-2, n=149), medium risk (3-5, n=308) or high risk (6-9, n=80) on the basis of their total risk score. Accordingly, a low risk individual could have either no risk factors or only one smoking parent but no siblings or friends who smoked. A medium risk individual could have no smoking parents but all of their friends who smoked and a high risk individual could have two smoking parents, and more than half of both their siblings and peers who smoked. The results were initially analysed to examine the effect of risk factors by evaluating differences between these three groups in terms of their profile factors, smoking behaviour, health beliefs and social activities using Chi square (X^2) and ANOVA (SPSSPC). The results were then analysed to examine the role of protective factors by initially evaluating interactions between risk status and smoking and then by focusing on those subjects who were behaving contrary to their risk status (high risk non-smokers and low risk smokers) and

examining factors which discriminated between these groups and those who were conforming to their risk factors (high risk smokers and low risk non-smokers) using Discriminant Analysis (SPSSPC).

Differences between subjects according to risk group

i) Profile factors

The profile factors according to risk group are shown in Table 1.

-Insert Table 1 about here-

The results showed that the three groups were comparable in terms of sex, but were significantly different in age ($F[2,535]=4.76$, $p<0.01$) and ethnicity. The high risk group were younger and were less likely to be Black African ($X^2 = 25.96$, $p<0.001$), Indian ($X^2=9.33$, $p<0.01$), Pakistani ($X^2=7.8$, $p<0.05$) and more likely to be Black Caribbean ($X^2=7.59$, $p<0.05$), White Eng/Sco/Wales ($X^2=10.05$, $p<0.01$) and White Irish ($X^2=8.66$, $p<0.05$) than both the medium and the low risk subjects.

ii) Education:

The type of schooling and qualifications for the three subjects groups are shown in Table 2.

- Insert Table 2 about here -

High risk subjects were more likely to have been educated in a comprehensive school ($X^2=35.06$, $p<0.001$), less likely to have been educated at either a Grammar ($X^2=9.75$, $p<0.01$)

or a Private school ($X^2=22.33$, $p<0.001$), less likely to be studying for or have A levels ($X^2=22.53$, $p<0.001$) or other academic qualifications ($X^2=37.81$, $p<0.001$), more likely to be studying for a NVQ ($X^2=6.65$, $p<0.05$) and less likely to be students ($X^2=24.47$, $p<0.001$) than the other subjects.

iii) Smoking behaviour:

Smoking behaviour for the three risk groups is shown in Table 3.

-Insert Table 3 about here-

In terms of smoking initiation, high risk subjects were significantly more likely to have tried a cigarette ($X^2=46.35$, $p<0.0001$) but were similar to the other subjects in terms of the age they tried their first cigarette. The results also showed differences for current smoking with the high risk subjects being more likely to be current smokers ($X^2=26.16$, $p<0.0001$). Of those who smoked, the high risk subjects smoked more cigarettes ($F[2,186]=8.86$, $p<0.005$), were more likely to smoke in front of their parents ($X^2=6.72$, $p<0.05$), and smoked sooner after getting up in the morning ($F[2,186]=4.39$, $p<0.05$) than the other subjects. In terms of smoking identity, of those subjects who smoked, the high risk subjects were more likely to see themselves as a smoker ($X^2=21.61$, $p<0.0001$) but were comparable to the other subjects in terms of the age when they developed an identity as a smoker. Also, of those subjects who smoked, the high risk subjects reported significantly lower self efficacy about quitting smoking ($F[2,165]=3.44$, $p<0.05$) and significantly lower intentions to quit smoking in the next six months ($F[2,165]=4.16$, $p<0.05$) compared to both the medium and low risk subjects. However, the three groups were comparable on ratings of outcome expectancy both in terms of

lung cancer and weight gain.

iv) Health beliefs:

The means for the ratings of health beliefs are shown in Table 4.

- Insert Table 4 about here -

The results showed a significant main effect of risk group for perceived severity of lung cancer ($F[2,535]=3.49, p<0.05$) with the medium risk group showing greater agreement with the statement 'Lung cancer is a serious illness' than the other two subject groups. The results also showed a significant main effect of risk group for the statements, 'Smoking cigarettes is an unsociable behaviour', ($F[2,535]=4.23, p<0.05$), which was rated highest by the low risk group and 'Smoking helps people maintain their weight' ($F[2,535]=5.98, p<0.01$) which was rated highest by the high risk group. The three groups were comparable in their ratings of perceptions of susceptibility and control.

iv) Social activities:

The results for the kinds of activities and the reasons for these activities are shown in Table 5.

- Insert Table 5 about here -

The results showed that the high risk subjects were more likely to engage in social activities ($F[2,535]=7.13, p<0.001$) and social unhealthy activities ($F[2,535]=7.9, p<0.0001$) than the other subjects but were comparable in terms of healthy and social and healthy activities. However, the results showed no differences between the three groups in terms of their reasons

for doing these activities.

Interactions between risk group and smoking behaviour

Subjects within each risk group were then divided into smokers and non smokers according to whether or not they currently smoked. This produced six groups: high risk smokers (56.3%, n=45), high risk non-smokers (43.7%, n=35), medium risk smokers (40.2%, n=124), medium risk non-smokers (59.7%, n=184), low risk smokers (12.75%, n=19) and low risk non smokers (87.2%, n=130). The results were then analysed using ANOVA (SPSSPC) to examine interactions between smoking and risk group on the subjects health beliefs and social activities.

i) Health beliefs:

The results showed no significant interactions between smoking and risk for beliefs about severity, susceptibility, control over health or benefits of smoking. However, the results showed a trend for an interaction for the belief that 'smoking cigarettes is an unsociable behaviour'. High risk non-smokers showed greater agreement with this statement than the medium risk non-smokers but lower agreement than the medium risk smokers. Low risk smokers showed greater agreement than the high risk smokers but lower agreement than the medium risk smokers ($F[2, 535]=2.93, p=0.054$). This suggests that a belief about smoking being unsociable may promote smoking in low risk subjects and protect high risk smokers from smoking.

ii) Social activities:

The results showed no significant interactions between smoking status and risk either for the kinds of activities carried out or for the reasons giving for doing these activities.

Discriminating between those who conform to their risk status and those who behave contrary to prediction

In order to assess which factors discriminate between those who are behaving in line with their risk status (high risk smokers, low risk non smokers) and those who are not (high risk non smokers, low risk smokers) a step-wise discriminant analysis (SPSSPC) was carried out for subjects within the high and low risk groups. The items which discriminate between the different groups are presented in decreasing order of importance.

For the high risk group subjects who smoked were more likely to believe that smoking was relaxing ($r=-0.7548$). Subjects who did not smoke were more likely to be studying for an academic qualification ($r=0.6438$), to be involved with activities in order to meet people ($r=0.5234$), to believe that smoking was unsociable ($r=0.4309$) and to be studying for a vocational qualification ($r=0.3993$).

For the low risk group subjects who smoked were more likely to believe that smoking was relaxing ($r=-0.4888$) and pleasurable ($r=-0.2795$). Subjects who did not smoke were more likely to believe that smoking was unsociable ($r=0.6519$), to do activities to fill up their spare time ($r=0.4992$) and to believe that lung cancer was serious ($r=0.2339$).

Discussion

The aim of the present study was to examine the role of risk factors in smoking behaviour and to evaluate variables that protect high risk individuals from smoking.

The results indicate that subjects classified as high risk were more likely to have tried smoking and to be current smokers than both the medium risk and the low risk subjects. This provides support for the role of parental, peer group and sibling behaviour in promoting smoking in adolescents (eg. Lader and Matheson, 1991). However, the results also suggest that these risk factors not only influence whether or not an individual smokes but how they smoke. Of those subjects who smoked in the present study, the high risk subjects smoked more, were more likely to see themselves as smokers, smoked earlier in the morning and were more likely to smoke in the presence of their parents. This suggests that high risk individuals may be more likely to become habitual and heavy smokers than those with fewer risk factors. In addition, the results indicate that high risk smokers may develop a stronger identity as a smoker. This may have implications for smoking cessation as successful quitting has been shown to relate to factors such as smoking fewer cigarettes and experiencing fewer withdrawal symptoms (for a review see Lichtenstein and Glasgow, 1992). This is supported by the results of the present study with the high risk subjects reporting lower self efficacy for smoking cessation and lower intentions to quit within the next six months. In other words, the situational risk factors identified in the literature appear to have additional effects beyond smoking initiation and may be involved in determining characteristics of how the individual smokes and whether they can successfully quit.

This effect of risk on behaviour may be mediated through changes in health beliefs. This is supported by the ratings of health beliefs with the high risk subjects reporting greater agreement with the benefits of smoking for weight maintenance, less agreement that smoking was unsociable and a lowered belief in the severity of lung cancer. Being frequently exposed to smokers may effect how adolescents think about smoking. These beliefs may in turn be

related to both whether they smoke and how they smoke.

However, although risk factors were related to smoking behaviour, not all subjects in the present study conformed to their risk status. Some low risk subjects reported smoking suggesting that certain factors may promote smoking even without the situational risk factors. Believing that smoking was relaxing and pleasurable differentiated between those low risk subjects who smoked and those who did not. Perhaps these health beliefs are critical enough to facilitate smoking even in the absence of risk. In addition, some subjects who were categorised as high risk did not smoke indicating a role for protective factors which act to counter risk. In particular, educational activities in the form of studying for either academic or vocational qualifications and being involved in social activities to meet people and believing that smoking is unsociable appeared to protect high risk individuals from smoking. In the same way that peer group pressure may motivate an adolescent to smoke, non-smoking peers can also encourage individuals not to smoke (Banks et al, 1981). Perhaps, the protective factors identified in the present study function via individuals changing environments in order to study and the subsequent exposure to a new non-smoking peer group. In the present study, subjects were categorised as high risk if they reported a combination of situational risk factors in the form of parental, sibling and friends smoking. It is possible that these high risk individuals have changed their social context in order to study and to develop a new social life. Within this new situation, they are subsequently encouraged to follow a new set of norms of not smoking. These new norms may therefore be protective.

In summary, situational risk factors may promote smoking in adolescents and in addition may influence characteristics of smoking such as amount, smoking identity and intentions to quit.

However, the results also suggest that the relationship between risk and actual behaviour is not a simple one and that health beliefs may promote smoking even in the presence of low risk, and that factors such as educational and social activities and health beliefs may protect high risk individuals from smoking. Perhaps, a propensity towards smoking in adolescents is established as a result of situational risk factors such as parental, sibling and peer group smoking. This propensity may either be facilitated or blocked by a set of other factors such as beliefs, education and training and changing social context. Further research using a prospective could evaluate these predictions and assess the temporal relationship between these variables. Perhaps, smoking initiation and maintenance should be conceptualised as a dynamic and ongoing process which has implications for the use of early interventions developed to buffer the effects of risk by targeting the relevant protective factors.

References

Ajzen, I. & Fishbein, M. (1970). The prediction of behaviour from attitudinal and normative beliefs. Journal of Personality and Social Psychology. 6, 466-487.

Banks, M.H., Bewley, B.R. & Bland, J.M, (1981). Adolescent attitudes to smoking: their influence on behaviour. International Journal of Health Education. 24, 39-44.

Becker, M.H., & Rosenstock, I.M., (1984) Compliance with medical advice. In Steptoe, A., Mathews, A., (Eds), Health Care and Human Behaviour. London. Academic Press Inc.

Bewley, B.R. (1978). Smoking in childhood. Postgraduate Medical Journal. 54, 197-199.

Charlton, A. & Blair, V. (1989). Predicting the onset of smoking in boys and girls. Social Science and Medicine, 29, 813-818.

Charlton, A. (1984) Children's opinions about smoking. Journal of the Royal College of Medicine, 34, 483-487.

Charlton, A. (1986). Children who smoke. Health at School, 1, 125-127.

Charlton, A. (1992). Children and tobacco. British Journal of Cancer, 66, 1-4.

Chassin, L., Presson, C.C., Sherman, S.J., Montello, D. & McGrew, J., (1986). Changes in peer and parent influence during adolescence: Longitudinal versus cross-sectional perspectives on smoking initiation. Developmental Psychology 3, 327-34.

Doll, R. & Hill, A.B. (1954). The mortality of doctors in relation to their smoking habits. A preliminary report. British Medical Journal, 1, 1451-1455.

Doll, R. & Peto, R. (1981). The causes of cancer. New York: Oxford University Press.

General Household Survey (1992). OPCS: London.

Gillies, P.A. & Galt, M. (1990). Teenage smoking - fun or coping ? In Wimbust, J.A.M. and Maes, S. (ed). Lifestyles and Health: New Developments in Health Psychology. DSWO /LEIDEN. Netherlands: University Press.

Goddard, E. (1990). Why children start smoking. London: HMSO.

Lader, D. & Matheson, J. (1991). Smoking among Secondary school Children in England 1990: an enquiry carried out by the Social Survey Division of OPCS. London: HMSO.

Lichtenstein, E. & Glasgow, R. (1992). Smoking Cessation: What have we learnt over the past

decade? Journal of Consulting and Clinical Psychology, 60, 518-527.

McNeil, A.D., Jarvis, M.J., Stapleton, J.A., Russell, M.A.H., Eiser, J.R., Gammage, P. & Gray, E.H. (1988). Prospective study of factors predicting uptake of smoking in adolescents. Journal of Epidemiology and Community Health, 43, 72-78.

Mosbach, P. & Leventhal, H. (1988). Peer group identification and smoking: Implications for intervention. Journal of Abnormal Psychology, 97, 238-245.

Murray, M., Swan, A.V., Bewley, B.R. & Johnson, M.R.D. (1984). The development of smoking during adolescence - the MRC / Derbyshire smoking study. International Journal of Epidemiology, 12, 185-192.

Ogden, J. & Fox, P. (1994). An examination of the use of smoking for weight control in restrained and unrestrained eaters. International Journal of Eating Disorders, 16, 177-186.

Pedersen, L.L. (1986). Change in variables related to smoking from childhood to late adolescence: An eight-year longitudinal study of a cohort of elementary school students. Canadian Journal of Public Health 77 Supplement 1, 33-9.

Santi, S., Best, J.A., Brown, K.S. & Cargo, M. (1991). Social environment and smoking initiation, The International of the Addictions, 25, 881-903.

Sherman, S.J., Barton, J., Chassin, L. & Pressin, C.C. (1982). Social image factors as

motivators of smoking initiation in early and middle adolescence. Child Development, 53, 1499-1511.

Sussman, S., Dent, C., Stacy, A.W., Burciaga, C., Raynor, A., Turner, G.E., Charlin, V., Craig, S., Hansen, W.B., Burton, D. & Flay, B.R. (1990). Peer group association and adolescent tobacco use. Journal of Abnormal Psychology, 99, 349-352.

Sutton, S.R. (1982). Fear-arousing communications: A critical examination of theory and research. In J.R Eiser (Ed.), Social Psychology and Behavioral Medicine, pp. 303-337. Chichester: John Wiley.

Swan, A.V., Murray, M. & Jarrett, L. (1991). Smoking behaviour from pre adolescence to young adulthood. Aldershot: Avebury (Gower) Publishing Co.

Table 1: Profile characteristics according to risk group

	Low risk	Medium risk	High risk
Age (yrs)*	17.8 $\pm$ 1.0	17.7 $\pm$ 1.0	17.4 $\pm$ 1.0
Sex	M: 38.3% (n=57) F: 61.7% (n=90)	M: 46.8% (n=144) F: 53.2% (n=162)	M: 53.8% (n=43) F: 46.3% (n=36)
Ethnicity			
Black African*	26.3% (n=30)	6.8% (n=21)	2.5% (n=2)
Black Caribbean*	4.7% (n=7)	5.9% (n=18)	13.8% (n=11)
White Eng/Sco/WI*	33.8% (n=50)	48.2% (n=148)	51.3% (n=41)
White Irish*	6.1% (n=9)	11.1% (n=34)	18.8% (n=15)
Indian	10.1% (n=15)	5.9% (n=18)	0% (n=0)
Pakistani	4.7% (n=7)	1.3% (n=4)	0% (n=0)
Chinese	0% (n=0)	0.7% (n=2)	0% (n=0)

* Significant effect of risk group ($p < 0.05$)

Table 2: Education according to risk group

	Low risk	Medium risk	High risk
Type of schooling			
Private *	26.6% (n=38)	15.3% (n=46)	2.5% (n=2)
Grammar *	16.1% (n=23)	10% (n=30)	3.8% (n=3)
Comprehensive *	55.2% (n=79)	72.1% (n=217)	92.5% (n=74)
Academic qualifications			
GCSE	67.8% (n=101)	71.1% (n=219)	67.5% (n=54)
A Level *	68.5% (n=102)	53.6% (n=165)	36.3 (n=29)
Other *	51.7% (n=77)	34.1% (n=105)	11.3% (n=23)
Vocational Qualifications			
NVQ *	15.4% (n=23)	17.5% (n=54)	28.8% (n=23)
Other	2.7% (n=4)	7.5% (n=23)	8.8% (n=7)

Student *	96.6% (n=44)	80.5% (n=248)	76.3% (n=61)

* Significant main effect of risk group ($p < 0.001$)

Table 3: Smoking behaviour according to risk group

	Low risk	Medium risk	High risk
Smoking initiation			
Tried smoking *	54.4% (n=81)	79.9% (n=246)	90% (n=72)
Age of first try (yrs)	13.5 $\pm$ 2.6	13.2 $\pm$ 2.4	12.8 $\pm$ 2.5
Current smoking			
Current smoker *	24.1% (n=19)	51.7% (n=124)	63.4% (n=45)
Amount smoked (approx no. cigs) *	1.79 $\pm$ 1.03 (<1 a day)	2.67 $\pm$ 1.22 (1-4 a day)	2.91 $\pm$ 1.10 (5-10 a day)
Do not smoke in front of parents *	88.9% (n=16)	66.1% (n=82)	54.5% (n=24)

Time of first cigarette (mins) *	335.8 $\pm$ 315.5	155.5 $\pm$ 184.6	104.1 $\pm$ 114.4
Smoking identity			
See self as smoker*	31.6% (n=6)	71.5% (n=88)	88.9% (n=40)
Age of seeing self as smoker (yrs)	16.1 $\pm$ 0.69	15.4 $\pm$ 1.9	14.9 $\pm$ 1.6
Beliefs about smoking behaviour			
Self efficacy *	4.31 $\pm$ 0.75	3.40 $\pm$ 1.33	3.37 $\pm$ 1.34
Behavioural intention (6mnths)*	3.70 $\pm$ 1.55	2.82 $\pm$ 1.43	2.56 $\pm$ 1.45
Outcome expectancy (lung C)	3.62 $\pm$ 1.33	4.22 $\pm$ 1.02	3.90 $\pm$ 1.20
Outcome expectancy (weight)	1.83 $\pm$ 1.03	2.81 $\pm$ 1.40	2.85 $\pm$ 1.44

* significant main effect of risk group (p<0.05)

Table 4: Health beliefs according to risk group

	Low risk	Medium risk	High risk
Smoking is bad for your health	4.64 $\pm$ 0.76	4.71 $\pm$ 0.81	4.62 $\pm$ 0.92
Smoking is unsociable *	3.36 $\pm$ 1.25	3.12 $\pm$ 1.18	3.11 $\pm$ 1.78
Smoking is pleasurable	2.49 $\pm$ 1.25	2.78 $\pm$ 1.37	2.70 $\pm$ 1.42
Smoking relaxes people	3.38 $\pm$ 1.28	3.18 $\pm$ 1.20	3.11 $\pm$ 1.28
Smoking helps to maintain weight *	2.19 $\pm$ 1.15	2.25 $\pm$ 1.12	2.75 $\pm$ 1.27

I am likely to get lung cancer	2.59 ± 1.34	2.94 ± 1.27	2.88 ± 1.19
Lung cancer is a serious illness *	4.61 ± 0.99	4.85 ± 0.59	4.73 ± 0.79
I have control over my health	3.55 ± 1.33	3.62 ± 1.23	3.82 ± 1.11

* significant main effect of risk group ($p < 0.05$)

Table 5: Activities: kinds and reasons for according to risk group

	Low risk	Medium risk	High risk
Kinds of activities			
Social *	1.4 ± 1.5	1.9 ± 1.4	2.1 ± 1.7
Healthy	1.9 ± 1.4	1.9 ± 1.3	1.8 ± 1.5
Social, healthy	0.3 ± 0.57	0.36 ± 0.56	0.38 ± 0.56
Social, unhealthy *	1.1 ± 1.2	1.5 ± 1.2	1.8 ± 1.4
Reasons for activities			
To meet people	3.03 ± 1.08	2.91 ± 1.1	2.7 ± 1.24

To improve health	3.57 ± 1.16	3.46 ± 1.18	3.39 ± 1.32
To fill spare time	3.37 ± 1.17	3.53 ± 1.08	3.46 ± 1.27

* significant main effect of risk group ($p < 0.01$)