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A research partnership has been forged between The Cancer Council of NSW (TCCN) and researchers at Macquarie University to investigate the influence of two relatively unexplored environmental factors on smoking behaviour in Australia: retail availability of tobacco and the presence of other people smoking in the vicinity of an individual. A diary method was used to collect what is believed to be the first publicly available detailed data on the tobacco purchase and consumption behaviour of intending quitters. The results show that after allowing for their usual level of smoking, intending quitters are more likely to smoke if there are 1) others smoking in the vicinity (with separate and additive effects for friends and/or family and other smokers) and 2) cigarettes for sale in the vicinity. The evidence generated through this research partnership will be useful in suggesting avenues for future policy and practice in the tobacco control area.

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Environmental Influences on Tobacco Consumption by Smokers Intending to Quit

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Abstract

A research partnership has been forged between The Cancer Council of NSW (TCCN) and researchers at Macquarie University to investigate the influence of two relatively unexplored environmental factors on smoking behaviour in Australia: retail availability of tobacco and the presence of other people smoking in the vicinity of an individual. A diary method was used to collect what is believed to be the first publicly available detailed data on the tobacco purchase and consumption behaviour of intending quitters. The results show that after allowing for their usual level of smoking, intending quitters are more likely to smoke if there are 1) others smoking in the vicinity (with separate and additive effects for friends and/or family and other smokers) and 2) cigarettes for sale in the vicinity. The evidence generated through this research partnership will be useful in suggesting avenues for future policy and practice in the tobacco control area.

Introduction

Cigarette smoking is an established threat to health, which persists despite a variety of public health initiatives to decrease the prevalence, and amount, of smoking. One factor which has received limited attention in the literature is the influence of ease of retail access to cigarettes on smoking activity or on attempts to quit. For adolescents, there is some evidence that restriction of tobacco supply is associated with lower rates of experimental and regular smoking. Studies have found drops in underage smoking ranging from 15.8% to 46% after restrictions to access, community education and enforcement of laws banning sales to minors (Altman et al., 1991; Bellew and Wayne, 1991; Bishai et al., 2005; DiFranza et al., 1992; Jason et al., 1991). Pokorny et al. (2003) found higher levels of retail tobacco availability were associated with increased odds that a youth initiated smoking, and a more recent study found that young people (aged 11-23 years) living in areas with relatively high retail tobacco density were somewhat more likely to smoke than those living in areas with much lower tobacco outlet density (Novak et al., 2006). The evidence is not unequivocal, however, as other studies have found that youths often substitute non-retail sources when retail supply is restricted (e.g. Levy et al., 2004). Moreover, to date there has been only very limited investigation of the extent to which ease of retail access to tobacco contributes to the rate of adult smoking (Chuang et al., 2005), or to the failure of attempts to quit.

The lack of attention in the literature to the influence of ease of retail access to cigarettes on smoking activity is surprising in light of traditional market theory which holds that the number of distribution outlets is strongly associated with higher levels of sales (Farris et al., 1989). If a product is visible everywhere, marketing theory suggests that customers will be exposed to it more often, will be more likely to buy it, and sales will be high, and vice versa (Farris et al., 1989; Reibstein and Farris 1995). This is supported by strong evidence from a range of product categories including fast food, psychoactive drugs, and alcohol (Ashe et al., 2003; Goldstein and Kalant 1990; Jekanowski et al., 2001). These studies have not been able to demonstrate a causal relationship between distribution and consumption, with a bi-directional relationship thought to be more likely (Dubelaar et al., 2002; Reibstein and Farris,

1995). However the possibility of a causal link is supported by evidence showing that limiting distribution of alcohol to minors was followed by a lower number of drink driving accidents among adolescents (e.g. Goldstein and Kalant, 1990).

While there are good grounds to suspect that retail availability of tobacco has an effect on the smoking behaviour of all smokers, it is probable that the effect is greater for smokers at particularly vulnerable stages of change (i.e. under-age, experimental and intermittent smokers, and those in the planning through to early maintenance stages of quitting). In this study our focus is on the latter group of smokers: adults intending to quit. A recent study in Victoria provides some support for this focus; Wakefield et al. (2008) found that around one-third of recent quitters reported an urge to make an impulse purchase of cigarettes as a result of seeing retail cigarette displays.

Smoking behaviour is also known to be influenced by social factors, with regular tobacco use by family and peers well documented to be an important influence on the smoking behaviour of adolescents and young adults, especially at vulnerable stages of change such as initiation and/or planning to quit (e.g. Prochaska and DiClemente, 1983; Flay et al., 1998; Schofield et al., 2001; Pokorny et al., 2003; Jones et al., 2004). In a study of quit behaviour by Australian smokers aged 14 years and older, Siahpush et al. (2003) found that the odds of successfully quitting were significantly greater for participants who lived in households where smoking was banned, and for those who reported that few or none of their friends smoked (compared to those who said most or all of their friends smoked).

This body of literature has tended to conceptualise peer and family tobacco use as exerting an important long-term influence on smoking behaviour through the creation of pro-smoking norms to which individuals conform. There has been much less attention to the short-term impact of proximate smokers on the diurnal smoking behaviour of adults, but the few studies that have been undertaken in this area are suggestive of an effect.

Shiffman and various co-authors have explored the impact of a range of internal and external stimuli on smoking behaviour and have found that the presence of others smoking is an important antecedent of situational smoking for smokers (Shiffman et al., 2002) and both lapsing and relapsing quitters (Shiffman, Paty et al., 1996; Shiffman, Gnys et al., 1996). Similarly, Trotter et al. (2002) found that 70% of smokers who regularly attended bars, nightclubs and gaming venues reported that they smoked more in these settings; that is, it appears that their smoking was socially cued by the presence of other smokers. Very little previous research has sought to differentiate between the effect of peers and unknown others smoking, however. The difference is important for understanding the cues which drive smoking: for example, if smoking is triggered by the sight and/or smell of smoke, then peers or strangers smoking in the vicinity would be expected to have an equivalent effect on smoking. If, in contrast, smoking is driven more by normative effects, then the effect of peers smoking would be expected to be greater than any effects from unknown others smoking. If smoking is driven by both normative effects and physical triggers, then both peers and others smoking in the vicinity could have separate and additive effects on smoking frequency. Shiffman and his co-researchers are amongst the few who have considered aspects of this question, but their studies have produced seemingly contradictory and/or inconclusive results.

The limited and inconclusive nature of these findings suggests that further investigation is warranted. By examining the extent to which situational smoking varies according to the physical proximity of other smokers, and which distinguishes between known social contacts

and unknown others, this study aims to make an important contribution to the evidence base on smoking behaviour.

In summary, this study attempts to address a number of gaps in the existing evidence base and literature on two key environmental influences on smoking behaviour. It does so by investigating: the tobacco purchase patterns of adult smokers intending to quit; the association between others smoking (both peers and strangers) on the smoking behaviour of intending quitters; and the association between tobacco retail availability and smoking behaviour.

Methodology

Data were collected by means of a diary survey sent to intending quitters, defined as people who had requested a 'Quit Kit' from the phone line of the NSW state government, 'Quitline'. The survey was enclosed with an information package (the 'Quit Kit') dispatched to 2,287 callers to the Quitline. A diary method was chosen to avoid the well-known problems of recall data (Bernard et al., 1984). Recipients were asked a variety of questions for each four-hour period that they were awake over a four day period: their physical location (home, work, restaurant etc); the presence of others smoking (no/yes); purchase (or supply by others) of cigarettes (no/yes); outlet type of any tobacco purchase and number of cigarettes smoked, if any. In order to collect data for all seven days of the week, the starting day for data collection was randomly varied, asking participants to commence recording on the next (randomly assigned) day of the week. Demographic and behavioural characteristics were also collected, e.g. age, gender, educational level, smoker status (number smoked per day, how soon after waking was first cigarette consumed) and quit status (whether currently attempting to quit, planning to quit in future, etc). A reminder with a duplicate survey was sent to all non-respondents approximately four weeks after the initial mailout.

Results

A total of 288 responses were received, representing a response rate of 12.6%, after allowing for returned mail and removal of a small number of duplicate addresses. The data presented here are based on 6,576 four-hour intervals (or cases) from those respondents. 45% of respondents were males and 55% females. Respondents aged 20-59 years were somewhat over-represented, while those aged 18-19 and over 60 years were somewhat under-represented, compared to the age distribution of the NSW population, possibly representing a higher use of the Quitline by these groups.

Smoking frequency and tobacco acquisition methods

62% of all respondents recorded that they had smoked at some time during the four-day diary period. In 59% of tobacco acquisition episodes, respondents purchased cigarettes and in 41% they were given cigarettes. Some individuals used both acquisition modes, and some used neither, presumably using their existing stock.

Presence of other smokers and smoking

Chisquare analysis was used to separately estimate the associations between the presence of (a) smoking friends and/or family and (b) other smokers, and the incidence of smoking during

a four-hour period. Respondents were significantly more likely to smoke during a four-hour period if their friends and/or family were present and smoking ($p < 0.001$). 49.6% of smoking episodes occurred when friends and family were present and smoking during the four-hour period. In contrast, only 30.5% of smoking episodes occurred when there were no friends and/or family smoking.

This apparent effect of smoking by others on the smoking behaviour of intending quitters was not limited to friends and family; respondents were also significantly more likely to smoke if there were others (i.e. not friends or family) smoking in the vicinity ($p < 0.001$). 51.2% of smoking episodes occurred when there were others (not friends and family) present and smoking during the four-hour period. In contrast, only 29% of smoking episodes occurred in their absence.

Retail availability and smoking

Chisquare analysis was also used to assess the relationship between the availability of cigarettes for sale, and the incidence of smoking. For a large majority of all four-hour periods for which data is available (76.6%), respondents reported that they did not see cigarettes for sale during that particular period. However if cigarettes were seen to be available for sale, there was a significant increase in the frequency of smoking ($p < 0.001$). If cigarettes were not available for sale, smoking occurred in 32.8% of cases. If cigarettes were seen to be available for sale, smoking occurred in 47.7% of cases.

Additive effects

In order to determine if smoking by family/friends, or by others, and the presence of cigarettes for sale had additive or correlated effects on the incidence of smoking, a binary logistic regression simultaneously including all independent variables was also conducted. The dependent variable in this analysis was smoking (no/yes). It is possible that heavy smokers may associate more with other smokers, thus confounding the effect of social influence on smoking behaviour. As a result, a control variable, 'Usual no. smoked', representing the number of cigarettes normally smoked in a day was included in the analysis. Results are shown in Table 1.

Table 1: Logistic regression: Prediction of smoking

Variable	Coefficient	SE Coef.	Z	P
Constant	-0.920	0.038	24.52	<0.001
FF smoking	0.330	0.079	4.20	<0.001
Other smokers	0.667	0.084	7.98	<0.001
Cigs for sale	0.201	0.072	2.78	0.005
Usual no smoked	- 0.123	0.036	3.44	0.001

The results show that after allowing for the number of cigarettes normally smoked, the presence of friends or family ('FF smoking') and others smoking ('Other smokers') had separate and significant effects on the frequency of smoking ($p < 0.001$ for each). The presence of cigarettes for sale ('Cigs for sale') ($p = 0.005$) also had a significant additive effect on the frequency of smoking. Smoking occurred in 37% of cases, with 57% of cases correctly explained, 31.8% of cases incorrectly predicted and 11.2% of cases tied.

Discussion

The results reinforce the difficulty that individuals intending to quit have in stopping smoking. Even among this group of intending quitters, where knowledge that their smoking activity was being recorded might have been expected to strengthen their resolve, 62% of all respondents smoked at some time over the diary period. The results also suggest that both social and market factors have an influence on the decision to smoke by intending quitters. Even after allowing for the number of cigarettes they usually smoked, the presence of other people smoking in the vicinity was significantly associated with a higher frequency of smoking by intending quitters. Smoking by peers and by unknown others each had a separate and additive effect on the likelihood of smoking, that is, respondents were more likely to smoke if friends and family were smoking, and even more likely to smoke if others were also smoking. This is consistent with both social (i.e. normative) factors and physical factors (e.g. the sight and smell of smoke) having an influence on smoking behaviour. Even after allowing for these two factors, the availability of tobacco for sale significantly increased the likelihood of intending quitters smoking in a given four-hour period.

The separate and additive effects of other people smoking and cigarettes being available for sale raises the possibility of a causative sequence: the presence of friends and family smoking triggers a desire to smoke, which is further fuelled if others are smoking. This desire to smoke is apparently often sated, either by being given cigarettes (41% of smoking episodes in the diary period involved the respondent being given cigarettes by another) or by purchase of cigarettes (59% of cases). Purchase of cigarettes is then likely to facilitate further smoking, and potentially, to failure of the quit attempt.

These findings on the significance of two key environmental influences on smoking behaviour have potential policy implications. The impact of retail availability on the decision to smoke warrants particular investigation in this regard. Analysis of the individual tobacco purchase patterns of a pilot sample of intending quitters, reported in a related paper (Burton et al. 2008), suggests that they disproportionately patronise certain outlet types: those typically associated with impulse purchases. Assuming this finding holds across the full sample of intending quitters, it suggests that policy initiatives aimed selectively at these outlets might be a relatively efficient method of preventing relapse. The finding that 41% of smoking episodes by intending quitters in this study involved cigarettes given by another also has potential policy implications. This non-commercial 'distribution' source seems to play a significant role in the re-supply of the intending quitter, as it does amongst youths when retail access is restricted (Levy et al., 2004).

Conclusion

The results reported here provide what we understand to be the first publicly available, detailed data on the association between various social and market factors on tobacco purchase and consumption behaviour by intending quitters. They highlight the significant positive association between other people smoking in the vicinity, the availability of tobacco for sale, and smoking behaviour by intending quitters. Since the response rate for the study was relatively low, the results must be interpreted with caution. Nonetheless the findings have significant implications for future research and, potentially, for policy development in the tobacco control arena. The partnership approach to this research – teaming academic

researchers with a not-for-profit organisation committed to promoting evidence-based innovation in tobacco control – embodies the Partnership, Proof and Practice theme of this international conference.

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