Employee’s perceived exposure to environmental tobacco smoke, passive smoking risk beliefs and attitudes towards smoking: a case study in a university setting

M. J. Duaso¹, J. De Irala² and N. Canga³

Abstract

Despite the growing literature on workplace smoking policies, few studies have focused on the implementation of such policies in university settings. Smoking in the workplace is still very common in many countries, including Spain. While the law is about to change and more non-smoking policies are to be implemented, it is not clear what kind of restrictions Spanish workers would find acceptable. This study investigated perceived exposure to environmental tobacco smoke (ETS), passive smoking risks beliefs and attitudes towards smoking at the University of Navarra (Spain). A questionnaire was sent by E-mail to 641 randomly selected employees and a response rate of 70.4% was obtained. The survey results suggest that 27.3% of the university employees were smokers and 26.6% were exposed to ETS on a daily basis. The majority of respondents (81.7%) supported a restrictive non-smoking policy. Acceptance among active smokers was significantly lower (59.2 vs. 89.3%). Smoking prohibition with the provision of smoking areas was the most favored option (46.9%). Results suggest that employees are ready to restrict smoking in the university, but there was not enough support for a total ban. Employers considering adopting a ban on smoking should be encouraged to conduct a similar survey to identify potential barriers to policy implementation.

Introduction

Reasons for the workplace to be smoke-free are overwhelming. The significant health consequences of involuntary smoking exposure have been known for more than three decades (US Department of Health and Human Services, 1986; International Agency for the Research on Cancer, 2002). Tobacco use, particularly cigarette smoking, continues to be the single greatest cause of preventable death in our society (US Department of Health and Human Services and Centers for Disease Control, 2000; WHO, 2003).

Restrictions on smoking in workplaces, public buildings, transportation systems and other enclosed areas have become increasingly common in different parts of the world (Brenner et al., 1997; Burns et al., 2000; Halperin and Rigotti, 2003), yet few workplaces in Spain have adopted non-smoking policies (Nerin et al., 2002; Gonzalez-Alonso et al., 2003).

The WHO (WHO, 2003) has adopted a Framework Convention on Tobacco Control to protect present and future generations from tobacco consumption and exposure to tobacco smoke. Among other strategies, the resolution asks each party to adopt and implement effective measures to provide protection from environmental tobacco smoke (ETS)
in indoor workplaces. This resolution calls for the widest possible international cooperation, and emphasizes the special contribution of academics and health care institutions to tobacco control efforts.

Universities are major employers, employing a wide range of professional, administrative and manual staff in a wide variety of disciplines. They are large organizations in which people learn, work and socialize. Consequently, universities have an enormous potential to protect the health and promote the well-being of their members. Universities, especially those imparting health-related disciplines, can contribute to the health of the wider community setting by being an example of good practice, by banning smoking from their premises, and by using their influence and expertise to advocate healthy environments (Gambescia, 1993; Abercrombie et al., 1998).

Despite the implications of the smoking problem and the potential benefits of non-smoking policies, few studies have focused on the implementation of such policies in university settings (Robinson, 1996; Apel et al., 1997; Etter, 1999; Halperin, 2003). Also, more research is needed to give an insight into successful strategies for countries where smoking restrictions are not in place or are not sufficiently observed.

The progress towards a smoke-free society is influenced by national and international initiatives; however, local community interventions have great potential. As Villalbi (Villalbi, 1999) suggests, the old adage: ‘think global, act local’ applies very well to tobacco control efforts. This study intended to investigate perceived exposure to ETS, passive smoking risk beliefs and attitudes towards smoking restrictions in a university setting. The final aim was to assess the anticipated impact of a smoking ban on university staff and to implement a policy addressing the needs of the university community.

**Methods**

This is a cross-sectional case study. The study took place in the main campus of the University of Navarra, located in Pamplona (Northern Spain). This university includes approximately 12 000 students and 3400 employees. The university offers 27 official degrees and over 300 postgraduate programmes. Around 25% of its students are training to become health professionals. This health background makes it even more necessary to establish a social climate in which smoking is not thought to be the norm. As Gambescia (Gambescia, 1993) argues, universities that give tacit approval of cigarette smoking on campus are incongruent with the health-enhancing mission of their health departments and schools. When this project was conceived in January 2000, smoking was permitted on all premises apart from laboratories, lecture rooms, libraries and lifts.

A questionnaire was sent to a sample of employees recruited from the university address book of the year 2000. This directory included the 3361 workers from Pamplona’s campus. For the purpose of this study, the 1438 employees from the university hospital were excluded, as they already had a non-smoking policy, giving an initial population of 1923 employees.

To estimate the sample size needed, three parameters were considered: an expected smoking prevalence of 32.5%, based on the latest regional survey (Navarra’s Government Department of Health, 1999), a precision of at least 3% and an a error of 0.05. According to these parameters, the minimum required sample size to estimate the smoking prevalence among university employees was 630. Finally, 641 participants were included in the sample. A random sample stratified by position held and generated with the help of STATA software was used. This provided a representative distribution of academics, managers, people in administrative posts and manual workers.

The questionnaire had a total of 46 items and was divided into three parts: one on sociodemographic information, another concerning smoking restriction policies, passive smoking risk beliefs and exposure to passive smoke, and a third for smokers only, enquiring about smoking habits and intention to quit. The estimated time required to complete the questionnaire was 15 min.

Participants were asked about their attitudes toward smoking restrictions. The questionnaire...
presented four different options (Option 1: ‘Employees come to agreements about where and when smoking is allowed’; Option 2: ‘Smoking should be prohibited in public places and corridors’, ‘Employees should not be allowed to smoke during conferences and other meetings’; Option 3: ‘Smoking should not be allowed anywhere in our workplace, except in designated smoking areas’; Option 4: ‘Smoking should be prohibited on all university premises, without exception’). These options corresponded to international classifications of policies for non-smoking measures (US Department of Health and Human Services, 1986).

Perceived smokiness at the university was measured using a five-point Likert-type scale from ‘extremely smoky’ to ‘not smoky at all’ (Thompson et al., 1995). The survey measured beliefs about health risk from worksite ETS by asking: ‘Do you think a smoky work environment is harmful to your health?’, ‘Do you think the chance of getting cancer for non-smokers is greater when people smoke at the work place?’ (Willemsen et al., 1996).

Standardized questions were used to assess smoking status (US Department of Health and Human Services, 1986; WHO 1996): ‘Have you smoked 100 cigarettes or more in your life? Do you smoke now?’. The Transtheoretical Model of Change (Prochaska and Velicer, 1997) was applied to measure subjects’ attitudes toward change. This model identifies five stages of change. ‘Precontemplation’ was defined as the period in which smokers were not considering quitting smoking (at least not within the next 6 months). ‘Contemplation’ was the period of time in which smokers were seriously thinking about quitting smoking in the next 6 months. The ‘preparation’ stage described smokers who were seriously thinking about quitting smoking in the next month and who had also tried to quit smoking during the past year. ‘Action’ was the period ranging from 0 to 6 months after smokers had made the overt change of stopping smoking. ‘Maintenance’ was defined as the period beginning 6 months after action had started.

Strength of addiction was measured using the Fagerström Test for Nicotine Dependence (FTND), an eight-item scale designed to measure physical dependence on nicotine (Heatherton et al., 1991).

An electronic version of the questionnaire was published on the university intranet. A personalized message with a personal identity code was sent to participants. They could either submit their reply by E-mail or download a printable version of the questionnaire and then send it by the free internal mail. Participants without E-mail received the written version of the questionnaire. Twenty days later, a reminder and a written questionnaire were re-sent by internal mail to all those who had still not replied.

In order to assess the representativeness of the results, the response rate by gender and smoking status was studied. Three attempts, on non-consecutive days, were made to contact non-respondents by internal phone. The calls intended to confirm whether they had received the questionnaire and to find out, if possible, their smoking status.

The questionnaire analysis was carried out using SPSS 10.0 software package. Frequencies were calculated for categorical variables and mean and SEs for quantitative variables. Means were compared using Student’s t-test. The $\chi^2$-test was used in analyses that entailed comparisons of proportions. Differences on Likert scales scores between smokers and non-smokers were compared using the Mann–Whitney $U$-test.

The project had ethical approval from the Research Ethics Committee of the University of Navarra. Participants in the study were informed that participation was voluntary and that data would be treated as strictly confidential, separating files with names from files with employee responses.

Results

Of the 641 questionnaires distributed, 63 (10.6%) were returned due to retirement, relocation or having left the university. Out of the 578 left, 407 replied giving a final response rate of 70.4%.

Sociodemographic characteristics of respondents and non-respondents are shown in Table I. Respondents were more likely to be female. Men were
on average older than women; the mean age for males was 39.3 years (SE 0.8) and for females 34.2 (SE 0.7). As expected, respondents were highly educated. Only 11.1% of the respondents had a high school education level or less. The majority of participants (70.2%) had academic jobs. These distributions appropriately reflected the proportions in the target population.

Of the respondents, 25.7% were current smokers, 17.4% ex-smokers and 56.9% non-smokers. It was only possible to contact 51 of the 171 non-respondents. All agreed to confirm their smoking status. Differences in smoking prevalence between respondents and non-respondents contacted by phone were not statistically significant (25.7 versus 31.4% Pearson $\chi^2$, $P = 0.228$). A sensitivity analysis was carried out, assuming that non-respondents who could not be contacted by phone had the same higher smoking prevalence as non-respondents who were reached. Adding up the figures from respondents and non-respondents, we estimated that the smoking prevalence among university employees was 27.3% [95% confidence interval (CI) 23.7–31.2].

Of the current smokers, most (60.2%) were moderate (smoked less than 20 cigarettes per day). The Fagerström test indicated that, on average, employees had low addiction to nicotine (76.3% scored 3 or less). Most current smokers fell in the first two categories of the Transtheoretical Model of Change: 59.6% were in precontemplation stage, as they were not considering quitting smoking, and 32.3% were in contemplation stage, as they were seriously thinking about quitting in the next 6 months. Only 8.1% were in preparation stage, as they were ready to make an attempt at quitting in the following month.

According to the survey results, the majority of university employees (57.2%) worked in a shared office. The average number of workers in shared offices was 4.6 (SE 0.2). Of the respondents, 41.1% shared their office with at least one smoker. When asked about the number of hours exposed to ETS (Table II), 26.6% of employees stated that they were regularly exposed to passive smoking for more than 1 hour per day and 19.6% for more than 3 hours per day.

Table III presents perceived smokiness at the university by smoking status. Few respondents (8.7%) considered their workplace extremely or very smoky, while 45.8% described it to be somewhat or slightly smoky. Smokers had a higher overall mean ranking on the 1–5 scale of smokiness compared to non-smokers (Mann–Whitney $U$-test; $Z = -2.54$ $P = 0.01$).

Passive smoking risk beliefs were measured using a five-point Likert-type scale from ‘strongly

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**Table I.** Sociodemographic characteristics of respondents and non-respondents

<table>
<thead>
<tr>
<th></th>
<th>Respondents [n (%)]</th>
<th>Non-respondents [n (%)]</th>
<th>Pearson $\chi^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>men</td>
<td>191 (46.9)</td>
<td>101 (59.1)</td>
<td></td>
<td>0.008</td>
</tr>
<tr>
<td>women</td>
<td>216 (53.0)</td>
<td>70 (40.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>subtotal</td>
<td>407 (100)</td>
<td>171 (100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high school or less</td>
<td>45 (11.2)</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>university degree</td>
<td>176 (43.7)</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>postgraduate degree</td>
<td>182 (45.2)</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>subtotal</td>
<td>403 100</td>
<td>171 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sciences</td>
<td>168 (40.0)</td>
<td>62 (36.5)</td>
<td></td>
<td>0.550</td>
</tr>
<tr>
<td>social sciences</td>
<td>153 (32.6)</td>
<td>68 (40.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>others</td>
<td>86 (27.4)</td>
<td>40 (23.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>subtotal</td>
<td>407 (100)</td>
<td>170 (100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td></td>
<td></td>
<td></td>
<td>0.699</td>
</tr>
<tr>
<td>academic</td>
<td>276 (70.2)</td>
<td>114 (71.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>administration</td>
<td>117 (29.8)</td>
<td>45 (28.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>subtotal</td>
<td>393 (100)</td>
<td>159 (100)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*There was no data available on non-respondents’ educational level.

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**Table II.** Self-assessment of daily exposure to ETS at work

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>All employees [n (%)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>caught fire</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not regularly exposed at work</td>
</tr>
<tr>
<td></td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td>1–2</td>
</tr>
<tr>
<td></td>
<td>3–5 h</td>
</tr>
<tr>
<td></td>
<td>6–9</td>
</tr>
<tr>
<td></td>
<td>&gt;10</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>
agree’ (5) to ‘strongly disagree’ (1). Figure 1 compares smokers and non-smokers beliefs on the risks of ETS. Perceived risks were significantly higher amongst non-smokers. Non-smokers had higher level of agreement over the item ‘working in a smoky environment is harmful to my health’. More than a quarter of smokers were uncertain as to whether the non-smokers chance of getting cancer is greater when people smoke at the workplace. The Mann–Whitney U-test shows that differences were statistically significant in both statements.

Attitudes towards a future smoking restriction policy in the university are displayed in Table IV. Results suggest that an overwhelming majority of the respondents (82%), regardless of their smoking status, supported a more restrictive policy than the existing one at the time the study took place. Acceptance among active smokers was significantly lower; however, even so, almost 60% were in favor.

There were significant differences between smokers and non-smokers. Smokers seem to be more likely to accept lower restrictions ($P < 0.001$). Only a few non-smokers favored the ‘individual solution’ approach, in which there is no non-smoking policy (Option 1), while this was the option selected most by smokers. A policy restricting smoking in the university except in designated smoking areas (Option 3) was overall the most favoured option. Acceptance of a total university ban on smoking was only selected by 6.7% of the respondents and according to these results only 9% of non-smokers would support it.

### Discussion

This study investigated attitudes towards a non-smoking policy in a university setting in Spain, a country without a long record of smoking control efforts and where smoking is still widely accepted.

#### Table III. Perceived smokiness at university by smoking status

<table>
<thead>
<tr>
<th></th>
<th>All [n (%)]</th>
<th>Smokers [n (%)]</th>
<th>Non-smokers [n (%)]</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely smoky</td>
<td>9 (2.3)</td>
<td>0 (0.0)</td>
<td>9 (3.1)</td>
<td></td>
</tr>
<tr>
<td>Very smoky</td>
<td>25 (6.4)</td>
<td>11 (11.0)</td>
<td>14 (4.8)</td>
<td></td>
</tr>
<tr>
<td>Somewhat</td>
<td>65 (16.6)</td>
<td>24 (24.0)</td>
<td>41 (14.1)</td>
<td>$P &lt; 0.05$</td>
</tr>
<tr>
<td>Slightly</td>
<td>114 (29.2)</td>
<td>29 (29.0)</td>
<td>85 (29.2)</td>
<td></td>
</tr>
<tr>
<td>Not smoky at all</td>
<td>178 (45.5)</td>
<td>36 (26.0)</td>
<td>142 (48.8)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>391 (100)</td>
<td>291 (100.0)</td>
<td>100 (100.0)</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 1. Environmental tobacco smoke risk beliefs by smoking status.
As a result of this research a non-smoking policy was implemented at the University of Navarra on 31 May 2002.

The percentage of current cigarette smokers found in this study (27.3%) was lower than expected. According to the last health surveys smoking prevalence in Spain is 35.7% and 32.4% in Navarra (Ministerio de Sanidad y Consumo, 1999). Several reasons might explain the lower smoking prevalence found. The sample under study consisted of a higher proportion of people with high levels of education and lower smoking rates are normally found among this group (Navarra’s Government Department of Health, 1999). Another explanation is in general the under-reporting of cigarette consumption and, in particular, the under-reporting of non-respondents, leading to an underestimation of the smoking prevalence rate. However, this is probably not a major issue in our study since questionnaires were anonymous. Furthermore, we took into account the possible answers of non-respondents by adjusting the smoking prevalence using a sensitivity analysis approach.

The addictive properties of nicotine may potentially undermine employees’ efforts to comply with a non-smoking policy. In this study employees presented a minimal level of nicotine dependence. Similar levels of nicotine dependence have been found in other Spanish samples (Becona et al., 1992; Jimenez-Ruiz et al., 2001). Fagerström et al. (Fagerström et al., 1996) argue that the degree of nicotine dependence correlates negatively with smoking prevalence. In countries such as the US, Canada or in the North of Europe, where a great deal of effort has been taken to reduce active and passive smoking, only those who are highly addicted to nicotine remain smokers. This phenomenon has been described as ‘selective quitting’ (Fagerström et al., 1996): smoking cessation occurs mostly among smokers with low dependence, leaving the more highly dependent ones in the population still smoking.

This study suggests that an important number of employees at the university were exposed to second-hand smoke on a daily basis. Reported exposure to ETS is consistent with other studies, such as the Exposure to Carcinogens (CAREX) European project which estimated that 22.6% of Spanish workers were exposed to passive smoking at their workplace (Kauppinen et al., 1998). Taking into account that there are no safe levels of exposure to ETS, an intervention was necessary to improve working conditions at the university.

Although most people were aware of the health risks associated with ETS, exposure awareness among employees who smoke was lower. This is consistent with published studies from other countries (Green et al., 2003). A failure to admit that passive smoking is a risk represented a barrier to reduce smoking prevalence and limit ETS exposure at the university.

The application of the Transtheoretical Model of Change to the sample under study suggests that the

<table>
<thead>
<tr>
<th>Attitudes</th>
<th>All [n (%)]</th>
<th>Non-smokers [n (%)]</th>
<th>Smokers [n (%)]</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept a more restrictive policy</td>
<td>316 (81.7)</td>
<td>258 (89.3)</td>
<td>58 (59.2)</td>
<td>( P &lt; 0.001 )</td>
</tr>
<tr>
<td>Option 1: Employees come to agreements about where and when smoking is allowed</td>
<td>123 (31.7)</td>
<td>68 (23.4)</td>
<td>55 (56.1)</td>
<td>( P = 0.001 )</td>
</tr>
<tr>
<td>Option 2: Smoking should be prohibited in public places and corridors. Employees should not be allowed to smoke during conferences and other meetings</td>
<td>57 (14.7)</td>
<td>44 (15.2)</td>
<td>13 (13.3)</td>
<td></td>
</tr>
<tr>
<td>Option 3: Smoking should not be allowed anywhere in our workplace, except in designated smoking areas</td>
<td>182 (46.9)</td>
<td>152 (52.4)</td>
<td>30 (30.6)</td>
<td></td>
</tr>
<tr>
<td>Option 4: Smoking should be prohibited on all university premises, without exceptions</td>
<td>26 (6.7)</td>
<td>26 (9.0)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>388 (100.0)</td>
<td>290 (100.0)</td>
<td>98 (100.0)</td>
<td></td>
</tr>
</tbody>
</table>
majority of smokers at the university were not considering quitting in the near future. Based on these results, and prior to implementing restrictions, an education campaign about the risks associated with active and passive smoking and the benefits of quitting was carried out to encourage smokers to move towards more active stages of change. Self-help materials and brief interventions were offered to increase self-efficacy among those smokers who were seriously thinking about stopping.

Attitudes towards smoking regulations in this sample were similar to the ones found in other European countries. In Germany (Apel et al., 1997), Switzerland (Etter et al., 1999), and The Netherlands (Willemsen et al., 1996) higher support has been found for restrictive policies with designated smoking areas than for a total smoking ban at the workplace. A social climate more favorable for a total ban on smoking at the workplace has been found in the US (Robinson 1996, Hocking, 1991) and also Australia (McAllister, 1995), where public support for banning smoking in the workplace ranged from 73 to 79%.

Several potential limitations should be considered when interpreting the findings in this study. Both smoking prevalence and exposure to ETS were based on self-reports, which might be subject to recall bias, and no biochemical verification was used. Prevalence estimates could have been affected by response rates. However, demographic characteristics of responders are consistent with university data.

Although this study focused on employees only, it is expected that the policy will also have an impact on students. Students develop independence and life skills at university, through living or spending time away from home, and frequently through experimenting and exploring (Abercrombie et al., 1998). Being in a non-smoking environment might reduce smoking cues and encourage students not to smoke.

Following the investigations described in this paper a number of projects are being taken up. An initial evaluation of the new policy is being done to assess the impact of the policy on smoking behavior at work, awareness about the smoke-free policy, changes in attitudes, changes in smoking prevalence rates and stages of change. Another project has been initiated to train students from health-related disciplines to become health agents for change, helping other students in their efforts to quit.

The results presented in this paper suggest that formulating a realistic policy for a smoke-free university can be achieved by consultation with all those concerned. It is important to adapt interventions to the unique needs of a community. In this study, the majority of university employees supported a restrictive non-smoking policy. Acceptance among active smokers was significantly lower, but even so, more than half of the employees who smoked were in favor. While these results are specific to this institution, it is possible that the attitudes in other academic institutions and work sites may be similar. Employers and administrators considering adopting a ban on smoking should be encouraged to conduct a similar survey to identify potential barriers to policy implementation and to aid in policy planning.

Acknowledgements

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References


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