

Smoking and mental health - a review of the literature

Dr Ann McNeill

Independent Consultant

&

Honorary Senior Lecturer in Public Health

St George's Hospital Medical School

London

Click [here](#) for a printable pdf version

Table of Contents

Acknowledgements	Error! Bookmark not defined.
1 Association of mental health problems and smoking	Error! Bookmark not defined.
1.1 Comparison with the general population	Error! Bookmark not defined.
1.2 Association of smoking with people living in institutions ..	Error! Bookmark not defined.
1.3 Proportion of all cigarettes smoked by people with mental health problems	Error!
Bookmark not defined.	
1.4 The role of the tobacco industry	Error! Bookmark not defined.
1.5 Nicotine dependence is a psychiatric disorder	Error! Bookmark not defined.
1.6 The relationship between smoking and different mental health disorders	Error!
Bookmark not defined.	
1.6.1 Schizophrenia	Error! Bookmark not defined.
1.6.2 Bipolar affective disorder	Error! Bookmark not defined.
1.6.3 Depression	Error! Bookmark not defined.
1.6.4 Psychological distress	Error! Bookmark not defined.
1.6.5 Other disorders	Error! Bookmark not defined.
2 The impact of smoking on people with mental health problems	Error! Bookmark not defined.
defined.	
2.1 People with mental health problems can ill afford to smoke	Error! Bookmark not defined.
2.2 High mortality and morbidity associated with smoking	Error! Bookmark not defined.
3 Why do people with mental health problems smoke more?..	Error! Bookmark not defined.
3.1 Association of cigarette smoking and mental health problems with deprivation	Error!
Bookmark not defined.	
3.2 The relationship between smoking and the environment	Error! Bookmark not defined.
3.3 Does smoking causes mental illness?	Error! Bookmark not defined.
3.4 Does the illness cause smoking? Nicotine use as self-medication	Error! Bookmark not defined.
defined.	
3.4.1 Relationship between nicotine and neurotransmitters	Error! Bookmark not defined.
defined.	
3.4.2 Nicotine and depression	Error! Bookmark not defined.
3.4.3 Nicotine and schizophrenia	Error! Bookmark not defined.
3.4.4 Nicotine and adult attention deficit hyperactivity disorder	Error! Bookmark not defined.
defined.	
3.4.5 Nicotine and cognition	Error! Bookmark not defined.
3.4.6 Interactions between nicotine and medications for schizophrenia ..	Error! Bookmark not defined.
not defined.	
3.5 Difficulties with cessation and withdrawal effects	Error! Bookmark not defined.
4 Reducing smoking in people with mental health problems	Error! Bookmark not defined.
4.1 Do people with mental health problems want to quit smoking?	Error! Bookmark not defined.
defined.	
4.2 Treatment for smokers with mental health problems	Error! Bookmark not defined.
4.2.2 Brief opportunistic advice to quit for smokers with mental health problems	Error!
Bookmark not defined.	

4.2.3 Cognitive and behavioural therapy for smokers with mental health problems..	Error! Bookmark not defined.
4.2.4 Group therapy and nicotine replacement therapy (NRT)	Error! Bookmark not defined.
4.2.5 Bupropion	Error! Bookmark not defined.
4.2.6 Offer smokers with mental health problems the best	Error! Bookmark not defined.
4.2.7 Smoking reduction and nicotine replacement therapy	Error! Bookmark not defined.
4.3 Smokefree policies	Error! Bookmark not defined.
4.3.1 Smoking policies in psychiatric institutions in the UK	Error! Bookmark not defined.
4.4 Smoking among mental health professionals	Error! Bookmark not defined.

Acknowledgements

I am extremely grateful for the diligent research assistance of Karen Richardson from ASH.

I would also like to acknowledge various reviews from the US and France that provided many of the references cited in this review. Two by Tony George and Jennifer Vessicchio are available free on-line^{i[1],ii[2]}. Reviews by Gregory Dalack^{iii[3]} and Jacques le Houezec^{iv[4]} were also very useful. I am also very grateful to Professors John Hughes, Michael Farrell, Martin Jarvis and Debra Malpass for providing literature and contacts with international experts on these issues. The tables are adapted from material prepared by Professor Martin Jarvis. Thanks also go to Ben Ayliffe and Naj Dehlavi from ASH for technical support.

The report was commissioned and managed by Judith Watt, SmokeFree London Programme.

December 2001

SmokeFree London Programme
London Region NHS
40 Eastbourne Terrace
London W2 3QR
Tel: 020 7725 5436
Fax: 020 7725 5393
sflondon@doh.gsi.gov.uk

This report aims to:

- ○ discuss the relationship between smoking and clinically diagnosed mental health problems
- ○ explain why this is an important yet poorly addressed public health issue
- ○ suggest approaches to reduce the problem.

Key issues identified in this report:

- ○ Nicotine dependence is the most prevalent, deadly and yet most treatable of all psychiatric disorders but is often overlooked by the psychiatric professions
- ○ Smoking prevalence is significantly higher among people with mental health problems than among the general population
- ○ Smoking prevalence is highest among those with a diagnosis of a psychotic disorder
- ○ Studies have shown smoking rates to be as high as 80% among schizophrenics although increased smoking might be associated with psychosis or severity of psychosis rather than with a specific psychotic illness
- ○ People with psychotic disorders who live in institutions are particularly vulnerable: over 70% of this group smoke including 52% who are heavy smokers
- ○ Daily cigarette consumption is considerably higher among smokers with mental health problems who may also inhale more deeply from their cigarettes
- ○ In the US it has been estimated that just under half of all the cigarettes smoked are smoked by people who have had a psychiatric or substance abuse disorder in the past month. This may be an overestimate but illustrates that a significant proportion of cigarettes smoked are likely to be done so by people with mental health problems.
- ○ Smoking related fatal diseases have been shown to be commoner among schizophrenics than among the general population
- ○ Some of the excess mortality of people with mental health problems is potentially preventable if they are given support to stop smoking
- ○ A significant proportion of people with schizophrenia recognises that smoking is a problem, want to quit and will attend smoking cessation therapy
- ○ More than half (52%) of schizophrenic smokers living in institutions wanted to give up smoking
- ○ Effective treatments exist to help people stop smoking and are not yet being routinely offered to people with mental health problems
- ○ All health professionals working with smokers with mental health problems should encourage smokers to quit and refer those needing further support to specialist smoking cessation services
- ○ There is some evidence from other countries to suggest that smokers with mental health problems feel excluded from mainstream stop smoking

programmes. Smoking cessation services need to be offered guidance on how to be accessible to and how best to support smokers with mental health problems.

- ○ Nicotine may help alleviate some of the positive and negative symptoms associated with psychiatric illnesses and may also help to alleviate the side effects associated with their medications
- ○ Attempts to stop smoking do not appear to exacerbate psychotic symptoms
- ○ Many mental health institutions at best condone and at worst encourage smoking as cigarettes are sometimes used to reward or punish patients.
- ○ Smoke-free policies encourage smokers to quit, make non-smoking the norm and reduce the harmfulness of environmental tobacco smoke.
- ○ People with mental health problems may be more vulnerable to the misleading messages about tobacco promoted by the tobacco industry
- ○ In the UK, people with schizophrenia who smoke contribute an estimated £139m each year to the Treasury.

1 Association of mental health problems and smoking

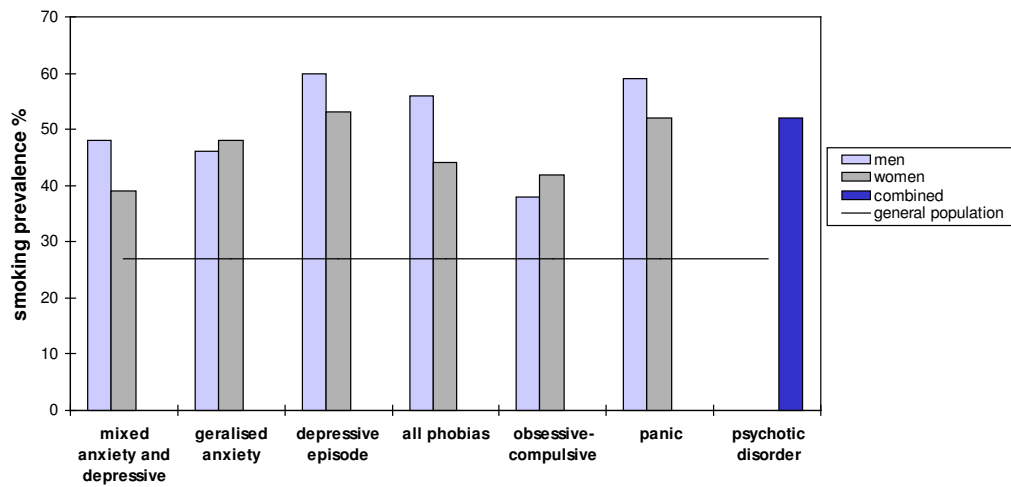
1.1 Comparison with the general population

Smoking prevalence is significantly higher among people with mental health problems than among the general population. The most recent data for England illustrating this are from the Psychiatric Morbidity Survey which involved over 10,000 adults and was carried out by the then Office of Population Censuses and Surveys (OPCS) in 1993^{v[5]}. Sixteen per cent of this general population sample had a current psychiatric disorder. The vast majority of these were neurotic disorders with nearly half being accounted for by mixed anxiety and depressive disorders. Less than 0.5% of the sample had a psychotic disorder. A similar survey has been carried out by the Office of National Statistics (ONS) in 2000, but data on smoking prevalence are not yet available.

Table 1 shows a breakdown of smoking prevalence among six categories of neurotic disorder and one category of any psychotic disorder (due to the prevalence of psychotic disorders in the general population being very low). The overall smoking prevalence for the sample was 32%, which compared well with a national smoking prevalence of 30% from the 1993 Health Survey **Error! Bookmark not defined.** (National smoking prevalence in 1998 was 26% in women and 28% in men^{v[6]}). All categories of mental health problems had higher levels of smoking than the general population. Forty four per cent of those diagnosed as having any neurotic disorder were smokers. The highest smoking rates were among those with a diagnosis of psychosis.

Table 1

Smoking prevalence by mental health problem



Source: Meltzer, H et al. OPCS Surveys of Psychiatric Morbidity in Great Britain Report 1: The prevalence of psychiatric morbidity among adults living in private households. London: HMSO 1995

For the neurotic disorders, a clear relationship was observed between smoking and the number of neurotic symptoms as measured by the revised version of the Clinical Interview Schedule (CIS-R)^{1[ai]}. This score ranges from 0 to 57 and the overall threshold score for significant psychiatric morbidity is 12. Current smoking increased in a stepwise fashion from 28% for a CIS-R score of 0-5, to 34% for a score of 6-11, 42% for a score of 12-17 and 48% for a score of 18 plus **Error! Bookmark not defined.**. Higher scores were also associated with heavier smoking^{viii[7]}. Smoking prevalence also varied with the number of neurotic disorders. For those with one neurotic disorder 43% were current smokers, for those with two or more disorders, 54% were current smokers **Error! Bookmark not defined.**

A dose response relationship has also been observed between the number of psychiatric diagnoses and smoking in a recent US study^{viii[8]}.

1.2 Association of smoking with people living in institutions

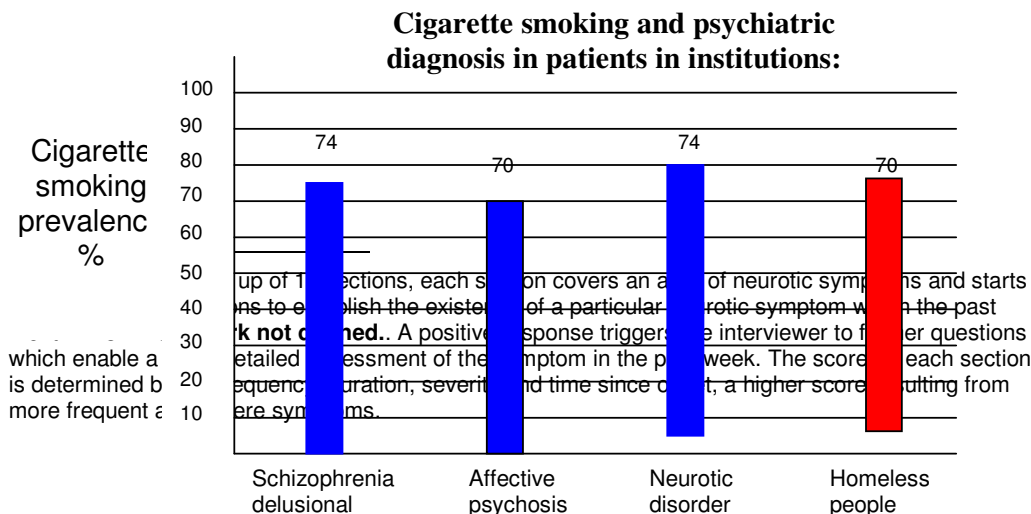
People with severe mental health disorders will be under-represented in national household surveys as many of them will be living in institutions or be homeless. Hence in 1996, in addition to the national household survey, the OPCS also published a national survey of around 1,200 residents in psychiatric institutions (including recognised lodgings, group homes, hostels, residential care homes and hospitals)^{ix[9]} and a national survey of over 1,000 homeless people^{x[10]}.

Among those living in institutions, three categories of disorder were examined:

- ○ schizophrenia, delusional or schizoaffective disorders (around 70% of the sample);
- ○ affective psychoses, i.e. mania and bipolar affective disorder (around 8%);
- ○ and neurotic disorders i.e. generalised anxiety disorder, depressive episode, mixed anxiety and depressive disorder, phobia, obsessive-compulsive disorder and panic (around 8%).

Five per cent had other mental health disorders and for the remaining 9% insufficient information was obtained to enable classification. Table 2 gives the smoking prevalence for these different disorders.

Table 2



As can be seen in the graph, people with mental health disorders who live in institutions have particularly high rates of smoking. Among homeless people smoking prevalence was 70%, the highest rates being observed among residents of nightshelters (84%) and rough sleepers (91%).

1.3 Proportion of all cigarettes smoked by people with mental health problems

In the US it was recently estimated that nearly 45% of all the cigarettes smoked were smoked by individuals with a psychiatric (ranging from psychotic illnesses to anxiety disorders and phobias) or substance abuse disorder in the past month **Error! Bookmark not defined.** These figures may be an overestimate because cigarette consumption figures were based on peak consumption, ie how many cigarettes per day people smoked when they were smoking most (daily cigarette consumption was not assessed). In addition, the definition of psychiatric illness was quite broad such that 28% of the US population was estimated to have had a mental illness in the last month. Nevertheless, the proportion of cigarettes smoked by people with mental health problems is startling. However, over one third of patients with any lifetime history of mental illness, and 30% of those having a mental illness in the last month, reported to have quit smoking. A similar analysis has not yet been carried out in England but it seems likely that it would yield results of a similar magnitude.

A further report in the US has queried whether smoking in pregnancy should be considered an indicator for screening for the additional risk to infant health from a psychiatric disorder^{xii[11]}. Preliminary data from this study indicated an association between smoking in pregnancy and a current psychiatric illness.

1.4 The role of the tobacco industry

Lasser and colleagues **Error! Bookmark not defined.** commented that the tobacco industry has 'identified psychologically vulnerable persons as a part of their tobacco market'. Building on this, Boyd and Lasser^{xiii[12]} suggested that those with mental health problems might find it more difficult to recognise 'the specious claims and implications of tobacco advertising'. They

argued that we should not assume that the tobacco industry does not target those with mental illnesses who are now a large part of their market.

1.5 Nicotine dependence is a psychiatric disorder

Nicotine dependence is a recognised psychiatric illness and has been referred to by John Hughes as ‘the most prevalent, most deadly, most costly, yet most treatable of all psychiatric disorders’^{xiii[13]}. However, it is often overlooked by the mental health professions^{xiv[14]}.

Hughes^{xv[15]} has argued that it would be preferable to distinguish between smoking and nicotine dependence, as not all smokers are nicotine dependent. He has remarked^{xvi[16]} that a recent US study showed that, despite decreases in smoking prevalence among young adults up until 1992, the prevalence of nicotine dependence symptoms increased over time such that the incidence of acquiring nicotine dependence symptoms by age 24 was in fact increasing. The importance of this illustrates the utility of the psychiatric diagnosis of nicotine dependence. Some mental health problems such as depression have been shown to be more associated with nicotine dependence than smoking^{xvii[17]}.

1.6 The relationship between smoking and different mental health disorders

A review of the relationship between smoking and some mental health disorders follows.

1.6.1 Schizophrenia

The OPCS survey of people living in institutions found that 74% of people with schizophrenic disorders were current smokers.

Strength of nicotine dependence is strongly related to cigarette consumption, perceived difficulty in stopping and time to first cigarette^{xviii[18]}. On all of these indicators, smokers with schizophrenic illnesses show signs of high dependence. Just over half (51%) of the sample were heavy smokers (defined as smoking more than 20 cigarettes a day); 55% of men, and 39% of women. This compares with 8% in the general population^{xix[19]}. Eighty-two per cent of the smokers felt that it was difficult not to smoke for a whole day, compared to 57% of smokers in the general population. Seventy-two per cent smoked their first cigarette within 30 minutes, compared with 41% in the general population^{xx[20]}.

Despite this high dependence however, there is still a reasonable degree of motivation to quit. More than half (52%) said they would like to give up smoking, compared with 69% in the general population.

Smoking prevalence in people with schizophrenia living in institutions may inflate smoking rates, as people with schizophrenia living in general households are omitted. One study^{xxi[21]} which did examine all people with

schizophrenia (n=169) in a discrete geographical area (Nithsdale in SW Scotland) found that 58% were smokers. This figure although lower than that given above is still considerably higher than the smoking rate in the general population. Furthermore, over two-thirds of the smokers in the Nithsdale sample were smoking 25 or more cigarettes a day (compared with 51% smoking more than 20 cigarettes a day in the OPCS institutional survey).

Elevated smoking rates among people with schizophrenia have also been observed in other countries **Error! Bookmark not defined.**^{.xxii[22]}.

In addition to higher cigarette consumption, Olincy and colleagues^{xxiii[23]} found significantly higher urinary cotinine levels among schizophrenic smokers than nonschizophrenic smokers with similar smoking histories suggesting that those with schizophrenia consumed higher doses of nicotine from their cigarettes.

Smoking rates may vary depending on the type of schizophrenia the person is suffering from. A Greek study found that smoking rates differed between different subtypes of schizophrenia^{xxiv[24]}.

There may also be gender differences in the smoking patterns of schizophrenics. In the OPCS institutional sample, 62% of women with a schizophrenic disorder were current smokers, compared to 78% of men. One US hospital study found that male schizophrenic patients had the highest frequency of smoking, followed by male nonschizophrenic patients, female schizophrenics and female nonschizophrenic smokers respectively^{xxv[25]}.

Given these data it is not surprising that smoking related fatal diseases are commoner among schizophrenics than among the general population^{xxvi[26]}. This study followed a cohort of 370 schizophrenics living outside hospitals, from 1981 for 12 years. During this time 79 died, 73% from natural causes (which includes smoking induced diseases) and 24% from unnatural causes such as suicides or accidents. Standardised mortality rates (SMRs) were significantly raised for smokers (but not for non-smokers), and for smoking-related diseases. The SMR for lung cancer was twice the expected value.

1.6.2 Bipolar affective disorder

The OPCS survey of people living in institutions found that 70% of people with affective psychosis (including mania and bipolar disorder) were smokers. Again, within this population of smokers, there appears to be high levels of dependence. Nearly half of the population (49%) were heavy smokers, the vast majority of all smokers (82%) felt that it would be difficult not to smoke for a whole day and 61% had their first cigarette less than 30 minutes after waking. However, there was still interest in quitting with again more than half (58%) stating that they would like to give up smoking.

Elevated rates of smoking among those with bipolar disorder have also been observed in other countries **Error! Bookmark not defined.**^{xxvii[27] xxviii[28]}. One study however found little increase in smoking rates among those with bipolar disorder although it had a very small sample size^{xxix[29]}.

A preliminary study of 92 patients with a diagnosis of bipolar affective disorder in Ireland may shed light on these potentially contradictory findings^{xxx[30]}. A relationship was found between smoking and heavy smoking and a history of psychotic symptoms. The group with no history of psychotic symptoms had a smoking prevalence similar to the national smoking prevalence figure. The authors hypothesised that increased smoking is associated with psychosis or severity of psychosis rather than with a specific psychotic illness.

One study has identified an increased risk for psychiatric complications after smoking cessation among smokers with histories of major depression, in particular bipolar disease^{xxxii[31]}.

1.6.3 Depression

The OPCS survey of people living in institutions categorised people with various depressive and anxiety disorders together as neurotic disorders so prevalence data for the various categories are not available separately. Smoking prevalence was high (74%) for people with these neurotic disorders: with women and men having the same smoking prevalence rates. Once again, indicators of dependence were very high: 77% of these found it difficult not to smoke for a whole day and 85% smoked their first cigarette within 30 minutes of waking. Yet nearly half (41%) said that they would like to give up smoking.

Studies examining only people with major depression from other countries have also shown that they are more likely to smoke**Error! Bookmark not defined.**^{xxxiii[32]}. In Great Britain, smoking among people with depressive episodes living at home⁵ was 56% and was higher among women (53%) than among men (46%). There is also some evidence from an Australian study of an association between regular smoking in teenage girls and high levels of depression and anxiety^{xxxiii[33]}.

Studies have also shown that people with major depression have difficulty when they try to stop^{xxxiv[34]}. As reported by George and Vessichio**Error! Bookmark not defined.**, one trial examining the efficacy of clonidine as an aid to smoking cessation in 71 heavy smokers who had failed in previous quit attempts found unexpectedly that 61% had a history of major depression^{xxxv[35]}. History of depression also had a significant negative effect on success at quitting. Another study has found that symptoms of depression assessed at baseline predicted time to first cigarette smoked after attempts at quitting, illustrating that symptoms of depression predict failure to quit^{xxxvi[36]}. More severe withdrawal symptoms have been observed when people with histories of major depression or indeed any anxiety disorder attempted unsuccessfully to stop smoking or to cut down, than among those without such a history^{xxxvii[37]}. However, severity of withdrawal did not account for the relationship between major depression and continued smoking. Smokers with a history of depression have also been shown to be more likely to experience more persistent withdrawal discomfort over a longer period of time^{xxxviii[38]}.

In addition, smokers with a history of depression who stop appear to be at a significantly increased risk of developing a new episode of major depression which remains high for at least six months^{xxxix[39]}. Covey and colleagues**Error!**

Bookmark not defined. described the relationship between smoking and depression as: 'complex, pernicious, and potentially life long'.

Other studies however have shown no effect of depression on rate of quitting. For example, Breslau and colleagues (1998) in a prospective study of over 1000 adults over a period of years found a history of major depression did not affect smokers rate of quitting^{xli[40]}.

Finally, one study whilst finding that the risk of experiencing major depressive episodes following quitting was twice as high among smokers with a history of depression, also found that developing depressive episodes was similar whether patients succeed in quitting or fail^{xlii[41]}. This suggests that it might be the attempt at quitting or fear of failure that might precipitate the depressive episodes.

1.6.4 Psychological distress

The OPCS survey of people living in general households⁵ found a smoking prevalence of 55% among people with panic disorder (52% among women, 59% among men). Higher rates of smoking have also been found in people suffering from panic disorder in other countries^{xliii[42]} although this finding has not always been consistent in men^{xliiii[43]}.

Smoking rates of 53%-60%, and higher cigarette consumption, have been found among people with post-traumatic stress disorder (PTSD)^{xliiv[44],xliiv[45]}. As mentioned above, one study has found withdrawal symptoms more severe in people with anxiety disorders who had unsuccessfully tried to reduce their smoking, than among those without such disorders**Error! Bookmark not defined..**

The OPCS survey of people living in general households⁵ found a smoking prevalence of 47% among those with a generalised anxiety disorder, 42% among those with mixed anxiety and depressive disorders, 48% among those with a phobia, 40% among those with obsessive-compulsive disorder. Among those with any neurotic disorder 44% were current smokers, 43% of women, 47% of men. These figures compare with 29% smokers among those with no neurotic disorder (28% of women, 30% of men).

As described earlier smoking (both current and heavy) was related to a higher numbers of neurotic symptoms on the CIS-R scale, and the number of neurotic disorders in the OPCS Psychiatric Morbidity Survey⁵.

1.6.5 Other disorders

Smoking has also been associated with adult attention deficit disorder^{xliiv[46]}, eating disorders^{xliiv[47]} and substance abuse disorders**Error! Bookmark not defined..**

An inverse relationship has been observed between cigarette smoking and some diseases eg Alzheimer's disease^{xlvi}, Parkinson's disease^{xlviii} and Tourette's syndrome^{xlvi}. George and Vessichio^{xlvi} report that nicotine may have a neuroprotective effect, as it appears to alleviate the neurological impairment involved with these diseases.

Le Houezec^{xlvi} reported that a preliminary study has shown cognitive functioning of people with dementia improved after short term (up to four weeks^{xlix}) nicotine administration and that an improvement has also been demonstrated in symptoms of Tourette's syndrome following nicotine administration. Similarly, one initial case study has illustrated that long-term nicotine administration in the form of nicotine patch improved Parkinson's Disease^l.

In summary, higher smoking prevalence and levels of nicotine dependence are associated with various mental health illnesses. In general, a greater severity of the illness is associated with higher rates of smoking. There are gender differences in smoking rates for some of the illnesses. Psychiatric complications when stopping have also been reported with depressive and anxiety disorders.

2 The impact of smoking on people with mental health problems

2.1 People with mental health problems can ill afford to smoke

People with mental health problems spend a significant proportion of their income on smoking. In one case study in the US a schizophrenic smoker was estimated to spend just over one third of weekly income on cigarettes^{li}.

McCreadie and Kelly^{li} estimated that there were at least 200,000 people with schizophrenia in the UK and based on estimates of 60% smoking an average of 26 cigarettes per day, estimated that they contributed £139m each year to the Treasury. They commented that the costs of schizophrenia have been estimated in the UK to be between £397m and £714m each year indicating that people with schizophrenia were, through their smoking, contributing substantially to the cost of their care. They concluded that,

'This double blow of smoking and unemployment hits the patients very hard, financially. The state loses less; what it gives to this vulnerable group in our community with one hand, it takes back with the other'.

McDonald's paper^{lii} substantiates these figures and comments that money spent on cigarettes 'is not being spent on clothing, leisure pursuits and personal possessions, which could help to increase the quality of life of these patients'.

2.2 High mortality and morbidity associated with smoking

Patients with mental health problems who smoke will get the same smoking related diseases as those who do not have such problems.

Many people with mental health problems die from smoking related diseases such as cardiovascular and respiratory diseases, the rates of which can be twice as high among schizophrenics as in age-matched control populations **Error! Bookmark not defined..**

There may also be interactions between the mental health illness and smoking. For example, Jung & Irwin found that depressed smokers had lower natural killer cell activity than control smokers and depressed and control non-smokers^{liii[53]}. Dysfunctional natural killer cell activity may contribute to primary tumour development and metastatic cancer risk.

Dalack and colleagues comment that recent data indicate that smoking is a risk factor for dyskinesia (defined as unusual body movements such as tremor) independent of medication exposure³. Tardive dyskinesia (tardive means delayed as the movement may become apparent only after long term treatment) has been linked to increased morbidity and mortality in those with chronic schizophrenia **Error! Bookmark not defined..**

The burden of smoking related illnesses on top of mental health problems may be huge. Boyd and Lasser have commented 'those with mental illness are often the least capable of coping with the devastating medical illnesses caused by smoking **Error! Bookmark not defined..**

Finally, smoking is also a cause of many fires. A small-scale study by Strathclyde Fire Brigade found that 12% of fires involving care in the community patients over a two year period were due to careless dispersal of smoke materials^{liv[54]}.

In summary, the effects of smoking among people with mental health problems will be of a similar or possibly greater magnitude to those without such problems. The cost of smoking, both financially and to physical health, is very high.

3 Why do people with mental health problems smoke more?

Several hypotheses have been proposed to account for higher smoking among those with mental health problems. Research is ongoing in this area and there may well be more than one explanation or there may be different explanations for the different types of mental health problem. Some of these hypotheses are discussed in more detail below.

3.1 Association of cigarette smoking and mental health problems with deprivation

Cigarette smoking has become increasingly concentrated in the most deprived groups. A clear inverse relationship exists between smoking prevalence and social class⁶. Table 3 shows smoking prevalence by a

deprivation score (taking into account occupation, educational level, housing tenure, car ownership, unemployment, and living in crowded accommodation) developed by Jarvis^[55].

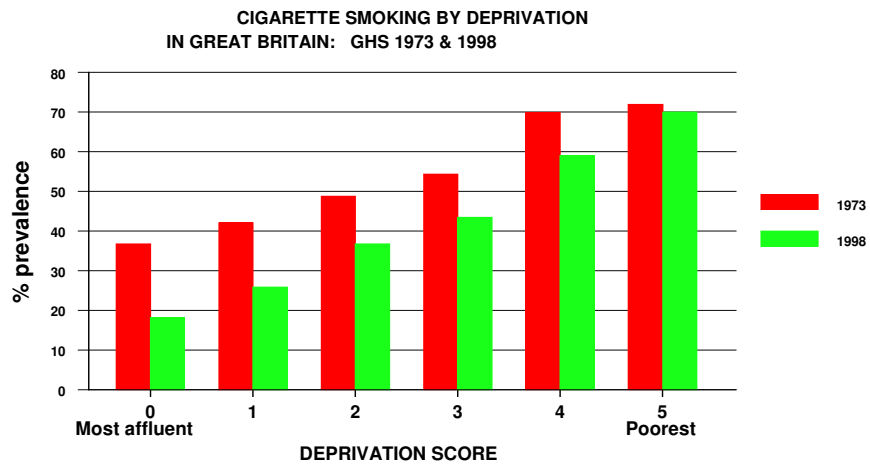
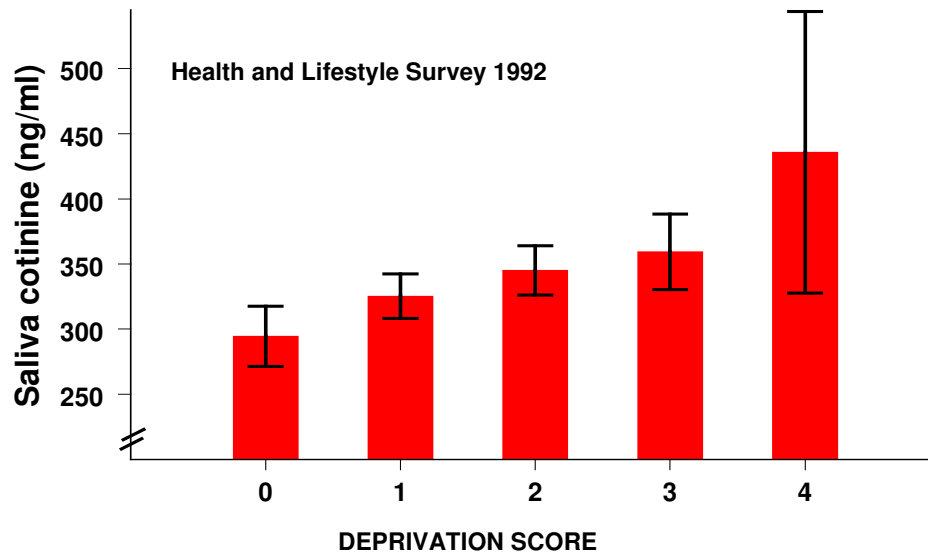


Table 3

Smokers in more highly deprived groups have also been shown to have higher nicotine dependence levels **Error! Bookmark not defined.** as shown in Table 4.

Table 4

**Socio-economic status and dependence in smokers:
saliva cotinine levels in HALS**



Similarly a relationship has been demonstrated between having a psychiatric disorder and deprivation. One study has demonstrated that both social class and area level deprivation had independent associations with mental health problems^{lvj[56]} and the authors suggested that both personal disadvantage and the deprivation of the surrounding area were having an effect.

So could the association between smoking and mental health problems be explained by deprivation factors? Perhaps people suffering from mental health illnesses smoke in a similar way to other deprived groups as a coping mechanism to deal with the stresses of their everyday lives.

One study among a cohort of 16 year old New Zealanders^{lvij[57]} examined depression and nicotine dependence and prospectively measured risk factors including sociodemographics, family history of criminality, life events etc. Much of the co-morbidity between depression and nicotine dependence could be explained by common or correlated risk factors associated with either disease. Contrary to an early study of twins that suggested a strong genetic association between smoking and major depression^{lviii[58]}, the New Zealand study suggested a substantial input of social and childhood factors which were antecedent to either nicotine dependence or depression. However, even after adjustment for these other risk factors there was a significant association between depressive disorders and nicotine dependence.

This latter finding has been demonstrated elsewhere: cigarette smoking is associated with mental health problems even after controlling for sociodemographic factors^{lix[59], lx[60]} suggesting that factors other than deprivation are involved.

3.2 The relationship between smoking and the environment

The data shown in Tables 1 and 2 demonstrate that the rates of smoking observed among people living in institutions were considerably higher than for those with similar illnesses living at home. The highest rates were observed for those homeless who were sleeping rough. These data suggest that the environment plays a role in smoking prevalence although it is possible that those with more severe forms of mental health diseases are those that are institutionalised or are homeless.

One study carried out in a US hospital **Error! Bookmark not defined.** suggested that it was unlikely that boredom or institutionalisation contributed to smoking. In this hospital, schizophrenic inpatients had higher smoking rates than nonschizophrenic inpatients and in addition, a long duration of hospitalisation was associated with being a nonsmoker among nonschizophrenic patients.

High rates of smoking in psychiatric institutions and hospitals may also reflect lax smoking policies. Anecdotal evidence suggests that cigarettes have been perceived as providing an area for negotiation between staff and patients and cigarette privileges can be offered as rewards for good behaviour **Error! Bookmark not defined.**

An Australian qualitative study of 24 patients living in the community with various psychotic disorders supported this. The smokers in this study perceived their smoking as a core need^{lxii[61]}. One consistent theme that emerged in the research was that smoking was a means of control in an otherwise uncontrollable environment, although some patients reported that this could be used against them as cigarettes were sometimes used to reward or punish patients. Another theme was that smoking was reinforced by people and places in their environment:

'The impression gained from all participants was that, if people went into hospital as non-smokers, in all probability they would leave as smokers, literally because of peer pressure to smoke, the lack of other activities to occupy them while there, and reinforcement by the institution.'

Some mental health professionals will also be smokers themselves and may indeed smoke with their patients^{lxii[62]}. Mental health professionals rarely discuss smoking with their patients **Error! Bookmark not defined.** **Error! Bookmark not defined.** **Error! Bookmark not defined.** This may be because they lack the skills and knowledge, or because they do not think that their patients can quit, or because they believe that smoking is one of the few pleasures that people with severe mental health problems can have^{lxiii[63]}.

3.3 Does smoking causes mental illness?

Prenatal exposure to nicotine or cigarette smoke may cause mental health problems later in life. There is evidence that prenatal nicotine exposure disrupts neuronal development hence making such a theory biologically plausible^{lxiv[64] lxv[65]}. Some studies have found an association between smoking during pregnancy and increased risk of adult deficit hyperactivity disorder^{lxvi[66]}.

As smoking precedes many mental health illnesses, smoking by the individual might contribute to or cause the illness. However, this would not preclude the possibilities that there might be common aetiologies (such as social, familial and individual risk factors) causing both smoking and the illness, or that smoking is used to ameliorate symptoms of the illness before it becomes overt or diagnosed.

Smoking has been found to predate illness in many different diseases, for example, bipolar illness^{Error! Bookmark not defined.} and schizophrenia^{Error! Bookmark not defined.}. Studies examining whether smoking precedes depressive and anxiety illnesses have thus far been contradictory.

Prospective data suggest that the association between nicotine dependence and major depression probably reflects common factors that predispose to both disorders^{[xviii][67], Error! Bookmark not defined.} For example, Breslau and colleagues' longitudinal five-year study^{Error! Bookmark not defined.} reported that a history of major depression at baseline increased significantly the risk for progression to daily smoking (although it did not significantly decrease the rate of quitting). History of daily smoking at baseline significantly increased the risk for major depression. The authors suggested that shared aetiologies might be important.

However, Wu and colleagues^{[xviii][68]} in a US study of nearly 2,000 youths assessed from 1989 to 1994, found that tobacco smoking predicted a slight increase in the risk of a subsequent onset of depressed mood, but depressed mood was not associated with a later risk of initiating cigarette smoking. This supported a possible causal link from tobacco smoking to later depressed mood in childhood and early adolescence but not vice versa.

Similarly, Johnson and colleagues in a study of a sample of nearly 700 youths from New York interviewed at ages 16 and 22 found that heavy cigarette smoking during adolescence was associated with an increase in various anxiety disorders at age 22 after controlling for various confounding factors^{[xix][69]}. However, anxiety disorders during adolescence were not significantly associated with chronic cigarette smoking during early adulthood. In this study, an association was found for agoraphobia, generalised anxiety disorder and panic disorder but not for obsessive-compulsive or social anxiety disorders. The authors suggested that cigarette smoking might increase risk of certain anxiety disorders during late adolescence and early adulthood. They hypothesised that the links with some anxiety disorders but not others may be linked to impaired respiration and the potential anxiogenic (i.e. increases anxiety) effects of sustained nicotine intake.

Breslau and colleagues also found that daily smoking was associated with an increased risk for the first occurrence of a panic attack^{[xx][70]}. These preliminary data also suggested that the link between smoking and lung disease could account for the relationship between smoking and panic attacks. There was also some evidence of a reduced risk of panic disorder after smoking cessation.

In common with these findings, West and colleagues report that anxiety decreased following the first week of smoking abstinence^{lxxi[71]}. The authors suggested that their findings supported the view that smoking is chronically anxiogenic rather than being anxiolytic or reducing anxiety and that is consistent with the finding that anxiety is increased among smokers in general population studies.

In summary there is some evidence that smoking may affect the body to increase vulnerability to some mental health disorders. There is some indication from these studies that smoking may cause an increase in anxiety.

3.4 Does the illness cause smoking? Nicotine use as self-medication

Even if smoking did not cause a mental illness, smoking might be maintained if it had a positive effect on symptoms of the illness. A self-medication view is consistent with several hypotheses about the effects of nicotine: that it helps to alleviate some of the positive and negative symptoms of mental health problems; that it improves cognition; that it may also help to alleviate the side effects associated with anti-psychotic medications. In the first hypothesis where nicotine alleviates some of the symptoms, then abstinence from smoking and nicotine would result in increased symptoms on quitting^{lxxii[72]}. This is also addressed in later sections.

These hypotheses are explored briefly below following a description of the biological processes related to nicotine intake.

3.4.1 Relationship between nicotine and neurotransmitters

Nicotine interacts with nicotinic receptors on nerves throughout the body and brain. In the brain, nicotine acts on nicotinic acetylcholine receptors (nAChR) causing transmitter release and metabolism. Chronic nicotine use causes inactivation of the receptors which might cause a subsequent increase in their number **Error! Bookmark not defined.** The brains of smokers have an increased number of high affinity nicotinic receptors^{lxxiii[73]}.

People with schizophrenia however have a lower number of nicotinic receptors. Leonard hypothesised that this might be due to an abnormality of the genes relating to neuronal nicotinic receptors in schizophrenia^{lxxiv[74]}.

Nicotine use affects the release of different neurotransmitters, including acetylcholine, dopamine, norepinephrine, serotonin (5-HT), glutamate, and aminobutyric acid (GABA) **Error! Bookmark not defined.** These neurotransmitters have various effects and may play a role in some mental health disorders.

3.4.2 Nicotine and depression

Reward pathways in the brain use dopamine (and possibly also norepinephrine and 5-HT) as the neurotransmitter and it has therefore been hypothesised that systems involving these neurotransmitters may be involved in depression in humans. Indeed, antidepressant drugs commonly increase dopamine, norepinephrine or 5-HT. Similarly, nicotine stimulates the release of these neurotransmitters, thereby counteracting depression **Error! Bookmark not defined.** Indeed, some small-scale pilot studies have shown that nicotine improves depression in never-smokers who are depressed^{lxxv[75]}. These findings could explain why

smoking cessation is associated with major depression in depressed smokers**Error! Bookmark not defined.**

Klimek and colleagues^{[xxvi][76]} found that long-term smokers had neurochemical abnormalities in a part of their brains, the locus coeruleus, similar to the brains of animals treated with antidepressant drugs and opposite to those observed in people with major depression. The direction of causality here remains unclear however. Smoking could cause the neurochemical abnormalities or people with these abnormalities may be more susceptible to becoming smokers.

Chronic smoking also appears to inhibit (non-nicotine) monoamine oxidase B (MAO-B) activity in the brain^{[xxvii][77]}. MAO-B is involved in the breakdown of dopamine and therefore if MAO-B is inhibited, dopamine levels would increase which would be rewarding. MAO inhibitors are effective antidepressants and together these findings also suggest that smoking (but not nicotine in this case) has some antidepressive effects**Error! Bookmark not defined.**

Finally, a study by Epping-Jordan and colleagues^{[xxviii][78]} found that when nicotine was administered to rats who had been chronically exposed to nicotine, the rats sensitivity to rewarding electrical impulses remained stable. During withdrawal however, the intensity of the electrical impulse had to be increased by 40% to maintain the rewarding response. This decreased sensitivity may correspond to the depression/anhedonia experienced by smokers during withdrawal.

3.4.3 Nicotine and schizophrenia

Dysfunction of dopamine and other neurotransmitters is associated with schizophrenia³. Positive symptoms (such as voices, delusion, confusion etc) of schizophrenia are thought due to excess dopamine in substantia nigra, whereas negative symptoms (such as withdrawal, inertia, lack of motivation) are due to concurring deficits of dopamine in the cortex**Error! Bookmark not defined.** These aspects are referred to further below.

People with schizophrenia who smoke present more positive psychiatric symptoms of schizophrenia than nonsmokers^{[xxix][79], [xxx][80]}. A recent study involved 101 patients with schizophrenia in which antipsychotic medication was discontinued. At baseline smokers had more positive symptoms and were apparently more functionally impaired than nonsmokers. This difference was however no longer evident after a 30-day medication discontinuation period^{[xxxi][81]}. This suggests an interaction between the medication, smoking and positive symptoms of schizophrenia. Interactions with medication are discussed further below.

Findings for negative symptoms have been contradictory with increased**Error! Bookmark not defined.**, similar**Error! Bookmark not defined.** or decreased**Error! Bookmark not defined.** negative symptoms being observed in smokers compared with nonsmokers.

One study found a relationship between heavy smoking and positive and negative symptoms. Heavy smokers (here defined as >25 cigarettes per day)

had the most positive symptoms and a significantly lower number of negative symptoms **Error! Bookmark not defined.**

Smoking in schizophrenia could therefore be related to ameliorating positive symptoms. In the small-scale qualitative study by Lawn and colleagues, schizophrenic smokers (more so than other diagnostic groups) reported that their smoking was self-medicating and they reported alleviating positive symptoms **Error! Bookmark not defined.** Smoking could also be serving to reduce the number of negative symptoms, although it may simply be associated with greater severity of the disease. Although the evidence and the direction of causality is unclear, Dalack and colleagues **Error! Bookmark not defined.** have concluded that smoking in schizophrenia may represent attempts to self-medicate symptoms of the illness, in particular negative symptoms. Negative symptoms associated with schizophrenia may be related to a lowered activity of the systems involving dopamine. Smoking may reverse this effect by stimulating the release of dopamine **Error! Bookmark not defined.** An example of this is given below.

3.4.3.1 Links with negative symptoms – P50 – schizophrenia and other mental health problems

Patients with schizophrenia are unable to ignore distracting stimuli, for example, abnormal auditory filtering is found in patients with schizophrenia. The abnormal filtering is often referred to as an auditory sensory gating deficit. To measure this abnormal filtering, paired auditory stimuli are delivered half a second apart. Subjects with no schizophrenia inhibit the response to the second stimulus. Schizophrenics show similar responses to both stimuli. This is referred to as diminished suppression of auditory-evoked P50 response.

This deficit may be related to nicotine receptors in the brain. Adler and colleagues (as reported by Dalack **Error! Bookmark not defined.**) have shown that nicotine and cigarettes can transiently reverse these deficits. George and Vessachio **Error! Bookmark not defined.** point out that atypical medications may also normalise P50 deficits in schizophrenia.

Genetic evidence links nicotinic function with the diminished P50 response as P50 is related to alpha nicotinic receptors in the brains of families affected with schizophrenia. Smoking also improved smooth pursuit eye movement abnormalities in schizophrenic patients and it has been suggested that dysfunctional nicotine receptors may be involved ^{[xxxii][82]}.

3.4.4 Nicotine and adult attention deficit hyperactivity disorder

Levin and colleagues in small-scale studies with adults with attention deficit hyperactivity disorder have found that acute administration of nicotine improved the symptoms of this disorder ^{[xxxiii][83], [xxxiv][84]}. The authors postulate that this may be due to nicotine receptors and neurotransmitters. This finding may be largely due to nicotine's affect on improving attention discussed in the next section below.

In summary, there is some evidence that nicotine impacts on the symptoms of various mental illnesses. The mechanisms involved appear to involve neurotransmitters and nicotine receptors, but the exact nature of these relationships is still being explored.

3.4.5 Nicotine and cognition

If nicotine improved general cognitive functioning, this could explain why many people with mental health problems smoke. A recent review^{lxxxv[85]} of the cognitive effects of nicotine however, concluded that nicotine does improve aspects of cognitive functioning in smokers forced to abstain. Benefits of nicotine for nonsmokers or smokers who were not abstaining from cigarettes were inconclusive. This suggests that many benefits of smoking may be simply relief of incipient adverse withdrawal effects that the smokers have wrongly labelled. Nevertheless, there may be positive benefits, for example, there is some evidence of improved focusing of attention in smokers over non-smokers^{lxxxvi[86]}.

3.4.6 Interactions between nicotine and medications for schizophrenia

3.4.6.1 Antipsychotic medications for schizophrenia

People with schizophrenia and some other mental health disorders are often treated with antipsychotic (i.e. reduces psychotic symptoms) also known as neuroleptic (i.e. acts on the nervous system) medication. Generally, antipsychotic drugs block dopamine receptors in the brain and hence block the passage of nerve signals by dopamine. In so doing they reduce the symptoms of schizophrenia^{lxxxvii[87]}. As the serotonin (5-HT) system interacts with the dopaminergic system, 5-HT may also be involved.

Antipsychotic medications are divided into typical and atypical types. Typical medications such as chlorpromazine were introduced into the market from the 1950s onwards. Atypical medications were developed during the 1990s and work on a wider range of symptoms and tend to be associated with fewer side effects.

Antipsychotic medication more effectively controls positive symptoms of schizophrenia than negative symptoms. Newer drugs appear also to more effectively act on negative symptoms. The medication also causes side effects. These include unusual body movements, such as dystonia (prolonged muscle spasms), akathisia (restlessness and agitation), and Parkinsonian movement disorders (including stiffness, shakiness, tardive dyskinesia, feeling drowsy).

3.4.6.2 Smoking and neuroleptics

Cigarette smokers are generally prescribed higher neuroleptic doses, which might be a due to smoking increasing the metabolism of the neuroleptic medication **Error! Bookmark not defined.** although not all studies are consistent with this **Error! Bookmark not defined.** If quicker metabolism of antipsychotic drugs is a factor, when people stop smoking they may experience an increase in drug levels in their blood and this may require a

reduction in the amount of antipsychotic drug they should be prescribed **Error!**
Bookmark not defined..

The choice of neuroleptic medication influences smoking behaviour. For example, the atypical treatment clozapine is associated with a decrease in smoking and haloperidol is associated with an increase in smoking and nicotine blood levels^{[xxxviii][88]}.

McEvoy and colleagues studied 70 patients with schizophrenia who were receiving conventional antipsychotics and then switched to clozapine^{[xxxix][89]}. Smokers showed significantly greater therapeutic response to clozapine than nonsmokers and smoked less when treated with clozapine than with conventional drugs. The authors concluded that certain patients with schizophrenia responded favourably to either nicotine or clozapine.

A more recent study on schizophrenic patients in British Columbia found that patients treated with clozapine had significantly lower expired air carbon monoxide values (an indicator of smoke inhalation) than patients treated with depot (injected) neuroleptics and patients receiving clozapine reported smoking less than patients treated with depot neuroleptics^{[xc][90]}. Decreased smoking rates do not appear to be associated with other atypical antipsychotic medications^{[xci][91]}.

3.4.6.3 Smoking may reduce the side effects of medication

As mentioned above antipsychotic drugs block dopamine receptors. In doing this, they will reduce pleasure. Smoking may help to counteract this blockade of dopamine receptors.

Regarding the typical antipsychotic medications, Levin and colleagues, for example, have found that nicotine reversed some of the adverse side effects of haloperidol treatment and improved cognitive performance in schizophrenia^{[xcii][92]}. One small single-blind study with 16 patients has also found that nicotine patches significantly reduced akathisia associated with antipsychotic medication^{[xciii][93]}.

McEvoy and colleagues hypothesised that if patients with schizophrenia smoked primarily to reverse the effects of their antipsychotic medications, then chronic schizophrenics should smoke at substantially higher prevalence rates than first-episode patients^{[xciv][94]}. Their study however found no difference in smoking rates between chronic and first-episode schizophrenics, suggesting that it is the schizophrenia, not its treatment with antipsychotic drugs that was determining smoking prevalence.

In summary, there is a relationship between smoking and neuroleptic doses and the type of neuroleptic medication being administered. Smoking may reduce the side effects of some forms of medication. Other factors also appear to play a role.

3.5 Difficulties with cessation and withdrawal effects

It has also been hypothesised that higher smoking rates in psychotic patients may be due to their experiencing greater difficulties with cessation and withdrawal effects when they try to stop. As stated above, these difficulties may vary depending on the mental illness and have been reported for depressive and anxiety symptoms **Error! Bookmark not defined.** Exacerbation of symptoms has not yet been detected with schizophrenics on abstinence^{xcv[95]}. However, although the data are limited, studies have suggested that cessation rates for schizophrenics are considerably lower than among smokers with other psychiatric diagnoses^{xcvi[96]}.

In summary, Section 3 has explored possible reasons for the links between smoking and mental health disorders. The evidence would support a multiplicity of factors, varying by the type of mental illness and probably the severity of the illness.

4 Reducing smoking in people with mental health problems

4.1 Do people with mental health problems want to quit smoking?

Around a half of people with mental health problems in the British surveys mentioned in section 1, expressed a desire to quit. Canadian and US studies have shown that people with schizophrenia recognise that smoking is a problem, are interested in attending smoking cessation groups and appear to be appropriately motivated^{xcvii[97],xcviii[98]}.

There are little data on effectiveness of different treatments for smokers with mental health problems from the UK. Most of the work in this field originates from the US and has been carried out with people with schizophrenia. This work is discussed below following a brief outline of what is known about effective smoking cessation treatments for all smokers.

4.2 Treatment for smokers with mental health problems

4.2.1 Effective smoking cessation treatments

Evidence based and professionally endorsed national smoking cessation guidelines in England^{xcix[99]} emphasised an integrated smoking cessation strategy involving brief opportunistic advice to quit from health professionals, with a prescription for effective pharmacological treatments, backed up by intensive specialist cessation support for those smokers who need it. Brief opportunistic advice has a low efficacy but because of the huge number of people health professionals see in the course of any one year, it can have a very significant public health impact. Brief advice mainly triggers attempts to quit (and may do so in 40% of smokers given such advice) but many smokers will need further support. Intensive support has a much higher efficacy but will reach fewer smokers.

Two pharmacological treatments have proven efficacy for smoking cessation. Over one hundred trials involving nicotine replacement therapies (NRT) have been carried out and these have demonstrated that NRT is effective in smoking cessation, approximately doubling the success rate of any treatment. NRT has an excellent safety record and given that smokers are already inhaling nicotine there are no significant new risks involved when smokers use NRT. There are currently six products available: gum, patch, nasal spray, inhaler, sublingual tablet, and lozenges. There is little evidence of any difference in these products, and little scientific support for matching treatments to smokers except the 4mg gum is better than the 2mg gum for heavy smokers and the standard strength patch is more effective than the low dose patch for moderate to heavy smokers. There is also some evidence that combinations of different types of NRT may be better than one alone^{ci[100]}.

Several trials have also demonstrated the effectiveness of bupropion (or amfebutamone, trade name Zyban). All of these trials involved combining treatment with bupropion with behavioural support. Again, bupropion approximately doubles the success rate. Bupropion has a more complex side-effect profile, with more drug interactions and contraindications, than NRT, so care is needed with prescribing.

All of these smoking cessation treatments have been demonstrated to be extremely cost-effective costing less than £1000 per life year saved^{ci[101]}, considerably below the informal NICE threshold for cost effective NHS treatments^{ci[102]}.

Following publication of the Government's White Paper, Smoking Kills^{ci[103]}, a network of NHS smoking cessation services have been set up across England. These services offer specialist intensive support for smokers as well as encouraging, training and supporting primary care health professionals to give brief opportunistic advice on smoking.

It is important for these services to be accessible to smokers with mental health problems and anecdotally there are reports of this happening in the UK. However, there is no guidance for those running the services as to how best to support smokers with mental health problems. It is important to be able to respond appropriately to requests for support and also to be proactive in reaching out to smokers with mental health problems in the community. There is some evidence from the qualitative Australian study that smokers with mental health problems feel excluded from mainstream smoking cessation programmes.**Error! Bookmark not defined..**

4.2.2 Brief opportunistic advice to quit for smokers with mental health problems

The US guidelines published by the American Psychiatric Association^{civ[104]} recommended the routine treatment of smoking for patients with psychiatric diagnoses. Data in the US indicate that physicians were identifying smoking status of people with such diagnoses but were not then providing counselling or pharmacotherapies to encourage and support smokers in stopping^{cv[105]}. One US commentator has suggested that psychiatric nurses are uniquely

placed to intervene with smokers and should also initiate and support wider tobacco control policies^{cvi[106]}.

A recent British editorial reported that although the national service framework for mental health states that people with a severe mental illness should have physical assessments, there was little evidence that this was happening^{cviij[107]}. They went on to comment that this is in spite of frequent contact with primary care services. We highlighted earlier reasons why mental health professionals do not intervene with smokers. However, it is clear from the evidence above that smokers with mental health problems are motivated to quit.

There is some suggestion that mental health problems may undermine attempts at quitting rather than ability to stop^{cviij[108]}. It is therefore critical that health professionals who come into contact with smokers with mental health problems routinely ask about smoking and advise their patients to stop. Many smokers will however need further support and this is outlined below.

Finally, it is important not to offer treatment when the mental health illness is florid or very active^{cix[109]}. A note can be made in the patient's notes however to intervene when the patient's condition stabilises. Patients should probably be followed up more closely, in order to monitor antipsychotic medication and as a precaution in case symptoms of the illness become exacerbated.

4.2.3 Cognitive and behavioural therapy for smokers with mental health problems

One study^{cx[110]} with cigarette smokers who had experienced major depressive disorder in the past examined the effects of a standard cognitive-behavioural smoking cessation treatment programme and this standard programme plus cognitive-behavioural treatment for depression. No pharmacological treatments were involved. Abstinence rates at one year were high (25 - 33%) and there was no difference between the treatments. However, secondary analyses revealed that smokers with recurrent major depression and heavy smokers were significantly more likely to be abstinent if they received the two treatment programmes rather than the standard programme only. The authors suggested that the additional programme for depression might provide benefits for some smokers with major depression.

4.2.4 Group therapy and nicotine replacement therapy (NRT)

Hall and colleagues^{cxii[111]} reported a preliminary study comparing a standard treatment programme using groups support with a depression prevention programme. Both programmes involved the use of nicotine gum. Abstinence rates were higher among smokers with a history of major depression in the depression prevention programme. A subsequent study however failed to replicate this finding with the two interventions producing similar abstinence rates^{cxii[112]}.

An uncontrolled trial to measure the efficacy of a smoking cessation group programme involving group therapy and nicotine patches, which had been modified for individuals with schizophrenia, found that a significant proportion stopped smoking^{cxiii[113]}. Fifty subjects completed a programme of seven weekly sessions (out of 65 who attended initial assessments) and 21 (42%) had quit smoking at the end. All but one of the subjects who had quit used the nicotine patch. There was no change in the positive or negative symptoms of schizophrenia.

A randomised controlled trial of 45 smokers diagnosed with schizophrenia or schizoaffective disorder assigned to a standard group therapy programme or a specialised group therapy programme for smokers with schizophrenia was carried out in the US^{cxiv[114]}. All subjects participated in 10 weekly group therapy sessions and treatment with the nicotine patch and continued to receive their pre-study atypical or typical antipsychotic medications. Smoking abstinence rates did not differ between the two types of group therapy programmes although continuous smoking abstinence rates in the last four weeks of the trial were higher with the specialised programme. However, atypical antipsychotic medications in combination with the nicotine patch significantly enhanced the rate of smoking cessation (56% vs. 22% at the end of the programme) compared with those receiving typical antipsychotic medications. In the atypical group, carbon monoxide levels decreased significantly. Risperidone and olanzapine were associated with the highest quit rates although sample sizes here are very small. Again, there were no changes in psychiatric symptoms during the trial.

This study built on the previous studies described earlier showing that the atypical medication clozapine may reduce cigarette consumption in schizophrenics and that the typical medication haloperidol could increase cigarette smoking. The authors suggested that medications targeting specific clinical symptoms and neurochemical aspects of schizophrenic illness could improve drug dependence.

A recent study examining retrospective utilisation of nicotine replacement therapies in a psychiatric unit in the US found that more patients preferred to use the nicotine inhaler over the nicotine transdermal patch^{cxv[115]}.

4.2.5 Bupropion

The most relevant contraindications for bupropion in this context include: in patients with a history of bipolar disease, in patients with a current seizure disorder or any history of seizures, in patients with a current or previous diagnosis of bulimia or anorexia nervosa. There are also several potential drug interactions between bupropion and anti-depressants and anti-psychotics which also need to be taken into account before prescribing bupropion.

Bupropion will therefore be unsuitable for many people taking concomitant medication. It is worth noting however, that bupropion is licensed as an antidepressant in the US (but not in the UK) and hence it has been used extensively with patients with depression in the US. The efficacy of bupropion however appears to be independent of a past history of depression and is not due to a reduction in depression following cessation^{cxvi[116]}. Interestingly, SSRIs have also been shown to be ineffective in helping smokers stop^{cxvii[117]}.

Studies in the US have also been carried out with bupropion and smokers with other mental health problems. A case report and preliminary placebo-controlled trials have supported the efficacy of bupropion enhancing smoking cessation rates in schizophrenic patients^{cxviii[118], cxix[119]}.

A further study included eight patients with schizophrenia who participated in a 14-week open-label trial of bupropion and supportive group therapy^{cxix[120]}. The goal was stopping smoking but patients were encouraged to continue to participate even if they were not successful in complete cessation. None of the patients stopped smoking during the study (one subsequently stopped smoking completely) but the treatment package helped patients decrease their cigarette consumption as measured by a decrease in expired air CO levels. No worsening of positive symptoms or cognition or anxiety was observed. There was no change in suppression of the P50 event-related potential, which might have been expected if nicotine intake decreased. The authors commented that this latter finding was hard to interpret although it is not known how much nicotine is needed to enact the relevant change. There was some evidence of an improvement in negative symptoms during the treatment period.

Preliminary work in 15 veteran outpatients with chronic post-traumatic stress disorder who wanted to stop smoking has shown that bupropion is generally well tolerated in combination with a stable psychotropic medication regimen, and may be effective for smoking cessation in those with this disorder^{cxix[121]}.

4.2.6 Offer smokers with mental health problems the best

Professor John Hughes, one of the leading experts in this field, advises that if health professionals manage to encourage their smoking patients to make an attempt to quit, they should be offered the best treatment, as it may be some years before they try to quit again. Given that these patients tend to be heavier smokers, for example, stronger doses of NRT may therefore be preferable and should be combined with specialist cessation support.

In addition, there is increasing evidence of the effectiveness of using more than one NRT for treatment**Error! Bookmark not defined..** One study also suggested that combining NRT and bupropion might enhance success^{cxix[122]}. Given the greater nicotine dependence in this population, combination therapy may increase the chances of successful stopping.

4.2.7 Smoking reduction and nicotine replacement therapy

Given the high rates of smoking and the low rates of stopping in this population a harm reduction approach might be appropriate in parallel with encouraging cessation. There is good evidence that smoking-related morbidity and mortality are related to the dose or amount of smoking, so that if some cigarettes could be replaced with less harmful forms of nicotine delivery, there might be an overall benefit to the smoker's health**Error! Bookmark not defined..** The potential downside to this approach is that it might discourage quit attempts. However, there is some evidence to suggest that by being able to control their smoking, using a less harmful form of nicotine delivery might actually encourage the smoker to quit**Error! Bookmark not defined..** It can be argued that smokers who are unable or unwilling to quit should at least be given the choice of which form of nicotine delivery to use.

Studies have therefore examined the impact of NRT on *ad libitum* smoking in psychiatric patients and preliminary evidence suggests that this may be a useful approach.

One small-scale study of 13 psychiatric patients found they smoked significantly fewer cigarettes whilst receiving the nicotine patch than when they had the placebo patch^{cxxiii[123]}.

A further exploratory study found that wearing a nicotine patch was safe and well tolerated over a 32 hour period among a group of ten heavy smokers with schizophrenia who were not actively trying to cut down or quit and who therefore smoked *ad libitum* during the study^{cxxiv[124]}. Nicotine levels increased during active patch treatment without evidence of nicotine toxicity. Psychiatric symptoms, carbon monoxide and cigarettes per day did not change, although eight subjects had a decrease in expired air CO on the active patch. The heaviest smokers (n=5) had a statistically significant decrease in expired air CO of at least 20% suggesting a reduction in smoke inhalation. Dyskinesias showed a small, but significant, increase during smoking when wearing the active patch.

4.3 Smokefree policies

Smokefree policies reduce the harmful effects of secondhand tobacco smoke, encourage smokers to quit and help to make non-smoking the norm. Many psychiatric patients who are ex-smokers may relapse when hospitalised and vulnerable to constant smoking stimuli **Error! Bookmark not defined..**

Research from Canada and the United States shows that a smokefree policy can be implemented in psychiatric institutions with careful planning and consistency by all staff. One study in the US concluded that a smokefree policy produced significantly fewer adverse effects than the staff anticipated^{cxxv[125]}. Staff attitudes also changed to favour a smokefree environment.

Vancouver General Hospital in Canada^{cxxvi[126]} implemented a complete indoor smokefree policy in its psychiatric assessment and inpatient psychiatry units. It is reported that workplace conditions notably improved and some long-standing beliefs about psychiatric patients were disproved.

The major concern was whether psychiatric patients could be prevented from smoking without major behavioural consequences: 'There seemed to be a long standing belief in the hospital community that psychiatric patients could not tolerate a non-smoking policy: many staff anticipated a resultant increase in violence and elopement and widespread surreptitious smoking.'

Nurses formed a committee and facilitated the implementation of the ban. Materials on smoking cessation were gathered and doctors were introduced to prescribing nicotine gum and clonidine hydrochloride to reduce withdrawal symptoms. The impending change was advertised to patients, other

departments and other hospitals. Numerous signs were put up – initially designed and produced by the patients themselves. The hospital found that open discussion was an effective way of addressing the ethical differences.

‘The approach of policy implementation seemed to produced more anxiety in the staff than in the patients: policy implementation itself was considerably less dramatic. Arguments over cigarettes continue to occur, but staff almost universally agree that problems overall have been fewer than before the policy’.

A psychiatric hospital in Tuebingen, Germany is currently introducing a complete smokefree policy in a staged manner^{cxxvii[127]}. Researchers carried out a survey initially among employees and found that a smoke-free environment was thought to be a reasonable and achievable goal in these settings.

4.3.1 Smoking policies in psychiatric institutions in the UK

Following a recent assessment of tobacco control policies in the NHS^{cxxviii[128]}, psychiatric units and long-stay units were identified as posing particular challenges to successful policies limiting smoking. Subsequently, the Health Development Agency published the results of a consultation process tackling tobacco control within these units^{cxxix[129]}. Forty NHS Trust tobacco control policies and statements were analysed.

The main emphasis of the final report is on staff at all levels in the organisation. The reason given for this emphasis is that staff are responsible for implementation of the policies: ‘Policies will flourish or flounder over time depending on how competently they are managed’.

Although encouraging smokers to stop was not the main emphasis in the tobacco control policies of the 40 trusts analysed, it was often recognised that a period of hospitalisation is an opportunity for health promotion on smoking.

One general medical trust’s policy indicated the need for staff to ascertain patients’ smoking status: ‘All in-patients and out-patients should be asked whether they are smokers. Where appropriate, advice on giving up should be provided. A supply of relevant literature should be maintained in each ward, clinic and health centre’.

With few exceptions the tobacco control policies allowed for designated smoking areas for users, either on the ward or nearby within the building.

None of the trusts explicitly offered NRT to patients within the 40 policy documents examined.

4.4 Smoking among mental health professionals

Smoking policies may also encourage psychiatric staff to stop smoking. There is a dearth of recent data on smoking among nurses^{cxxx[130]}. Studies in the 1980s found conflicting evidence as to whether smoking is higher among

psychiatric nursing than among other psychiatric professions^{cxxxii[131] cxxxiii[132]}. However, one small-scale study in the UK, which examined employment influences on women's smoking, found that psychiatric nurses had a smoking prevalence rate twice that found among other groups of nurses^{cxxxiii[133]}.

-

In summary, smokers with mental health problems are motivated to quit and can be successfully helped to stop smoking. Effective treatments include group therapy, NRT and bupropion. There is some evidence that adapting the treatment programme for smokers with mental health problems may enhance efficacy although the data are limited. Harm reduction approaches are also worth considering for smokers with mental health problems who are unable or unwilling to quit. Smokefree policies can be successfully introduced in psychiatric institutions and will encourage smokers to quit. Mental health professionals have an important role to play in encouraging and supporting smokers' attempts to stop.

References

-
- i[1] George TP, Vessicchio JC. *Nicotine addiction and schizophrenia*. Psychiatric Times; February 2001; Vol XVIII, issue 2. [\[View Article\]](#)
- ii[2] George TP, Vessicchio JC. *Nicotine addiction and other psychiatric disorders*. Psychiatric Times; February 2001; XVIII, issue 2. [\[View Article\]](#)
- iii[3] Dalack G, Healy DJ, Meador-Woodruff JH. 1998. *Nicotine dependence in schizophrenia: clinical phenomena and laboratory findings*. The American Journal of Psychiatry; 155: 1490-1501. [\[View Abstract\]](#)
- iv[4] Le Houezec JL. *Nicotine: abused substance and therapeutic agent*. J Psychiatry Neurosci; 1998; 23: 95-108. [\[View Abstract\]](#)
- v[5] Meltzer H, Gill B, Petticrew M et al. *Economic activity and social functioning of adults with psychiatric disorders (OPCS Surveys of Psychiatric Morbidity in Great Britain Report 3)*. London: HMSO; 1995. [\[View Summary\]](#)
- vi[6] Office for National Statistics. *Living in Britain: results from the 1998 General Household Survey*. London: Stationery Office; 2000. [\[View Report\]](#)
- vii[7] Farrell M, Howes S, Taylor C et al. 1998. *Substance misuse and psychiatric co-morbidity: an overview of the OPCS National Psychiatric Morbidity*. Addictive Behaviours; 1998; 23:909-918. [\[View Abstract\]](#)
- viii[8] Lasser K, Wesley Boyd J, Woolhandler S et al. *Smoking and mental illness. A population-based prevalence study*. JAMA; 2000; 284: 2606-10. [\[View Abstract\]](#)
- ix[9] Meltzer H, Gill B, Petticrew M et al. *Economic activity and social functioning of residents with psychiatric disorders (OPCS Surveys of Psychiatric Morbidity in Great Britain Report 6)*. London: HMS; 1996. [\[View Summary\]](#)
- x[10] Gill B, Meltzer H, Hinds K et al. *Psychiatric morbidity among homeless people (OPCS Surveys of Psychiatric Morbidity in Great Britain. Report 7)*. London, HMSO; 1996 [\[View Summary\]](#)
- xi[11] Flick LH, Cook CL, Homan SM, et al. *Persistent tobacco use in pregnancy: an indicator of psychiatric illness?* Presentation at US 129th APHA conference. [\[View abstract\]](#)
- xii[12] Boyd JW, Lasser K. *Tobacco Madness*. Commentary, Psychiatric Times 17; 2001 [\[View Article\]](#)
- xiii[13] Hughes JR. *Nicotine – related disorders*. In: Sadock BJ, Sadock VA (eds). *Kaplan & Sadock's Comprehensive Textbook of Psychiatry, 7th edn*. Lippincott Williams & Wilkins. New York; 1999.
- xiv[14] Zarin DA, Pincus HA, Hughes JR. *Treating nicotine dependence in mental health settings*. J Prax Psych and Behav Health; 1997; 250-4.
- xv[15] Hughes JR. *Co-morbidity and smoking*. Nicotine & Tobacco Research; 1999; 1: S149-S152.
- xvi[16] Hughes JR. *Distinguishing nicotine dependence from smoking: why it matters to tobacco control and psychiatry*. Archives of General Psychiatry; 2001; 58: 817-8. [\[View Abstract\]](#)
- xvii[17] Breslau N, Kilbey MM, Andreski P. *Nicotine dependence, major depression and anxiety in young adults*. Archives of General Psychiatry; 1991; 48 (12): 1609-74. [\[View Abstract\]](#)
- xviii[18] Professor Martin Jarvis personal communication.
- xix[19] DoH. *Statistics on smoking: England, 1978 onwards*. ONS Statistical Bulletin; 2000 [\[View Report\]](#)
- xx[20] Lader D, Meltzer H. *Smoking Related Behaviour and Attitudes*. ONS; London; 2001 [\[View Summary\]](#)
- xxi[21] Kelly C, McCreadie R. *Smoking habits, current symptoms, and pre-morbid characteristics of schizophrenic patients in Nithsdale, Scotland*. The American Journal of Psychiatry; 1999; 156: 1751-7. [\[View Abstract\]](#)
- xxii[22] Hughes JR, Hatsukami DK, Mitchell JE et al. *Prevalence of smoking among psychiatric outpatients*. Am J Psychiatry; 1986; 143: 993-7. [\[View Abstract\]](#)
- xxiii[23] Olincy A, Young DA, Freedman R. *Increased levels of the nicotine metabolite cotinine in schizophrenic smokers compared to other smokers*. Biol Psychiatry; 1997; 42, 1-5. [\[View Abstract\]](#)

-
- xxiv[24] Beratis S, Katrivanou A, Gourzis P. *Factors affecting smoking in schizophrenia*. Comprehensive Psychiatry; 2001; 45: 393-402. [\[View Abstract\]](#)
- xxv[25] de Leon J, Davvand M, Canuso C et al. *Schizophrenia and smoking: an epidemiological survey in a state hospital*. Am J Psychiatry; 1995; 152: 453-5. [\[View Abstract\]](#)
- xxvi[26] Brown S, Inskip H, Barraclough B. *Causes of the excess mortality of schizophrenia*. Br J Psychiatry; 2000; 177: 212-7. [\[View Article\]](#)
- xxvii[27] Itkin O, Nemets B, Einat H. *Smoking habits in bipolar and schizophrenic outpatients in southern Israel*. J Clin Psychiatry; 2001; 62:269-72. [\[View Abstract\]](#)
- xxviii[28] Gonzalez-Pinto, Gutierrez M, Ezcurra J et al *Tobacco smoking and bipolar disorder*. J Clin Psychiatry; 1998; 59: 225-8. [\[View Abstract\]](#)
- xxix[29] Diwan A, Castine M, Pomerleau CS et al. *Differential prevalence of cigarette smoking in patients with schizophrenia vs. mood disorders*. Schizophrenia Research; 1998; 33, 113-118. [\[View Abstract\]](#)
- xxx[30] Corvin A, O'Mahony E, O'Regan M et al. *Cigarette smoking and psychotic symptoms in bipolar affective disorder*. Br J Psychiatry; 2001; 179, 35-8. [\[View Abstract\]](#)
- xxxi[31] Glassman AH, Covey LS, Dalack GW et al. *Smoking cessation, clonidine, and vulnerability to nicotine among dependent smokers*. Clin Pharmacol Ther; 1993; 54: 670-9. [\[View Abstract\]](#)
- xxxii[32] Anda RF, Williamson DF, Escobedo LG, Mast EE, Giovino GA, Remington PL. *Depression and the dynamics of smoking*. JAMA, 1990; 264: 1541-5. [\[View Abstract\]](#)
- xxxiii[33] Patton GC, Hibbert M, Rosier MJ et al. *Is smoking associated with depression and anxiety in teenagers?* Am J Public Health; 1996; 86: 225-30. [\[View Abstract\]](#)
- xxxiv[34] Covey LS, Glassman AH, Stetner F. *Cigarette smoking and major depression*. J Addict Dis; 1998; 17: 35-46. [\[View Abstract\]](#)
- xxxv[35] Glassman AH, Stetner F, Walsh BT et al. *Heavy smokers, smoking cessation, and clonidine. Results of a double-blind randomized trial*. JAMA; 1988; 259: 2363-6. [\[View Abstract\]](#)
- xxxvi[36] Niaura R, Britt DM, Shadel WG et al. 2001. *Symptoms of depression and survival experience among three samples of smokers trying to quit*. Psychology of Addictive Behaviours; 2001; 15: 13-17. [\[View Abstract\]](#)
- xxxvii[37] Breslau N, Kilbey MM, Andreski P. *Nicotine withdrawal symptoms and psychiatric disorders: findings from an epidemiologic study of young adults*. Am J Psychiatry; 1992; 149: 464-9. [\[View Abstract\]](#)
- xxxviii[38] Covey LS, Glassman AH, Stetner F. *Major depression following smoking cessation*. American Journal of Psychiatry, 1997; 154: 263-5. [\[View Abstract\]](#)
- xxxix[39] Glassman AH, Covey LS, Stetner F et al. *Smoking cessation and the course of major depression: a follow-up study*. The Lancet; 2001; 357: 1929-32. [\[View Article\]](#)
- xl[40] Breslau N, Peterson EL, Schultz LR et al. *Major depression and stages of smoking. A longitudinal investigation*. Arch Gen Psychiatry; 1998; 55: 161-6. [\[View Abstract\]](#)
- xli[41] Tsoh J, Humfleet GL, Munoz RF et al. *Development of major depression after treatment for smoking cessation*. The American Journal of Psychiatry; 2000; 157: 368-74. [\[View Abstract\]](#)
- xlii[42] Amering M, Benkier B, Berger P et al. *Panic disorder and cigarette smoking behaviour*. Compr Psychiatry; 1999; 40, 35-38. [\[View Abstract\]](#)
- xliii[43] Pohl R, Yergani VK, Balon R et al. *Smoking in patients with panic disorder*. Psychiatry Research; 1992; 43, 253-62. [\[View Abstract\]](#)
- xliv[44] Beckham JC, Roodman AA, Shipley RH et al. *Smoking in Vietnam combat veterans with posttraumatic stress disorder*. J Trauma Stress; 1995; 8: 461-72. [\[View Abstract\]](#)
- xlv[45] Beckham JC, Kirby AC, Feldman ME, et al. *Prevalence and correlates of heavy smoking in Vietnam veterans with chronic post-traumatic stress disorder*. Addictive Behaviours; 1997; 22: 637-47. [\[View Abstract\]](#)
- xlvi[46] Pomerleau OF, Downey KK, Stelson FW et al. *Cigarette smoking in adult patients diagnosed with attention deficit hyperactivity disorder*. J Subst Abuse; 1995; 7: 373-378. [\[View Abstract\]](#)

-
- xlviij[47] Pomerleau CS, Ehrlich E, Tate JC et al. *The female weight-control smoker: a profile*. J Subst Abuse; 1993; 5: 391-400. [\[View Abstract\]](#)
- xlviij[48] Morens DM, Grandinetti A, Reed D et al. *Cigarette smoking and protection from Parkinson's disease: false association or etiologic clue?* Am Acad Neurology; 1995; 45: 1041-51. [\[View Abstract\]](#)
- xliv[49] White HK, Levin ED. 1999. Four-week nicotine skin patch treatment effects on cognitive performance in Alzheimer's disease. Psychopharmacology (Berl); 1999; 143: 158-65. [\[View Abstract\]](#)
- l[50] Villafane G, Degos J-D, Lagrue G, Cesaro P. *Long-term nicotine administration can improve Parkinson's Disease – Report of a case*. Poster, SRNT Europe Conference, Paris, 2001.
- li[51] McCreadie RG, Kelly C. *Patients with schizophrenia who smoke: private disaster, public resource (editorial)*. Br J Psychiatry; 2000; 176: 109. [\[View Abstract\]](#)
- lii[52] McDonald C. *Cigarette smoking in patients with schizophrenia*. Br J Psychiatry; 2000; 176: 596-7. [\[View Article\]](#)
- liii[53] Jung W & Irwin M. *Reduction of natural killer cytotoxic activity in major depression: Interaction between depression and cigarette smoking*. Psychosomatic Medicine, 1999; 61: 263-70. [\[View Abstract\]](#)
- liv[54] Docherty B. *Care in the Community*. Fire Prevention, 1999; 317:26-27.
- lv[55] Jarvis M, Wardle M 1999. Social patterning of health behaviours: the case of cigarette smoking . In: Social determinants of health. Eds: Marmot M, Wilkinwon R. OUP, Oxford 1999. Pp 2240-55.
- lvi[56] Rasul F, Stansfeld SA, Davey-Smith G et al. *Sociodemographic factors, smoking and common mental disorder in the Renfrew and Paisley (MIDSPAN) study*. J Health Psychology; 2001; 6: 149-158. [\[View Abstract\]](#)
- lvii[57] Fergusson DM, Lynskey MT, Horwood LJ. *Co-morbidity between depressive disorders and nicotine dependence in a cohort of 16-year olds*. Archives of General Psychiatry; 1996; 53: 1043-7. [\[View Abstract\]](#)
- lviii[58] Kendler KS, Neale MC, Maclean CJ et al. *Smoking and major depression: a causal analysis*. Archives of General Psychiatry; 1993; 50: 36-43. [\[View Abstract\]](#)
- lix[59] Jorm AF, Rodgers B, Jacomb PA et al. *Smoking and mental health: results from a community study*. Med J Aust; 1999; 170: 74-7. [\[View Abstract\]](#)
- lx[60] Farrell M, Howes S, Bebbington P et al. *Nicotine, alcohol and drug dependence and psychiatric co-morbidity. Results of a national household survey*. Br J of Psychiatry; 2001; 179: 432-7 [\[View Abstract\]](#)
- lxi[61] Lawn SJ, Pols RG, Barber JG. *Smoking and quitting: a qualitative study with community-living psychiatric clients*. Social Science & Medicine, 2002; 54: 93-104.
- lxii[62] NW Adelaide Mental Health Service. *Tobacco and Mental Illness Project*. Tobacco and mental illness Issues Paper; 1999
- lxiii[63] Eastwood R. *Weeding out*. The Lancet; 1993; 341: 1316.
- lxiv[64] Slotkin TA, Cho H, Whitmore WL. *Effects of prenatal exposure on neuronal development. Selective actions on central and peripheral catecholaminergic pathways*. Brain Research Bulletin, 1987; 18: 601-611. [\[View Abstract\]](#)
- lxv[65] Ernst M, Moolchan ET, Robinson ML. *Behavioral and neural consequences of prenatal exposure to nicotine*. J Am Acad Child Adolesc, 2001; 40: 630-41. [\[View Abstract\]](#)
- lxvi[66] Milberger S, Biederman J, Faraone SV, Jones J. *Further evidence of an association between maternal smoking during pregnancy and attention deficit hyperactivity disorder: findings from a high-risk sample of siblings*. J Clin Child Psychol, 1998; 27: 352-8. [\[View Abstract\]](#)
- lxvii[67] Breslau N, Kilbey MM, Andreski P. *Nicotine dependence and major depression. New evidence from a prospective investigation*. Arch Gen Psychiatry; 1993; 50: 31-5. [\[View Abstract\]](#)
- lxviii[68] Wu L-T, Anthony JC. *Tobacco smoking and depressed mood in late childhood and early adolescence*. American Journal of Public Health; 1999; 89: 1837-40. [\[View Abstract\]](#)
- lxix[69] Johnson JG, Cohen P, Pine DS et al. *Association between cigarette smoking and anxiety disorders during adolescence and early adulthood*. JAMA; 2000; 284: 2348-2351. [\[View Abstract\]](#)

-
- lxx[70] Breslau N, Klein DF. *Smoking and panic attacks: an epidemiologic investigation*. Archives of General Psychiatry; 1999; 56: 1141-7. [\[View Abstract\]](#)
- lxxi[71] West R, Hajek P. *What happens to anxiety levels on giving up smoking?* Am J Psychiatry; 1997; 154: 1589-92. [\[View Abstract\]](#)
- lxxii[72] Pomerleau CS, Marks JL, Pomerleau OF. *Who gets what symptom? Effects of psychiatric cofactors and nicotine dependence on patterns of smoking withdrawal symptomatology*. Nicotine & Tobacco Research; 2000; 2: 275-80. [\[View Abstract\]](#)
- lxxiii[73] Leonard S, Bertrand D. *Neuronal nicotinic receptors: from structure to function*. Nicotine & Tobacco Research; 2000; 3: 203-23. [\[View Abstract\]](#)
- lxxiv[74] Leonard S, Breese C, Adams C et al. *Smoking and schizophrenia: abnormal nicotinic receptor expression*. Eur J Pharmacol; 2000; 393: 237-42. [\[View Abstract\]](#)
- lxxv[75] Malpass D. Smoking and mental health seminar. November, 2001. Presentation.
- lxxvi[76] Klimek V, Zhu M-Y, Dilley G. *Effects of long-term cigarette smoking on the human locus coeruleus*. Archives of General Psychiatry; 2001; 58: 821-7. [\[View Abstract\]](#)
- lxxvii[77] Fowler JS, Wange GJ, Volkow ND et al. *Smoking a single cigarette does not produce a measurable reduction in brain MAO B in non-smokers*. Nicotine & Tobacco Research; 1999; 1, 325-9. [\[View Abstract\]](#)
- lxxviii[78] Epping-Jordan MP, Watkins SS, Koob GF, & Markou A. *Dramatic decrease in brain reward function during nicotine withdrawal*. Nature, 1998; 393: 76-8. [\[View Abstract\]](#)
- lxxix[79] Goff DC, Henderson DC, Amico E. *Cigarette smoking in schizophrenia: relationship to psychopathology and medication side effects*. Am J Psychiatry; 1992; 149: 1189-94. [\[View Abstract\]](#)
- lxxx[80] Ziedonis DM, Kosten TR, Glazer WM et al. *Nicotine dependence and schizophrenia*. Hosp Community Psychiatry; 1994; 45: 204-6.
- lxxxii[81] Apud JA, Egan MF, Wyatt RJ. *Effects of smoking during antipsychotic withdrawal in patients with chronic schizophrenia*. Schizophrenia Research; 2000; 46, 119-127. [\[View Abstract\]](#)
- lxxxiii[82] Olincy A, Ross RG, Young DA, Roath M, Freedman R. *Improvement in smooth pursuit eye movements after cigarette smoking in schizophrenic patients*. Neuropsychopharmacology; 1998; 18, 175-85. [\[View Abstract\]](#)
- lxxxiv[83] Levin ED, Connors CK, Sparrow E et al. *Nicotine effects on adults with attention-deficit/hyperactivity disorder*. Psychopharmacology; 1996; 123: 55-63. [\[View Abstract\]](#)
- lxxxv[84] Levin ED, Connors CK, Silva D et al. *Effects of chronic nicotine and methylphenidate in adults with attention deficit/hyperactivity disorder*. Exp Clin Psychopharmacol; 2001; 9: 83-90. [\[View Abstract\]](#)
- lxxxvi[85] West R. *Nicotine as a cognitive enhancer: the current state of the evidence*. Presentation at SRNT Europe Conference, Paris; 2001 [\[View Article\]](#)
- lxxxvii[86] Ernst M, Heishman SJ, Spurgeon L, London ED. *Smoking history and nicotine effects on cognitive performance*. Neuropsychopharmacology, 2001; 25: 3113-9. [\[View Abstract\]](#)
- lxxxviii[87] Crocker A. *The neuropharmacology of tobacco smoking*. Adelaide, 2000.
- lxxxviii[88] McEvoy JP, Freudenreich O, Levin ED et al. *Haloperidol increases smoking in patients with schizophrenia*. Psychopharmacology; 1995; 119, 124-6. [\[View Abstract\]](#)
- lxxxix[89] McEvoy JP, Freudenreich O, Wilson WH. *Smoking and therapeutic response to clozapine in patients with schizophrenia*. Biol. Psychiatr; 1999; 46, 125-9. [\[View Abstract\]](#)
- xc[90] Procyshyn RM, Ihsan N, Thompson D. *A comparison of smoking behaviours between patients treated with clozapine and depot neuroleptics*. International Clinical Psychopharmacology; 2001; 16: 291-294. [\[View Abstract\]](#)
- xci[91] Combs DR, Advokat C. *Antipsychotic medication and smoking prevalence in acutely hospitalized patients with chronic schizophrenia*. Schizophrenic research; 2000; 46, 129-137. [\[View Abstract\]](#)
- xcii[92] Levin ED, Wilson W, Rose JE et al. *Nicotine-haloperidol interactions and cognitive performance in schizophrenics*. Neuropsychopharmacology; 1996; 15: 429-36. [\[View Abstract\]](#)

-
- xciii[93] Anfang MK, Pope HG Jr. *Treatment of neuroleptic-induced akathisia with nicotine patches*. Psychopharmacology (Berl); 1997; 134: 153-6. [\[View Abstract\]](#)
- xciv[94] McEvoy JP, Brown SRN. *Smoking in first-episode patients with schizophrenia*. The American Journal of Psychiatry; 1999; 156, 1120-1. [\[View Abstract\]](#)
- xcv[95] Dalack GW, Becks L, Hill E et al. *Nicotine withdrawal and psychiatric symptoms in cigarette smokers with schizophrenia*. Neuropsychopharmacology; 1999; 21: 195-202. [\[View Abstract\]](#)
- xcvi[96] Dalack GW, Meador-Woodruff. *Acute feasibility and safety of a smoking reduction strategy for smokers with schizophrenia*. Nicotine & Tobacco Research; 1999; 1: 53-57. [\[View Abstract\]](#)
- xcvii[97] Addington J, el-Guebaly N, Addington D et al. *Readiness to stop smoking in schizophrenia*. Can J Psychiatry; 1997; 42: 49-52. [\[View Abstract\]](#)
- xcviii[98] Ziedonis DM, George TP. *Schizophrenia and nicotine use: report of a pilot smoking cessation program and review of neurobiological and clinic issues*. Schizophr Bull; 1997; 23: 247-54. [\[View Abstract\]](#)
- xcix[99] West R, McNeill A, Raw M. *Smoking cessation guidelines for health professionals: an update*. Thorax, 2000; 55:987-999. [\[View Abstract\]](#)
- c[100] McNeill A, Foulds J, Bates C. *Regulation of nicotine replacement therapies (NRT)*. A critique of current practice. Addiction. 2001; 96:1757-1768. [\[View article\]](#)
- ci[101] Parrott S, Godfrey C, Raw M, et al. *Guidance for commissioners on the cost effectiveness of smoking cessation interventions*. Thorax, 1998; 53(Suppl 5, Pt 2): S1-38. [\[View Abstract\]](#)
- cii[102] Raftery J. NICE: faster access to modern treatments? Analysis of guidance on health technologies. BMJ 2001;323:1300-1303. [\[View Article\]](#)
- ciii[103] Department of Health. *Smoking Kills: a White Paper on Tobacco*. London: The Stationery Office, 1999. [\[View Paper\]](#)
- civ[104] American Psychiatric Association. *Practice guideline for the treatment of patients with nicotine dependence*. American Journal of Psychiatry; 1995; 153: 1-31 (supp). [\[View Report\]](#)
- cv[105] Thorndike AAN, Stafford RS, Rigotti NA *US physicians' treatment of smoking in outpatients with psychiatric diagnoses*. Nicotine & Tobacco Research; 2001; 3: 85-91. [\[View Abstract\]](#)
- cvi[106] Cataldo JK. *The role of advanced practice psychiatric nurses in treating tobacco use and dependence*. Arch Psychiatr Nurs; 2001; 15: 107-119. [\[View Abstract\]](#)
- cvi[107] Phelan M, Stradins L, Morrison S. *Physical health of people with severe mental illness*. BMJ; 2001; 322: 443-4. [\[View Article\]](#)
- cviii[108] John Hughes, personal communication.
- cix[109] John Hughes, personal communication.
- cx[110] Brown RA, Kahler CW, Niaura R et al. *Cognitive-behavioural treatment for depression in smoking cessation*. Journal of Consulting and Clinical Psychology; 2001; 69: 471-480. [\[View Abstract\]](#)
- cxii[111] Hall SM, Munoz RF, Reus VI et al. *Nicotine, negative affect and depression*. Journal of Consulting and Clinical Psychology; 1993; 61: 761-7. [\[View Abstract\]](#)
- cxii[112] Hall SM, Munoz RF, Reus VI et al. *Mood management and nicotine gum in smoking treatment: A therapeutic contact and placebo-controlled study*. Journal of Consulting and Clinical Psychology, 1996; 64: 1003-9. [\[View Abstract\]](#)
- cxiii[113] Addington J, el-Guebaly N, Campbell W et al. *Smoking cessation treatment for patients with schizophrenia*. Am J Psychiatry; 1998; 155: 974-6. [\[View Abstract\]](#)
- cxiv[114] George TP, Ziedonis DM, Feingold A et al. *Nicotine transdermal patch and atypical antipsychotic medications for smoking cessation in schizophrenia*. Am J Psychiatry; 2000; 157: 1835-42. [\[View Abstract\]](#)
- cxv[115] D'Mello DA, Bandlamudi GR, Colenda CC. *Nicotine replacement methods on a psychiatric unit*. American Journal of Drug and Alcohol Abuse; 2001; 27: 525-9.
- cxv[116] Hughes JR, Stead LF, Lancaster T. *Antidepressants for smoking cessation*. Cochrane database Systematic Rev; 2000 [\[View Abstract\]](#)

-
- cxvii[117] John Hughes, personal communication.
- cxviii[118] Evins AE, Tisdale T. *Bupropion and smoking cessation*. Am J Psychiatry; 1999; 156: 798-9. [\[View Article\]](#)
- cxix[119] Evins AE, Mays VK, Rigotti NA. *Reduction in tobacco use in schizophrenia with bupropion SR and cognitive behavioural therapy in Abstracts of the 6th Annual Meeting of the Society for Research on Nicotine and Tobacco*; Middleton, Wis; SRNT; 2000.
- cxx[120] Wiener E, Ball M, Patricia RNC et al. *Effects of sustained-release bupropion and supportive group therapy on cigarette consumption in patients with schizophrenia*. The American Journal of Psychiatry; 2001; 158, 635-7. [\[View Abstract\]](#)
- cxxi[121] Hertzberg MA, Moore SH, Feldman ME et al. *A preliminary study of bupropion sustained-release for smoking cessation in-patients with chronic posttraumatic stress disorder*. J Clin Psychopharmacology; 2001; 21: 94-8. [\[View Abstract\]](#)
- cxxii[122] Jorenby DE, Leischow SJ, Nides MA et al. *A controlled trial of sustained-release bupropion, a nicotine patch, or both for smoking cessation*. N Engl J Med; 1999; 340: 685-91. [\[View Abstract\]](#)
- cxxiii[123] Hartman N, Leong G, Glynn SM et al. *Transdermal nicotine and smoking behaviour in psychiatric patients*. Am J Psychiatry; 1991; 148:374-5. [\[View Abstract\]](#)
- cxxiv[124] Dalack GW, Meador-Woodruff JH. *Acute feasibility and safety of a smoking reduction strategy for smokers with schizophrenia*. Nicotine & Tob Res; 1999; 1: 53-7. [\[View Abstract\]](#)
- cxxv[125] Patten et al. *Effects of a smoke free policy on an inpatient psychiatric unit*. Tobacco Control; 1995; 4: 373-9.
- cxxvi[126] Beemer BR. *Hospital psychiatric units. Nonsmoking policies*. J Psychosoc Nurs Ment Health Serv; 1993; 31: 12-4. [\[View Abstract\]](#)
- cxxvii[127] Friederich HM, Buchkremer G, Batra A. *Towards a smoke free psychiatry*. Abstract of presentation given at European Conference on Smoke Free Workplaces, Berlin, May 2001.
- cxxviii[128] Health Education Authority. *Been there, done that. Revisiting tobacco control policies in the NHS*. HEA; London; 1999 [\[View Report\]](#)
- cxxix[129] Health Development Agency. *Tobacco Control Policies within Psychiatric and Long-Stay Units, A Consultation Document*. HDA; London; 2000
- cxix[130] Rowe K, Macleod Clark J. *The incidence of smoking amongst nurses: a review of the literature*. Journal of Advanced Nursing; 2000; 31: 1046-53. [\[View Abstract\]](#)
- cxix[131] Tagliacozzo R, Vaughn S. *Stress and smoking in hospital nurses*. American Journal of Public Health; 1982; 5: 441-8. [\[View Abstract\]](#)
- cxix[132] Dore K, Hoey J. *Smoking practices. Knowledge and attitudes regarding smoking of university hospital nurses*. Canadian Journal of Public Health; 1988; 79: 170-4. [\[View Abstract\]](#)
- cxix[133] Gubbay J 1992. *Smoking and the Workplace*. Centre for Health Policy Research, University of East Anglia; 1992.