Stress, stress management, smoking prevalence and quit rates in a disadvantaged area: has anything changed?

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Introduction

Smoking, socio-economic status and health

Smoking is the greatest cause of death and disease in Australia. One study found that tobacco smoking caused an estimated 19,000 deaths and 142,500 hospital admissions per year in Australia. There are several studies that show positive correlations between socio-economic status (SES) and health status. Indicators of lower SES (lower education, lower income, unskilled workers, unemployed persons and individuals who receive welfare benefits) may also predict higher tobacco smoking rates. One study found that quit rates increased with social status and were higher among persons living with a spouse or partner compared with singles.

Smoking causes greater harm (higher levels of morbidity and mortality) in low SES groups because lifestyle choices exacerbate the health problems created by deprived material conditions.

Disadvantaged areas, stress and smoking

Investigators in a study in Glasgow distinguished between SES and a 'disadvantaged area' and argued that a disadvantaged area may contribute to generating ill-health and reinforce smoking. These investigators listed five main factors that define disadvantaged communities: few facilities and services that are beneficial for health; fewer job prospects; increased exposure to stress caused by higher levels of crime and violence; few opportunities for social interaction; and self beliefs of exclusion and abandonment. These investigators reported that a poorly resourced and stressful environment,

Abstract

Issue addressed: To assess the prevalence of smoking, quit rates, and perceived levels of stress as a barrier to quitting in the most disadvantaged area in metropolitan Adelaide in comparison to smokers recruited from a neighbouring, more affluent area. To assess how frequently general practitioners (GPs) in the two areas use stress management as a smoking cessation strategy and to assess how effective this strategy is for each area.

Methods: One thousand smokers aged between 18 and 75 were recruited from general practices in the two areas; eligibility criteria included having had at least one puff of a cigarette in the past week. A baseline survey was administered at recruitment and at follow-up 12 months later. Semi-structured telephone interviews were also conducted at the 12-month follow-up with 50 randomly selected participants from the two areas.

Results: The disadvantaged area had a higher prevalence of smoking, significantly higher levels of perceived stress as a barrier to cessation, and significantly lower quit rates compared with the more affluent neighbouring area. Stress management as a smoking cessation strategy occurred less frequently and was less effective with the disadvantaged group. The prevalence rate for the disadvantaged area has not changed in the past 10 years.

Conclusions: Stress may present as a significant barrier to smoking cessation in disadvantaged areas. Higher levels of stress may therefore, at least in part, explain the lower quit rate and higher prevalence of smoking in disadvantaged areas. More effective stress management strategies need to be developed and promoted in disadvantaged areas.

Key words: Stress; stress management; smoking prevalence; quit rates; disadvantaged area.

Health Promotion Journal of Australia 2008:19:40-4

So what?

This study contributes towards more effective smoking cessation strategies for disadvantaged areas where prevalence rates are high and do not appear to be decreasing.
strong community norms, isolation, and limited opportunities for respite and recreation appeared to combine to encourage tobacco use and discourage cessation.\textsuperscript{11} They also reported that smoking provided a means of coping with stress generated from low incomes, unemployment and living in inadequately resourced and unsafe communities.

Stress occurs when the perceived demands of the environment are greater than the individuals' perceived ability to cope.\textsuperscript{12} There are several studies that directly link smoking behaviour and stress.\textsuperscript{13-15} Daily negative events and perceived stress are associated with smoking and urges to smoke.\textsuperscript{14} Negative peer- and school-related events may lead to a risk of increased smoking behaviour and intentions to smoke among adolescents.\textsuperscript{15} In one study, smokers (pregnant African American women on low incomes and living in violent neighbourhoods) reported how cigarettes assisted them to relieve the stress in their lives, making it more difficult to quit.\textsuperscript{16} The interviewees also stated that the sources of stress were often out of their control even though they recognised that personal accountability was important for smoking cessation to occur. Therefore, any attempt at introducing smoking cessation interventions in disadvantaged areas may need to consider managing stress symptoms. Addressing how smokers in disadvantaged areas react to the presence of higher levels of environmental stress, and/or working towards diminishing the cause of the reported higher levels of stress, may be important. However, it should be recognised that there are other factors that may influence a smoker's ability to quit. For example, self-efficacy and outcome expectations have a negative association with smoking as a health risk behaviour\textsuperscript{17} and the act of smoking itself may generate levels of stress.\textsuperscript{18}

A stress-related physiological theory about smoking may explain why it is more difficult to quit smoking in a disadvantaged area, where higher levels of perceived stress may be experienced. The 'stress hormone' cortisol is ultimately stimulated in the presence of environmental stressors. Nicotine increases the production of the 'anti-cortisol' hormone dehydroepiandrosterone (DHEA)\textsuperscript{18} and therefore has positive effects against stress and anxiety. Smoking tobacco products may ameliorate human stress in the presence of environmental stressors, which consequently may make smoking cessation more difficult. This theory may be more relevant in environments that produce greater levels of stress.

**General practitioners and stress management**

In Australia, 50% of general practice patients are asked about their smoking and one-third are counselled.\textsuperscript{19,20} However, there does not appear to be any information in the literature about how often clinicians offer stress management and how effective stress management strategies are in disadvantaged areas.

**Aims and hypotheses**

It is hypothesised that a disadvantaged region (Area A) will have a higher smoking prevalence rate and a lower quit rate compared with a relatively non-disadvantaged area (Area B). It is also hypothesised that self-reports of stress as a barrier to quitting would be higher in the disadvantaged location (Area A). How often stress management was used as a smoking cessation strategy by general practitioners in the two areas was examined, as well as how effective this strategy was for both areas.

**Methods**

**Participants**

One thousand smokers were recruited from 12 general practice waiting rooms as a sample of convenience in the Adelaide metropolitan region. Eligibility criteria included having had at least one puff of a cigarette in the past week and being aged between 18 and 75. In Area A, there were 442 participants recruited (253 female, 57%) with a mean ± standard deviation age of 38.0±12.8. In Area B, there were 558 participants recruited (354 female, 63%) with a mean ± standard deviation age of 38.59±11.27.

**Attrition rate**

Six hundred and twenty-two participants (62%) remained in the study at 12 months follow-up. In Area A, 264 (60%) participants had remained and 358 (64%) in Area B. The proportion of female-to-male participants had not changed from baseline: the majority of participants were female in areas A and B (55% and 63% respectively). The mean age for areas A (40.2±12.5) and B (39.6±11.1) had not changed. There was no evidence to suggest that the sample characteristics had changed over 12 months due to participant withdrawal.

**Regions**

The present study investigated two local government areas (LGAs) in metropolitan Adelaide, South Australia. Based on Census data (Australian Bureau of Statistics (ABS) 2001), including Socio-Economic Indexes for Areas (SEIFA 2001) and police records, one region is considered to be the most disadvantaged area in metropolitan Adelaide (Area A). The other is a more affluent neighbouring region (Area B) chosen because it is a similar geographical outer-suburb location. Area A is approximately half the geographic size and population of Area B (populations were approximately 67,000 and 129,000 in 2001 respectively). Socio-economic factors other than those defined earlier\textsuperscript{14} were also investigated as possible influences on smoking behaviour outcomes between the two areas. These included education, income, and dangerous working environments.
Table 1 lists the criteria used to define the two distinct socio-economic regions, with Area A defined as the most disadvantaged region in metropolitan Adelaide and Area B as a more affluent neighbouring region.

Materials and procedure
Smokers were recruited from several general practice clinics in areas A and B; surveys were administered face-to-face. This survey included questions regarding: demographic characteristics, general health, whether they had at least one puff of a cigarette in the past week, motivation to quit, and nicotine dependence ("how soon after waking would you have your first cigarette" and "how many cigarettes would you smoke on a typical day"). A count of non-smokers was recorded.

A similar participant survey was administered by post to the same cohort 12 months later. For those recruited participants who did not respond to the first mail-out, the survey was posted a second time. An attempt was made to collect survey information from non-respondents to the second mail-out by administering a structured telephone interview. The follow-up survey did not ask about demographic characteristics but included a question asking the participants who had not quit to rate, on a five-point scale, how stressful events had acted as a barrier to smoking cessation in the past six months. The percentage of smokers at baseline who no longer smoked (had not had a puff of a tobacco product in the past week) at follow-up was calculated as a point estimate of the quit rate for both areas. Semi-structured telephone interviews were also conducted at the 12-month follow-up with 50 randomly selected smokers from across the two regions.

Results and Discussion

Smoking prevalence
The smoking prevalence, according to the rate of recruitment of smokers (2003), for the most disadvantaged area was 39% (n=1,105). This prevalence rate is supported by evidence from the Health Omnibus Survey data collected in 2002-04, which reports a similar prevalence rate (38%). This is almost twice the rate for Area B (23%, n=2,426). The hypothesis that a disadvantaged region would produce a higher smoking prevalence rate compared with a relatively non-disadvantaged area was supported.

Smoking quit rates
The quit rate for participants in Area A (6.4%; n=17/264) after 12 months is significantly lower (χ²=6.59, df=1, p=0.01) compared with the more affluent LGA, Area B (12.5%; n=45/358). Therefore, the hypothesis that a disadvantaged region would have a significantly lower quit rate compared with a relatively non-disadvantaged area was supported. The quit rate differences between the regions may not be explained due to differences in nicotine dependence (measured by the number of cigarettes smoked on a typical day and how soon they start to smoke after waking); as these parameters were not significantly different at baseline or at follow-up between the two regions (median scores in both regions: smoked 16-20 cigarettes, n=487, and first cigarette 6-30 minutes after waking, n=479). Similarly, quit rate differences between the regions may not be explained by significant differences in self-

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Area A</th>
<th>Area B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment (related to social isolation and low income)</td>
<td>7.5%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Percentage of employees working in the manufacturing industry (related to dangerous working conditions)</td>
<td>33%</td>
<td>23%</td>
</tr>
<tr>
<td>Crime rating (1-5, 5 is the highest) (related to violence and criminal activity)</td>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>Percentage of public housing (related to low income)</td>
<td>18%</td>
<td>9%</td>
</tr>
<tr>
<td>Income: Percentage of households with weekly income below $500 (related to low income)</td>
<td>40%</td>
<td>33%</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>6%</td>
<td>13%</td>
</tr>
</tbody>
</table>

Public amenities

| Public meeting places (related to social isolation): 0.17 per 1,000 residents | 0.37 per 1,000 residents |
| Public eating places (restaurants/cafe/pubs): 1,000 residents | 1,000 residents |

SEIFA decile ranking:

| (5 highest socio-economic area) | 70 | 8 |

| Table 1: Area defining characteristics. (Area A is ranked lowest or near the lowest compared with other Adelaide metropolitan areas for all criteria.) |

| Table 2: Mean self-report rating scores summarised for Areas A and B. |
|-----------------|-------|---|---|---|---|
| Area A          | Mean±SD | Area B | Mean±SD | t-test | p value |
| Mean±SD | (n) | Mean±SD | (n) | p value |
| Baseline motivation to quit scores (scale 1-7; 7=very keen to quit) | 4.93±2.01 (440) | 5.07±1.95 (534) | p=0.05 |
| Follow-up motivation to quit scores (scale 1-7; 7=very keen to quit) | 4.67±1.92 (213) | 4.83±1.87 (278) | p=0.05 |
| Baseline general health scores (scale 1-5; 5=Excellent health) | 3.05±0.90 (439) | 3.12±0.89 (555) | p=0.05 |
| Follow-up general health scores (scale 1-5; 5=Excellent health) | 3.02±0.83 (112) | 3.14±0.89 (161) | p=0.05 |
| Follow-up: Level of how much stressful events had prevented smoking cessation (scale 1-5, 5=Very much so) | 3.84±1.20 (44) | 3.29±1.47 (49) | p<0.05 |

Stress and personal care
For the purpose of this paper, personal care areas relevant to smoking include psychological stress and social isolation. Areas with greater numbers of public meeting and eating places, located near to public housing, were associated with a lower quit rate compared with areas with lower numbers of these amenities. There was no significant difference in the number of stressful events experienced (n=910) and the number of days affected by clinical depression (n=648) between areas.

Disadvantages in terms of social isolation and stress
The finding that smokers in the most disadvantaged areas are more likely to be poorly educated, unemployed, and have lower incomes, and that smokers in more affluent areas are more likely to have better health, lower smoking prevalence rates, and lower quit rates suggests that interventions in the most disadvantaged areas to help smokers quit may need to be more targeted and intensive than those in more affluent areas.
reports of motivation to quit levels or self-reports of general health scores at baseline and follow-up. See Table 2 for the respective mean scores for Areas A and B.

Stress
Using an independent sample t-test, a statistically significant difference was found between the two regions in the mean level of how stressful events had prevented smoking cessation for those smokers who had continued to smoke after 12 months (t_{19} = -2.03; see also Table 2). There are studies that do investigate the effect of self-report stress levels in relation to smoking maintenance; however, there does not appear to be any well-established quantitative index in the literature that has directly measured stress as a barrier to smoking cessation. It is important, in the majority of cases, to assess health issues using both quantitative and qualitative methods of data collection. Several participants from Area A, during the semi-structured interviews, reported that a very high level of stress was a major barrier to quitting. For example, one female participant commented that she was “very stressed” and that “it is hard to quit at difficult times”. One male participant reported that he was unable to quit because of the stress caused by the recent murder of his friend. Consequently, the hypothesis that self-reports of stress (in relation to presenting a barrier to quitting) would be higher in the disadvantaged location is supported. Area A, as a disadvantaged region, may provide an environment that produces more stressful events that are subsequently perceived by the smoker to require more relief through smoking tobacco. Therefore, smoking cessation programs and strategies in disadvantaged areas in particular may need to consider managing stress symptoms.

Stress management
For those smokers who had discussed smoking cessation with their health professional (n = 125), a higher percentage of smokers from Area B (31%, n = 24/78) discussed strategies for dealing with stress (e.g. relaxation techniques) than those in Area A (23%, n = 11/47). Thus, even though stress presents as a greater barrier to quitting in the disadvantaged area, clinicians located in Area A were less likely to discuss this impediment with smokers. The quit rate for those smokers in Area B who had discussed stress management with their health professional was 25% (n = 6/24), which is an increase from the overall quit rate of 12%. None of the smokers who had discussed stress management with their health professional in Area A (n = 0/11) had quit. Therefore, the stress management offered by clinicians may be less effective in disadvantaged areas.

Disadvantaged regions, stress, quit rates and smoking prevalence
The finding that Area A (as a disadvantaged region) may

provide an environment that produces more stressful events that subsequently require more relief through smoking tobacco, hence reducing the quit rate, may partly explain the higher prevalence of smoking compared with the more affluent area. However, there are other factors to consider. For example, tobacco companies are known to target disadvantaged areas. Previous research has found that neighbourhoods of lower SES have higher convenience store concentrations that offer a greater access to purchase cigarettes. Reductions in the availability of tobacco products within neighbourhoods are related to decreased levels of smoking. There have been several smoking studies that have focused on disadvantaged women. High rates of smoking exist among disadvantaged women. However, statistically significant associations between quit rates and gender and quit rates and age were not found in either of the case study regions. Psychosocial factors – for example, powerlessness, low self-efficacy and social pressures – are reported to be directly associated with an increased prevalence in smoking behaviour and these factors may also induce higher stress levels.

Has anything changed?
There have been a number of studies since the 1970s that have investigated the relationship between stress and smoking. However, much of this literature has involved qualitative research methods that have not examined this important health issue in relation to stress management strategies employed by clinicians in disadvantaged areas. Consequently, it was not unexpected that the results of this study revealed that the disadvantaged area examined had a relative and absolute high smoking prevalence rate, in contrast to a declining overall smoking rate in Australian adults: 35% in 1980 and 23% in 2001. Area A was found to have a considerably higher smoking prevalence rate (39%) than the national average in 1980 (more than 20 years ago).

Historical data collected in the Health Omnibus Survey has revealed that the smoking prevalence rate during 1993-95 for Area A was 39.8%, almost exactly the same rate that was found for this area 10 years later in this study. Data collected from the Health Omnibus Survey also revealed that the South Australian smoking prevalence rate for 1993-95 was 26.8%, much lower than for Area A. These data suggest that communities in disadvantaged areas may not share a decline in smoking prevalence rates with those residing in more affluent areas.

Limitations and recommended future investigations
It would have been useful to ask a related question on how much stressful events had acted as a barrier to smoking cessation for those participants who did quit. This would have provided a more meaningful measure of stress in relation to smoking
behaviour. Additionally, future research may need to consider other factors that may influence cessation rates in disadvantaged areas; for example, density of tobacco retail outlets.

Using samples of convenience is not the most accurate sampling technique for establishing prevalence. However, the common sampling method for both areas may allow a comparison of difference.

Smoking cessation programs should more often target disadvantaged areas for two reasons: first, these regions have higher prevalence rates, and, second, they may have greater barriers to quitting. Further investigation is required to establish the mode of stress management offered by clinicians, why it is not effective in disadvantaged areas, and to examine ways of diminishing the influence of environmental factors that augment stress. Examining cortisol levels is an objective measure of stress and may be a way of quantifying stress levels in future research.

Conclusion

Promoting smoking cessation is a difficult task given the complex nature of this licit drug. Stress may present as a greater barrier to quitting in disadvantaged areas relative to more affluent areas. Lower incomes, lower education, more dangerous working conditions, greater social isolation, and higher levels of violence and criminal activity may all produce an environment where stress becomes a greater barrier to smoking cessation. Higher levels of stress may therefore, at least in part, explain the lower quit rate and higher prevalence of smoking in disadvantaged areas, and why the smoking prevalence rate may not be declining in such areas. Smoking cessation programs should target disadvantaged areas with a greater emphasis on coping strategies for alleviating stress. The development and promotion of more effective stress management strategies in disadvantaged areas is recommended. Effective strategies may involve improved identification and management of stress symptoms and/or diminishing the cause of the reported higher levels of stress.

Acknowledgements

Thanks to Dr John Litt, who contributed to providing data.

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