TOBACCO PURCHASE AND CONSUMPTION BY SMOKERS INTENDING TO QUIT

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ABSTRACT

This study examines the impact of two environmental factors on the tobacco purchase and consumption behaviour of smokers intending to quit. The results show that intending quitters are more likely to smoke if, in their immediate vicinity, there are 1) others smoking and 2) cigarettes for sale. Certain retail outlet types also appear to be disproportionately used by intending quitters.

INTRODUCTION

Cigarette smoking is an established threat to health, which persists despite a variety of public health initiatives to decrease its prevalence. One factor which has received limited attention is the influence (if any) of ease of retail access to cigarettes on smoking activity or on attempts to quit. For adolescents, there is some evidence that higher levels of retail tobacco availability are associated with smoking initiation (Pokorny et al. 2003) and, conversely, that restriction of tobacco supply is associated with lower rates of experimental and regular smoking (e.g. Altman et al. 1991). The evidence is not unequivocal, however, as other studies have found that youths often substitute non-retail sources when retail tobacco 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). 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). Although 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, the possibility of a causal link is suggested by evidence showing that limiting distribution of alcohol to minors was followed by a lower number of drink driving accidents among adolescents (Goldstein and Kalant 1990).

The study reported here is, we believe, the first to use individual-level data to explore the nature of the link between distribution, purchase and consumption of tobacco products, and to relate that consumption to the social situation of the smoker. We hypothesise that if a causal relationship between distribution and consumption of tobacco does exist, then it is likely to be more pronounced: (1) for certain types of smokers such as those intending to quit, who might be more likely to make impulse purchases if cigarettes are seen to be available for sale (Wakefield et al. 2008); (2) in certain social contexts, e.g. when they are in the presence of peers and/or others who are smoking (e.g. Shiffman et al. 1996), and (3) for particular types of retail outlets at certain times of the day, e.g. sales from convenient outlets that are open early in the morning and/or late at night. Interestingly, while there is published data on the market share for tobacco purchases by different outlet types (e.g. Euromonitor 2005), there is no published data on the extent to which individuals purchase from different types of outlet (e.g. supermarkets, tobacconists, etc), or if they use different outlets at different times of the day or week.

In summary, this study attempts to address a number of gaps in the existing evidence base and literature on the relationship between tobacco distribution and consumption. It does so by investigating:

- the tobacco purchase patterns of adult smokers intending to quit;
- these individuals' share of purchases between different outlet types, across different times of the day;
- the impact of others smoking (both peers and others) on the smoking behaviour of intending quitters, and
- the impact of tobacco retail availability on their smoking behaviour.

METHODOLOGY

Data was collected by means of a survey sent to intending quitters, defined as people who had requested a 'Quit Kit' from the phone line of an Australian government health service in January-February 2007. The survey was enclosed with an information package (the 'Quit Kit') dispatched to callers by the Quitline operators. The total number of diaries initially dispatched was 700. This sample was subsequently reduced by returns to sender (3), removal of duplicate mailings (21), and removal of a small number

of non-respondents who advised that they had decided not to quit smoking after all (3). The final sample size was therefore 673.

The survey was in a diary format, recording tobacco purchase and consumption hourly or four-hourly over a one- or four-day period. The diary method was chosen to avoid the well-known problems of recall data (Bernard et al. 1984). Two different time periods for the diary method were used to determine if it was feasible to collect data over a multiple day period. In addition, in order to collect data for all seven days of the week, the requested starting day was varied, asking participants to commence recording on the next (randomly assigned) day of the week. To encourage participation, respondents were offered the chance to win a $100 shopping voucher. To test the optimal reward for future versions of the survey, the odds of winning were varied between 1 in 10 and 1 in 20. Twenty-eight different variations of the survey were thus dispatched (n=25 for each planned variation), reflecting all possible combinations of the above three variables. Depending on the variation that they received, recipients of the survey were asked to answer a variety of questions for each one/four-hour period that that they were awake: their physical location (home, work, etc); presence of others smoking (yes/no); purchase or borrowing of cigarettes (yes/no); outlet type of any tobacco purchase and number of cigarettes smoked, if any. Demographic and behavioural characteristics were also collected, e.g. age, gender, educational level, smoker status and quit status. A reminder mailout with a duplicate survey was sent to all non-respondents approximately 3 weeks after the initial mailout.

Smoking frequency was estimated together and separately for the one-day and four-day diarists. The factors leading to cigarette smoking were modelled for the four-day diarists, using each four-hour time period as one case. Thus the data presented here provide 986 cases from the 45 four-day diarists who returned the completed survey. In order to estimate the unique and partial effects of factors, both univariate and multivariate tests were conducted.

RESULTS

A total of 87 responses were received to the two waves of the survey, representing a response rate of 13%. The response rates for the four different diary format/incentive combinations are shown in Table 1. Overall response rates for the one-day (12.5%) and four-day (13.4%) diary formats were not significantly different ($p = 0.71$); nor did response rates vary significantly across the two incentive formats (1 in 10 or 1 in 20 chance of winning a $100 shopping voucher) ($p = 0.2$). Overall the best response rate was for the four-day, 1 in 20 incentive format (14.9%). While the response rate for this group was not significantly higher than the other groups ($p > 0.1$), it does suggest that future data collection for related studies is feasible over a four-day period, while using the lower incentive level. Around 40% of respondents were males and 60% females. Respondents aged 20-39 years were somewhat over-represented, while those aged 18-19 and over 55 years were somewhat under-represented, compared to the age distribution of the Australian population as a whole (Table 2). The study results reported in the rest of this paper focus on the frequency of smoking and place and time of tobacco purchase for all respondents, while providing more detailed analysis of smoking-related behaviour only for the four-day diarists.

Smoking Frequency and Tobacco Acquisition Methods

Around half (54%) of all respondents recorded that they had smoked at some time during the diary period (56% of four-day diarists; 52% of one-day diarists). Of those who smoked, 68% purchased cigarettes and 43% were given cigarettes. Some individuals used both acquisition modes, and some used neither, presumably using their existing stock. There were marked differences in acquisition modes between the four-day and one-day diarists, presumably reflecting the longer period of data collection; 84% of smoking four-day diarists purchased cigarettes compared to 50% for the one-day diarists, while 60% of smoking four-day diarists were given cigarettes compared to 23% of the one-day diarists. More than half of all smoking four-day diarists acquired tobacco by both ‘purchase’ and ‘given’; by contrast, 100% of smoking one-day respondents used only one of these acquisition methods or had tobacco in stock (by deduction).

Purchase across Retail Outlet Types

Of the individuals who purchased tobacco, 40% did so from supermarkets and 19% from petrol (gas) stations. The remaining outlet types (i.e. convenience stores; mixed businesses; tobacconists; liquor stores; newsagents; bar/pub/clubs) were each used by around 4-10% of purchasing smokers. Since some individuals purchased from more than one outlet type, a slightly different, but broadly similar picture emerges if all purchases are examined. An analysis of the site of all purchases is shown in Table 3.

When compared with market share data for tobacco sales, the results reported in Table 3 show quite marked differences in the use of different outlet types by intending quitters who purchased tobacco. These individuals apparently disproportionately patronised

certain outlet types such as liquor stores, newsagents and bars/clubs/pubs, which respectively represented 11%, 5% and 7% of sales to survey respondents, but which based on Euromonitor (2005) market data, were each responsible for less than 2% of total cigarette sales in Australia in 2004. In contrast, supermarkets were used significantly less by intending quitters (39% of sales) than total market share data would suggest, since supermarkets were responsible for 49% of total cigarette sales in 2004 according to Euromonitor (2005). These differences in sales are unlikely to be accounted for by more recent changes in market share data, since 1997-2004 data show a steady increase in market share by supermarkets, and a decline in sales by liquor stores, newsagents and bars/clubs/pubs.

Time of Purchase

Of all tobacco purchases made, 39% were made between 6-10am, 25% between 10am–2pm, 20% between 2-6pm and 16% between 6-10pm. None were made outside this spread of hours (i.e. within the 10pm – 6am period). Due to the small sample size, this result must be interpreted with caution, but the finding does not appear to provide any justification for attempts to limit smoking by restrictions on late-night sales.

Modelling Results for the Four-Day Diarists

(a) Presence of other smokers and smoking
Chi-square analysis was used to assess the relationship between the presence of other smokers, and the incidence of smoking across different times of the day. Respondents were significantly more likely to smoke if their friends and/or family were present and smoking in the same four-hour period (p <0.001). That is, if friends and family were present and smoking during the four-hour period, 46.4% of respondents smoked. In contrast, if there were no friends and/or family smoking, only 16.9% of respondents smoked. 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). If others were smoking in the vicinity, 42.7% of respondents smoked. In contrast, if there were no smokers in the vicinity, only 16.3% of respondents smoked.

(b) Retail availability and smoking
Chi-square 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, 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. Smoking occurred at some stage during the four-hour period in 27.1% of all cases, however if cigarettes were seen to be available for sale, the smoking rate rose to 40.5% of four-hour intervals (p < 0.01).

(c) 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 multivariate logistic regression was performed. 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, representing the number of cigarettes normally smoked in a day, was included in the analysis. This variable was measured in four categories (10 or less, 11-20, 21-30 and 31 or more). Results are shown in Table 4. The results show that after controlling for the number of cigarettes normally smoked (‘Usual smoke’) the presence of friends or family (‘FF smoking’) (p <0.001) and others smoking (‘Other smokers’) (p =0.015) had separate and significant effects on the frequency of smoking. The presence of cigarettes for sale (‘Cigs for sale’) (p =0.049) also had an additional significant effect on the frequency of smoking. 82.2% of cases were correctly explained, with only 15.9% of cases incorrectly predicted (and the remaining 1.9% of cases ties).

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, 54% of all respondents nonetheless 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 controlling 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 had separate and additive effects on the likelihood of smoking. This is consistent with both social cues (i.e. normative effects) and physical cues (e.g. the sight and smell of smoke)

having an influence on smoking behaviour. The availability of tobacco for sale also significantly increased the likelihood of intending quitters smoking in a given four-hour period.

The separate and additive effect of other people smoking and cigarettes being available for sale raises the possibility of a causative sequence: the presence of others smoking triggers a desire to smoke. This desire to smoke is apparently often sated, either by borrowing cigarettes (43% of those who smoked in the diary period were given cigarettes) or by purchase of cigarettes (68% of those who smoked cigarettes had purchased them). Purchase of cigarettes is then likely to facilitate further smoking, and potentially, failure of the quit attempt. This sample size did not allow testing of this potential time sequence, but further data collection is planned to allow such analysis in the future.

As noted earlier, the tobacco purchase patterns of intending quitters also show some intriguing differences in the use of different outlet types compared to market share data. The nature of the outlet types disproportionately patronised by intending quitters (liquor stores, newsagents and bars/clubs/pubs) suggests that such purchases are more likely to have been made on impulse, rather than planned. This in turn implies an effect of distribution on consumption: if tobacco had not been available for purchase at these sites, the intending quitter's attempt to stop smoking may have been sustained for a longer time. The observation that quitters were less likely to purchase tobacco at supermarkets than market share data would suggest, also lends some support to this proposition. Tobacco purchases at supermarkets are arguably more likely to be planned than impulsive, for instance if they take place during the weekly shopping trip. Although this finding must be interpreted with caution, given the small sample size, it suggests that further research in this area is warranted. If the finding proves robust, it could suggest avenues for future policy development. For example, if certain small outlet types are responsible for a much larger percentage of sales to intending quitters than their market share data would suggest, then policy initiatives aimed selectively at these outlets might be a relatively efficient method of preventing relapse by intending quitters.

The finding that 43% of the intending quitters in this study acquired cigarettes by being given them by others also has potential policy implications. This non-commercial distribution source seems to play a significant role in the resupply of the intending quitter, as it does amongst youths when retail access is restricted (Levy et al. 2004), and suggests that quit smoking advice may benefit from inclusion of suggestions such as ‘Try to avoid smokers, but if you can’t, tell your friends and family not to give you cigarettes, even if you ask for them’.

CONCLUSION

This study provides the first publicly available, detailed data on the impact of various social and market factors on tobacco purchase and consumption behaviour by intending quitters. It shows that data collection using a relatively onerous diary method over a four-day period is feasible. The results highlight the significant impact of other people smoking in the vicinity, and the availability of tobacco for sale, have in facilitating lapse or possibly even relapse amongst this population. The results also suggest that market share data cannot be extrapolated to individual level purchases. Since the sample size was small, and the response rate relatively low, the results from the study must be interpreted with caution. Nonetheless the findings have significant implications for future research and, potentially, for policy development in the tobacco control arena.

TABLES

Table 1: Response Rates for Different Diary Formats

Diary format	Response rate	Diary format	Response rate
One day, 1 in 10 chance of $100	10.7%	Four-day , 1 in 10 chance	11.9%
One day, 1 in 20 chance	14.3%	Four-day , 1 in 20 chance	14.9%

Table 2: Age Distribution of Respondents

Age Groups	Actual % of Respondents in each age group	Expected % in each age group based on Australian Population
18-19 yrs	2%	4%
20-39 yrs	44%	37%
40-54 yrs	29%	28%
55 yrs and over	25%	32%

Table 3: Tobacco Purchase Site as a Proportion of All Purchases Made

	Super	Petrol	Conven	Mixed B	Tobac	Liquor	News	Bar	TOTAL
4-day	30%	21%	5%	5%	12%	12%	7%	9%	100%
1-day	69%	15%	0%	0%	8%	8%	0%	0%	100%
Total	39%	20%	4%	4%	11%	11%	5%	7%	100%

Super – Supermarket; Petrol – Petrol (Gas) Station; Conven – Convenience Store; Mixed B – Mixed Business; Tobac – Tobacconist; Liquor – Liquor Store; News – Newsagent; Bar – Bar/Pub/Club

Table 4: Logistic regression: Prediction of smoking

Variable	Coefficient	SE Coef.	Z	*p*
Constant	-2.012	0.221	-9.11	<0.001
Family/Friends smoking	0.935	0.228	4.10	<0.001
Other smokers	0.588	0.243	2.42	0.015
Cigs for sale	0.394	0.200	1.97	0.049
Usual smoke	0.0122	0.009	1.32	0.187

REFERENCES

Altman, David G., Lolly Rasenick-Douss, Valodi Foster and Joe B. Tye. 1991. "Sustained Effects of an Educational Program to Reduce Sales of Cigarettes to Minors." *American Journal of Public Health* 81 (7): 891-93.

Ashe, M., D. Jernigan, R. Klinc, and R. Gataz. 2003. "Land Use Planning and the Control of Alcohol, Tobacco, Firearms, and Fast Food Restaurants." *American Journal of Public Health* 93(9): 1404-1408.

Bernard, H. Russell, Peter Killworth, David Kronenfeld and Lee Sailer 1984. "The Problem of Informant Accuracy: The Validity of Retrospective Data." *Annual Review of Anthropology* 13: 495-517.

Chuang, Y.-C., C. Cubbin, D. Ahnand M.A. Winkleby. 2005. "Effects of Neighbourhood Socioeconomic Status and Convenience Store Concentration on Individual Level Smoking.", 59 (7): 568-573.

Euromonitor. April 2005. *Tobacco in Australia, Executive Summary*. Global Market Information Database.

Farris, Paul, James Oliver, and Cornelius de Kluyver. 1989. "The Relationship Between Distribution and Market Share." *Marketing Science* 8 (2): 107-28.

Goldstein, A. and Kalant, H. 1990. "Drug Policy: Striking the Right Balance." *Science* 249 (4976): 1513-1521.

Jekanowski, M. D., J.K. Binkley, and J. Eales. 2001. "Convenience, Accessibility, and the Demand for Fast Food." *Journal of Agricultural and Resource Economics* 26 (1): 58-74.

Levy, D.T., F. Chaloupka and J. Gitchell, J. 2004. "The Effects of Tobacco Control Policies on Smoking Rates: A tobacco Control Scorecard." *Journal of Public Health Management Practice* 10(4): 338-53.

Pokorny, S.B., L.A. Jason and M.E. Schoeny. 2003. "The Relation of Retail Tobacco Availability to Initiation and Continued Smoking." *Journal of Clinical Child and Adolescent Psychology* 32 (2): 193-204.

Shiffman, S., J. A. Paty, M. Gnys, J.A. Kassel and M. Hickcox 1996. "First Lapses to Smoking: Within-Subjects Analysis of Real-Time Reports." *Journal of Consulting & Clinical Psychology* 64 (2): 366-379.

Wakefield, M., D. Germain, and L. Henriksen 2008. "The effect of retail cigarette pack displays on impulse purchase." *Addiction* 103 (2): 322-328.