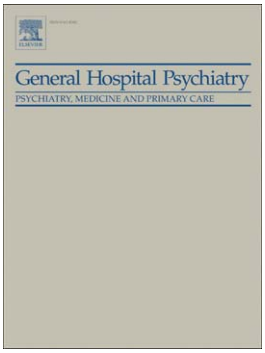

Do people with mental illness receive adequate smoking cessation advice? A systematic review and meta-analysis

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PII: S0163-8343(14)00290-4
DOI: doi: 10.1016/j.genhosppsych.2014.11.006
Reference: GHP 6943

To appear in: *General Hospital Psychiatry*

Received date: 22 August 2014
Revised date: 13 November 2014
Accepted date: 14 November 2014

Please cite this article as: Mitchell Alex J., Vancampfort Davy, De Hert Marc, Stubbs Brendon, Do people with mental illness receive adequate smoking cessation advice? A systematic review and meta-analysis, *General Hospital Psychiatry* (2014), doi: 10.1016/j.genhosppsych.2014.11.006

Do people with mental illness receive adequate smoking cessation advice? A systematic review and meta-analysis

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Acknowledgements: Thank you to Ms Verity Markham former research assistant in the Leicestershire Partnership NHS trust, department of psycho-oncology, for help with the early stages of this project.

Do people with mental illness receive adequate smoking cessation advice? A systematic review and meta-analysis

Abstract

Background: Prevalence rates of smoking in people with mental illness are high and premature mortality attributed to tobacco related physical comorbidity is a major concern. We conducted a meta-analysis comparing rates of receipt of smoking cessation advice among people with and without mental illness.

Method: Major electronic databases were searched from inception till August 2014 for studies comparing rates of receipt of smoking cessation advice of people with and without a mental illness. Two independent authors completed methodological appraisal and extracted data. A random effects meta-analysis was utilized.

Results: Seven studies of satisfactory methodological quality (n mental illness= 68,811, n control=652,847) were included. Overall there was no significant difference in smoking cessation advice rates between those with and without a mental illness (RR=1.02, 95% CI: 0.94 – 1.11-, n=721,658, Q=1421, p<0.001). Subgroup analyses demonstrated people with severe mental illness (SMI) received comparable rates of smoking cessation advice to those without SMI (RR=1.09, 95% CI 0.98-1.2, n=559,122). This remained true for people with schizophrenia (RR=1.09, 95% CI 0.68-1.70) and bipolar disorder (RR=1.14, 95% CI 0.85-1.5). People with non-severe mental illnesses were slightly more likely to receive smoking cessation advice (RR=1.16, 95% CI=1.04-1.30, Q=1364, p<0.001, n=580,206).

Conclusions: People with SMI receive similar smoking cessation advice rates as people without mental illness, whilst those with non-severe mental illness are slightly more likely to receive smoking cessation advice. Whilst progress has been made, offering smoking cessation advice should receive a higher priority in everyday clinical practice for patients with a mental health diagnosis.

Introduction

There is irrefutable evidence that people with mental illness have a reduced life expectancy compared to members of the general population [1-3]. Worryingly, this mortality gap appears to be widening [3,4]. About 80% of these deaths are attributable to physical comorbidity and modifiable lifestyle factors rather than suicide [1-3,5]. For instance, Lawrence et al [3] recently established in a large population based study that 77.7% of deaths were attributed to physical health comorbidity such as cardiovascular disease (29.9%) and cancer (13.5%).

One modifiable lifestyle factor that is consistently implicated as a contributory factor to this mortality gap is smoking [2,3,6]. Smoking is the most common substance use disorder in people with mental illness and prevalence rates are two to four times higher than members of the general population [7-9]. In the USA, people with mental illness are estimated to smoke almost one out of every two cigarettes smoked [7,9,10]. People with severe mental illness (SMI) are particularly at risk and are often very heavy smokers [9] and in particular it has long been known that people with schizophrenia smoke at high rates and this remains true today. For instance, Hartz et al [11] recently established that people with schizophrenia are substantially much more likely to smoke than the general population (Odd Ratio=4.6). It is therefore unsurprising that mortality attributed to smoking is particularly high among this group. For example, Tran et al [12] found that smoking is associated with a two fold increase in cancer related deaths in those with mental illness. Others have found that mortality is higher in smokers than non-smokers with schizophrenia (Hazard Ratio=2.1) with around 12 times increased risk of cardiac death seen in patients aged 35-54 [13]. Cardiac disease accounted for 43% of deaths in smokers but only 19% of deaths in non-smokers with schizophrenia [13] thus indicating the increased risk of cardiovascular disease when patients smoke. Moreover, it is estimated that quitting smoking might reduce cardiac events by 90% in this group [14]. However, smoking related mortality affects all people with mental illness, regardless of diagnosis. Callaghan et al [15] found in a large scale follow-up study covering approximately 1.7 million years that tobacco related conditions accounted for roughly 53% of total deaths in schizophrenia, 48% in bipolar

disorder and 50% of those with depression. Overall, estimates seem to suggest that life expectancy among people with mental illness is reduced by approximately 25 years due to chronic diseases secondary to tobacco use (e.g., cardiac and pulmonary disease, [16]) compared to 10 years among smokers without a mental illness [17]. The economic costs associated with smoking among people with mental illness are also considerable. For instance, in the United Kingdom the cost to the economy for smokers with mental illness was estimated to be £2.34 billion in 2009/10 [18] (approximately $3.74 billion) including direct healthcare costs, indirect morbidity costs and indirect mortality costs due to smoking-related diseases.

Given the above, numerous authors have called for urgent research to determine and deliver effective smoking cessation interventions among people with mental illness in daily clinical practice [3,9,15]. Helping people with mental illness stop smoking should form a routine part of clinical care and is clearly an International public health priority [19] and several interventions may help. For instance, a systematic review of randomised control trials on smoking cessation interventions [20] established a number of safe approaches (for example Bupropion) to help people with schizophrenia stop smoking. A recent systematic review concluded that smoking cessation interventions are as effective in people with SMI as the general population [21]. From an environmental perspective many inpatient psychiatric units have implemented smoking restrictions or bans [22]. Whilst it is true that inconsistencies in the implementation of smoke-free policies in mental health facilities have been reported in a number of countries results have generally been encouraging [23]. However the most fundamental intervention is smoking cessation advice. In the general population smoking cessation advice helps improve quit rates [24-26] but it remains unclear if this applies in mental health settings, in particular do such patients receive adequate cessation advice from clinicians? Mass media campaigns have been widely disseminated in many countries and may be effective for some groups [27] but have not been aimed at those with mental illness. Thus despite some advances in awareness and interventions for smoking in those with mental ill heath it is not clear if we have achieved at least parity of care compared with the general population. Advice and support to stop smoking from

members of the multidisciplinary team should be the first port of call and may instigate the process of stopping smoking for the patient.

Within recent years, numerous studies have established that people with mental health problems receive suboptimal medical care as well as preventive advice and physical health screening compared to the general populations [28-31]. It is currently unclear if these disparities extend to receipt of smoking cessation advice and support. Given the substantial burden of smoking on morbidity and mortality among people with mental illness, it is important that research considers if there is a disparity among smoking cessation advice given to people with mental illness compared to the general population, ideally whilst taking into account different subtypes and severity of mental ill health. Thus, the aim of the current paper was to establish if there are differences in the rates of smoking cessation advice among people with mental illness compared to those without mental illness.

Method

We conducted a systematic review and meta-analysis in accordance with the Meta-analysis of Observational Studies in Epidemiology guidelines [32] and reported it in line with the PRISMA statement [33] following a predetermined protocol.

Eligibility criteria

Studies were eligible that: 1) included people with a diagnosis of non-organic mental illness (including SMI (e.g. schizophrenia, psychosis, bipolar disorder), mood disorders, depression, anxiety) or mental health problem according to recognised diagnostic criteria (ICD 10 or DSM IV)/ validated screening measures or medical chart reviews. 2) Were comparative studies (including observational or intervention studies, in which case baseline data was used) with a group without mental illness. 3) Reported smoking cessation advice rates for both samples among those who smoked. We defined smoking cessation advice in accordance with Stead et al [34] (2013) as '*recorded verbal instructions from the physician with a 'stop smoking' message irrespective of whether or not information was provided about the harmful effects of smoking*'. We also included studies that reported smoking cessation advice from any member of the multidisciplinary team, as we believe smoking cessation advice is every clinician's responsibility.

We did not include studies reported among people with dementia/ mild cognitive impairment or learning disabilities (although to our knowledge no such papers existed). No language restrictions were placed upon potentially eligible studies. If we encountered multiple studies from the same data set at different times, we used the largest and / or most recent data. If we encountered studies that enquired about smoking cessation advice but did not report the data in the paper, we contacted the authors to acquire the variables of interest (no additional requests were necessary). .

Literature search and study selection

Two independent authors (AJM, BS) conducted electronic searches of Medline, Pubmed, Embase and CINAHL electronic databases from inception till August 2014. The key words used were smoking* or smoking cessation or smoking cessation advice and mental or psychiatr* or depression or mood or anxiety or severe mental illness/ SMI or schizophrenia or psychosis or psychotic. In addition, we conducted full text searches of the Web of knowledge, Scopus, Science Direct, Ingenta Select, Springer-Verlag's LINK and Blackwell Wiley and hand searched all included articles (i.e. checked the reference lists for potentially relevant articles). We also conducted online 'hand searches' including the in press sections of major psychiatric journals from 2000 up until August 2014 (including General Hospital Psychiatry, British Journal of Psychiatry, Schizophrenia Research, Schizophrenia Bulletin, Psychological Medicine, Acta Psychiatrica Scandinavica, American Journal of Psychiatry, JAMA Psychiatry, Canadian Journal of Psychiatry, Journal of Psychiatric Research, Psychiatric Services).

After the removal of duplicates, two independent reviewers (BS, AJM) screened the titles and abstracts of all potentially eligible articles. Both authors applied the eligibility criteria, and a list of full text articles was developed through agreement. Two reviewers (BS, AJM) then considered the full texts of these articles and the final list of included articles was reached through consensus.

Methodological quality assessment

Two authors (AJM, BS) independently completed the methodological appraisal of included studies using the Newcastle Ottawa Scale (NOS, [35]). The NOS provides an assessment of the quality of non-randomised controlled trials and each article received a methodological quality score out of 9. Articles were judged across three key areas: selection, comparability and outcomes. The NOS validity and reliability has been established and scores of 5 out of 9 were considered satisfactory quality [35].

Data extraction

All data extraction was conducted by two independent authors (BS, AJM) utilising a predetermined form. We extracted data regarding the study design, setting, patient information (number, demographic, type of mental illness and classification criteria), control participant information, details of the smoking cessation advice and the results.

Meta-analysis

We calculated the relative risk (RR) together with the 95% confidence intervals (CI) for each study. If we encountered odds ratios within the eligible papers, these were converted into RR using an established method [36]. We planned subgroup analysis to compare smoking cessation advice rates in people with SMI (schizophrenia, bipolar disorders) and non-severe mental illnesses (e.g. depression, anxiety etc) as well as specific mental disorders. Due to the anticipated heterogeneity, data was with a random effects meta-analysis [37]. Heterogeneity was calculated with the Cochran Q statistic [38]. All data was analysed using statsdirect software. Publication bias in each of the analyses was assessed with a visual inspection of funnel plots and Egger's regression method [39] and Begg-Mazumdar test [40], with a p-value <0.05 suggesting the presence of bias.

Results

Search results, included studies and participant characteristics

The initial searches yielded 1,103 valid hits and we subsequently screened the abstracts of 460 papers. Following this, 386 papers were excluded and we considered the full texts of 74 potential articles. At this stage, the eligibility criteria were applied and 67 articles were excluded with reasons (see figure 1 for details) and 7 met the inclusion criteria. Full details of the search strategy are given in figure 1.

Figure 1 here

Details of included studies

In total, 721,658 participants were represented across the 7 cross-sectional studies including 652,847 people without a mental illness and 68,811 people with a mental illness. The mean age of people with mental illness across the studies ranged from 50.1 years to 76.1. Four of the studies were conducted in the United States [41-44] and 3 were conducted in the United Kingdom [45-47]. A range of different types of mental illness were considered within the studies but 5 provided data for individuals with SMI (mainly schizophrenia and bipolar disorder; [42,43,45-47]) and 4 provided data for people with other types of mental illness [41,43,44,47]. The type of smoking cessation advice varied, with 2 studies this included counselling [41,42] and the remainder included general advice on smoking cessation and this was usually delivered by a physician. Full details of the included studies are summarised in table 1.

Table 1 here

Methodological quality of the included studies

The NOS summary scores for each article are presented in table 1. No study scored below 5 on the NOS and all were considered at least of satisfactory methodological quality. Overall the mean NOS score across the 7 articles was 7.1±0.8.

Narrative results

Druss et al [41] included 88,241 patients from a national cohort and found no difference in smoking cessation counselling rates between those with a mental illness (n=4664) and without (n=83,577) (RR=1.03, 95% CI: 0.95-1.12). The authors [41] reported that attendance of smoking cessation counselling was associated with a reduced mortality across the entire population sample regardless of a mental health diagnosis or not (HR, 0.67; 95% CI, 0.62-0.72). Hippisley-Cox et al [45] conducted a cross-sectional analysis with 485 general practices contributing anonymised medical records of over 3.26 million patients to the database which included 127,932 patients with coronary heart disease (CHD) (701 had a diagnosis of schizophrenia or bipolar disorder). Overall, the study established there was not any significant difference in smoking cessation advice over the past 15 months for individuals with schizophrenia (RR=0.99 (95% CI: 0.95-1.04)) whilst there was a small but significant increased chance of people with bipolar disorder receiving smoking cessation advice (RR=1.04 (95% CI:1.01-1.07).

Using a general practitioner database record linkage system, Whyte et al [46] did not find any significant difference in the rates of smoking cessation advice given to those with people diabetes and SMI (n=1043) and without any mental illness (n=10,000) (RR=1.52 (95% CI: 0.6-3.86)). Goldberg et al [42] compared smoking cessation counselling rates of care for type 2 diabetes delivered to those with SMI (n=201) and without (n=99) and found no significant difference (RR=1.96 (95% CI: 0.97-3.95)) despite the significantly higher rates of smoking in the SMI group (53% compared to 34%).

Szatkowski and McNeil [47] investigated the smoking cessation support including 387,246 primary care patients without a mental illness that smoked and 32,154 patients with a mental illness who

smoked. Across the whole sample, there people with mental illness were significantly more likely to receive smoking cessation advice (RR=1.45 (CI: 1.43-1.48)) and this was evident in the subgroup analysis for all of the different types of mental illness except those with eating disorder. However, interventions appear lower per consultation for smokers experiencing mental illness when compared with smokers without. Further details can be seen in table 1.

Duffy et al [43] determined rates of smoking and receipt of provider recommendations for smoking cessation advice among patients with mental illness treated in the U.S. Department of Veterans Affairs (VA) treatment facilities. The authors demonstrated that people with schizophrenia who smoked (n=1430) were significantly less likely to be given smoking cessation advice from their physician compared to the general population (RR=0.69 (95% CI: 0.58-0.82). No significant differences were observed in smokers with bipolar disorder, other psychoses, people with depression and post-traumatic stress disorder. However, people with substance use disorders were significantly more likely to receive smoking cessation advice (RR=1.04 (CI: 102-1.05)). The authors found that the majority of patients with mental illness that reported receiving smoking cessation services still continued to uphold high smoking rates and that selected groups were at risk for receiving fewer smoking cessation services, indicating the continued need to distribute cessation services. Finally, Shi et al [44] found that overall people reporting mental health problems (n=1,897) were significantly more likely to receive smoking cessation advice (RR=1.22 (CI: 1.17-1.26)) than those without a mental illness (n= 17,042).

Meta-analysis

It was possible to pool the smoking cessation advice rates from 7 studies using 13 different samples (n=721,658). Overall, there was no significant difference in smoking cessation advice rates between those with and without a mental illness (RR=1.02, 95% CI: 0.94 – 1.11, n=721,658, Q=1421, p<0.001; figure 2a). The funnel plot was broadly symmetrical and neither the Begg (=0.205, P = 0.36) or the Egger test (=-2.27, P = 0.68) indicated any evidence of publication bias (figure 2b).

Figure 2 a and b here

Smoking cessation advice rates among people with SMI

Next, it was possible to pool smoking cessation advice rates from 5 studies incorporating 9 samples with individuals with SMI including a total of 559,122 participants (n SMI=6894, n control =552,228). The pooled analysis demonstrated there was no significant difference in smoking cessation advice rates between people with a SMI and those without an SMI (RR=1.09, 95% CI = 0.98 - 1.230; Q=242, p<0.001; figure 2). The pooled analysis did not demonstrate any evidence of publication bias (Begg = 0.11, p=0.61, Eggers test = 2.21, p=0.5).

Figure 3 here

We pooled data from 3 studies [43,45,47] to investigate if there were difference in smoking cessation advice rates in people with bipolar disorder and schizophrenia and the control populations. The random effects analysis demonstrated there were no significant differences in smoking cessation rates in people with bipolar disorder (RR=1.14 (95% CI = 0.85-1.545; Q=109,p<0.001) or schizophrenia (RR=1.09 (95% CI = 0.68- 1.70; Q=109, p<0.001) compared to the control samples.

Smoking cessation rates among people with non-severe mental illness

Finally, it was possible to pool from 4 studies using 10 samples to investigate smoking cessation advices rates among people with and without a mental illness. The pooled analysis demonstrated that people with non-SMI were significantly more likely than control populations to receive smoking cessation advice (RR=1.16, 95% CI = 1.04-1.30; Q=1364, p<0.001, n mental illness=64,689, n control=515,517, figure 4). There was no evidence of publication bias within this analysis (Begg=0.15, P = 0.60, Egger test=5.70, =p=0.4). Finally, two studies consisted of “any mental illness” and may have included people with SMI; therefore we conducted an exploratory analysis removing these. This established that people with any non SMI mental illness were still significantly more likely to receive smoking cessation advice (RR=1.18, 95% CI = 1.04-1.33, Q=1331, p<0.001).

Insert figure 4 here

Discussion

This is the first meta-analysis to our knowledge to investigate if there is a disparity in smoking cessation advice rates in people with mental illness compared to the general population. Our results demonstrate that overall people with mental illness (including SMI) are broadly offered comparable rates of smoking cessation advice to members of the general population (RR=1.02, 95% CI 0.94-1.11). Our subgroup analysis demonstrated that people with SMI are offered comparable rates (RR=1.10, 95%CI 0.98-1.23), whilst people with non SMI mental illness are offered slightly higher rates of smoking cessation advice rates (RR=1.16, 95%CI 1.04-1.30). Clearly, a broadly comparable level of cessation advice could remain a concern given the greatly increased smoking rates among people with mental illness and the physical illnesses and premature mortality directly attributable to smoking in people with mental illness. Whilst progress has been made, equivocal interventions may not enough for this highly at risk population that has competing problems such as low socio-economic status, poor social support, and comorbid substance abuse. More intensive, multi-faceted interventions may need to be developed to reach this vulnerable population. This effect appeared to hold true even in those with schizophrenia alone and in those with bipolar illness alone (RR=1.09, 95%CI 0.68-1.77 and RR=1.14, 95% CI 0.85-1.54 respectively). Only in cases of non-severe mental illness were rates higher and then only modest so by about 16%.

Smoking cessation interventions are broadly as effective in people with mental illness, including those with SMI, as with members of the general population [21]. Therefore a failure to offer significantly greater levels of advice cannot be ascribed to therapeutic apathy. That said surveys of mental health professionals suggest only a minority feel that patients' smoking was their responsibility or would make time to treat smoking [48]. Yet both the American and European Psychiatric Associations recommend it as a frontline clinical intervention [9,49]. The findings from

Druss et al [41] add weight to the "common sense" recommendation that multidisciplinary teams (MDT) should encourage, advise and support patients to stop smoking since they found across their whole sample (including 4664 people with mental illness) attendance at smoking cessation was associated with a greatly reduced mortality (HR=0.67). In the past there have been concerns echoed that encouraging individuals with mental illness may have a detrimental effect on their psychiatric symptoms. However, recent research [21] has established that provided the patients mental health status is stable, the provision of smoking cessation advice and initiation of treatment does not worsen their mental state. In fact, recent research has demonstrated that smoking cessation is actually associated with a risk reduction for mood/anxiety or alcohol use disorder, including those with these as pre-existing disorders [50]. Since people with mental illness experience a wide range of barriers to stopping smoking [9] it is important that members of the MDT take the lead and give advice (including counselling) to instigate, educate, motivate and empower people with mental illness to stop smoking [9].

Within our review, three studies were conducted in the UK where there has been a financial incentive for general practitioners (GP's) to record people with mental illness smoking status and offer and implement smoking cessation services. This may have to some extent influenced the results in these countries, although they appear broadly similar to the other studies conducted in the US. It should also be noted that the US has also seen considerable smoking cessation efforts in the VA which may have accounted for this result [51]. Yet a direct comparison of cardiovascular screening (blood pressure, lipid levels and smoking status) of patients with asthma, and diabetes with patients with schizophrenia indicates that general practitioners are less likely to screen patients with schizophrenia for cardiovascular risk compared with the other two groups [52]. Another important consideration of the results from this review is that several of these studies (e.g. [41,42,45,46]) specifically recruited people with pre-existing physical comorbidities (diabetes or CHD). Whilst smoking cessation advice is a relatively new concept among people with mental illness, it is established among people with diabetes and CHD and this may have influenced the advice rates recorded.

Therefore, the smoking cessation advice rates observed in these studies is likely to be due to a greater sensitivity among providers to the poorer physical health of this group. It remains however unclear if smoking cessation advice rates and support are comparable in people newly diagnosed with a mental illness. Future research should consider people experiencing their first-episode of psychosis, since a previous meta-analysis [53] has already demonstrated significantly higher rates of smoking compared with the general population early in the disease.

Clinical implications

The receipt of higher rates of smoking cessation advice in non SMI is initially encouraging, although it is in reality small and clearly not entirely satisfactory. It is concerning that in more severe forms of mental illness rates of received advice are often lower than in milder forms. There is strong evidence from previous studies that patients with schizophrenia and bipolar disorder receive inadequate medical care which may influence health outcomes such as mortality [29]. We suggest failure to offer enhanced smoking cessation advice could be one factor maintaining high mortality in SMI. Provision of lifestyle advice within the psychiatric consultation is now promoted as a matter of routine [5], but our findings do indicate that advice on smoking may still not be offered systematically to all with mental illness that smoke. Because smoking cessation rates following interventions and advice are comparably effective with those observed in the general population, we believe that smoking cessation advice and associated therapeutic interventions and drug treatment are promoted by mental health MDT's. The current review findings clearly demonstrate that it is important to give psychiatrists, but also primary care physicians training in smoking cessation advice in people with mental illness. The treatment of tobacco dependence should for example be incorporated into the catalogue of disorders to be studied during specialist training in psychiatry. However, offering smoking cessation advice should not be isolated to qualified doctors and all members of the MDT and in particular nurses may help in this process.

The American [49] and European [9] Psychiatric Associations recommend that psychiatrists should routinely assess a patient's smoking status (e.g., current smoker, ex-smoker, never smoked, number of cigarettes per day). A procedure analogous to the so-called '4 A Intervention' may be recommended for short-term interventions: (1) Ask; (2) Advise; (3) Assist; (4) Arrange. Treating psychiatrists should thus: (1) ask about the patient's smoking habits; (2) clearly advise the patient to quit smoking; (3) offer the patient psychological support during smoking cessation and explain pharmacological aids; and (4) arrange follow-up visits to check that the patient is still abstinent. Other adaptations to this model, including the 5A's are also available and can be considered [54]. Previous research in 156 persons with SMI demonstrated that implementing (some of) these steps at each patient visit in community mental health centres may already have modest benefits (i.e. reduction of numbers of smokers and/or numbers of cigarettes smoked) after twelve months [55]. Clinician advice to discontinue smoking is best given in a non-judgmental, empathic and supportive manner [56]. A 'quit day' should be set or gradual reduction of tobacco consumption could be proposed as an alternative approach [57], especially as this method was recently found to have a comparable abstinence effect to quitting abruptly [58]. Thus, both methods can be recommended. To increase the quit rate, established programmes (individual therapy, group therapy, telephone coaching) should however be employed wherever available [56].

Limitations

Whilst this is the first review of its kind, a number of limitations must be considered along with the results which are reflections of limitations in the primary studies. First, we pooled data on several different types of mental illness within the main analysis. However, this is reflective of the range of mental illnesses seen by mental health services. We attempted to increase clinical homogeneity by conducting subgroup analysis for those with and without SMI and further attempted to reduce heterogeneity within these subgroup analyses. Second, it is unsurprising to note that each of the analysis demonstrated statistical heterogeneity. Third, all of the studies included within the meta-

analysis were from the UK or the US and it remains unclear if the results are generalizable outside these countries. Fourth, most of the studies included older and people with mental illness (over 50 years of age) that had pre-existing physical comorbidities (e.g. diabetes and CHD) and no data is available on people newly diagnosed with mental illness. This means it is likely that our results may be an overestimation of smoking cessation rates and such rates in younger populations are unclear and warrant future research. Particular attention should be given to those presenting with their first episode psychosis. Fifth, details regarding the type and nature of smoking cessation advice were limited in the original manuscripts and it is unclear how heterogeneous these interventions were. Lastly, a number of the included studies appeared to demonstrate lower levels of mental illness than one would expect. Thus, the samples of some studies may be biased to some extent.

Future Research

Future research should seek to investigate if there are differences in the rates of smoking cessation advice given to people that are newly diagnosed with a mental illness. Of great importance is prospective research to investigate the most effective type of smoking cessation advice on quitting rates in patients with mental illness and their health outcomes. Such research should inform clinical practice. In particular, research is warranted to investigate smoking cessation advice rates and outcomes in younger people with mental illness.

Conclusion

People with severe mental illness are not offered any higher rates of smoking cessation advice to members of the general population without severe mental illness. People with mild mental illness appear to be offered slightly higher rates of smoking cessation. This is despite the 2-4 higher rates of smoking in people with mental illness and the drastically increased morbidity and mortality attributed to tobacco use. Clinicians should be given training about smoking cessation advice in this

population, and prevention and treatment of tobacco dependence should receive a higher priority in everyday clinical care.

Funding

No funding was received for this project.

Conflict of interest

BS and AJM have no conflict of interest to report.

DV is supported by the Research Foundation – Flanders (FWO - Vlaanderen).

MDH declares that he has been a consultant for, received grant and/or research support and honoraria from, and been on the speakers' bureaus and/or advisory boards of the following companies: Astra Zeneca, Bristol-Myers Squibb, Eli Lilly, Janssen-Cilag, Lundbeck, Pfizer, Sanofi Aventis and Takeda.

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Figure 1. PRISMA 2009 flow diagram for search strategy

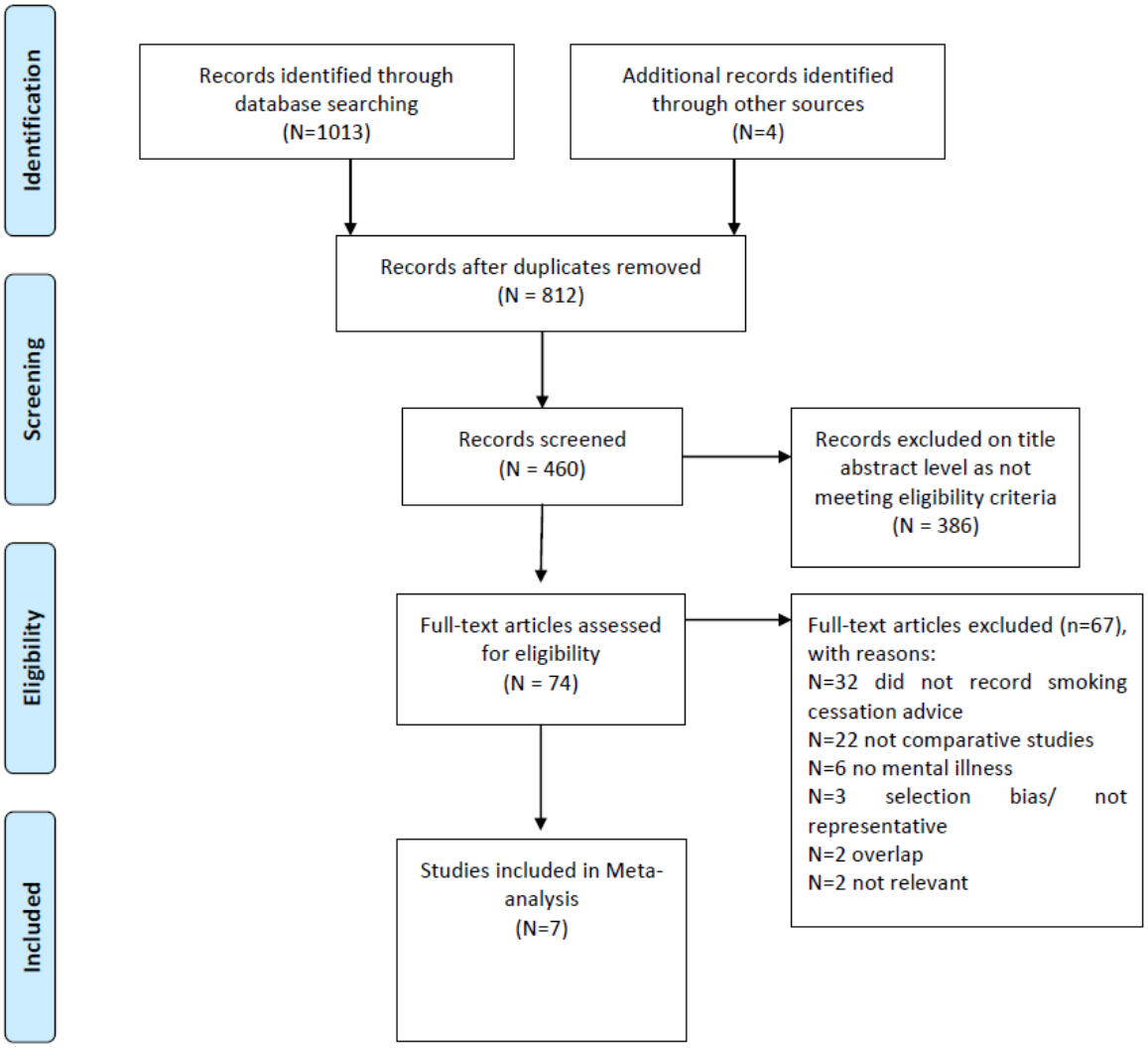


Figure 2a – Pooled smoking cessation advice rates across included studies (N=7, n=721,658)

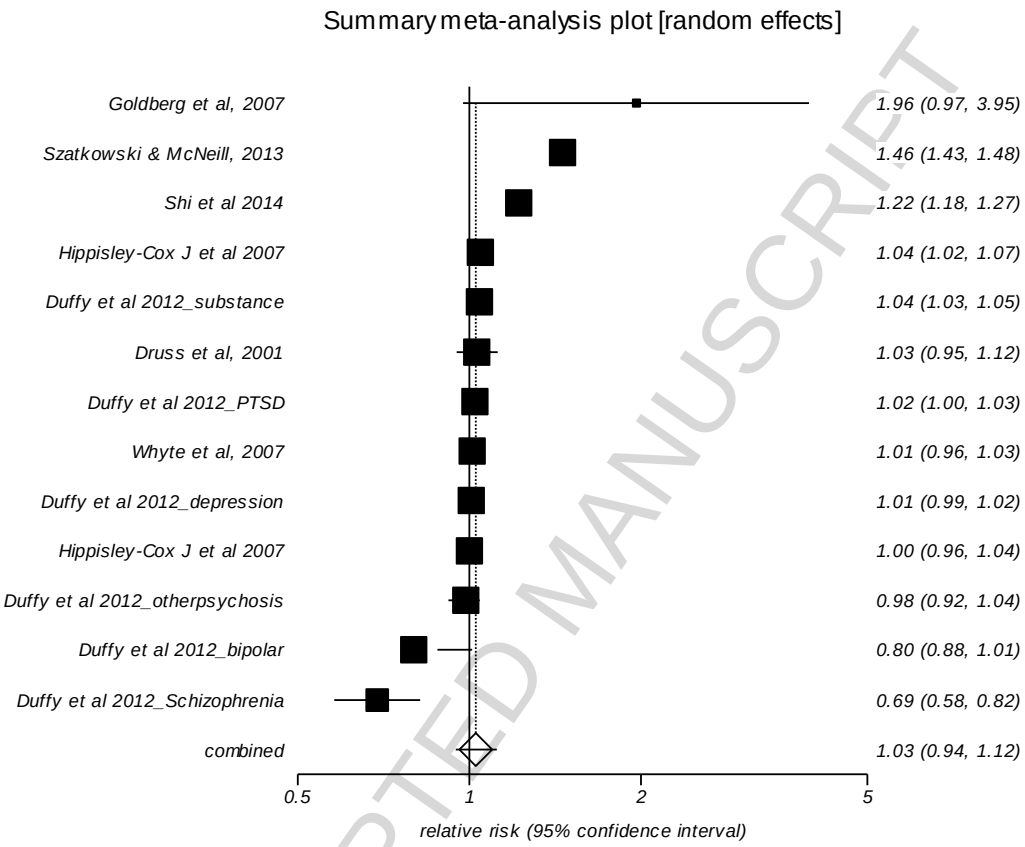


Figure 2b, funnel plots for main pooled analysis

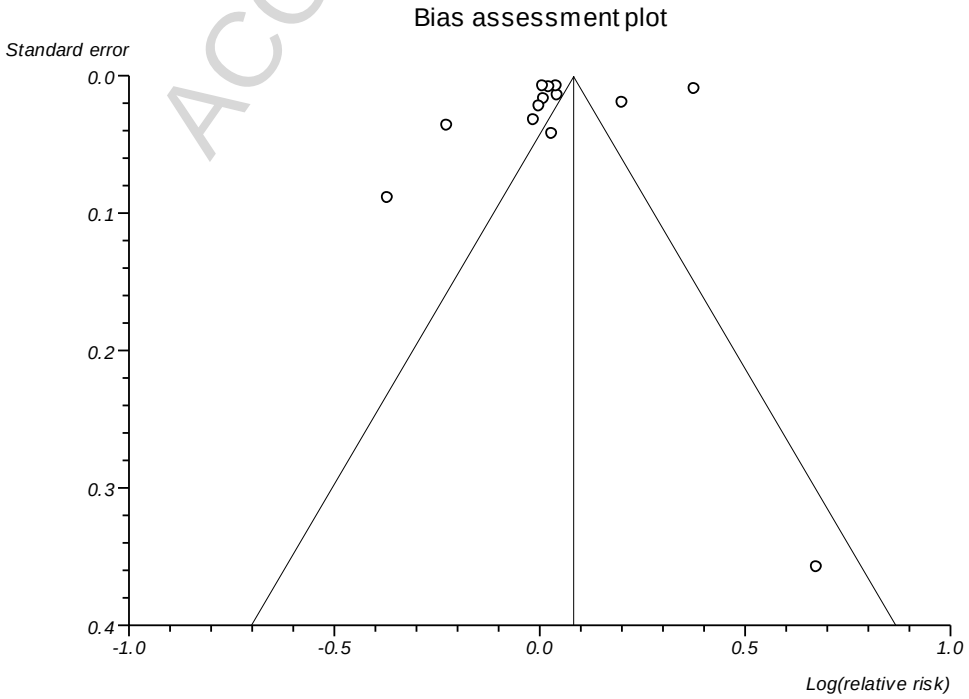


Figure 3. Smoking cessation rates in people with SMI and controls (N=5, n=559,122)

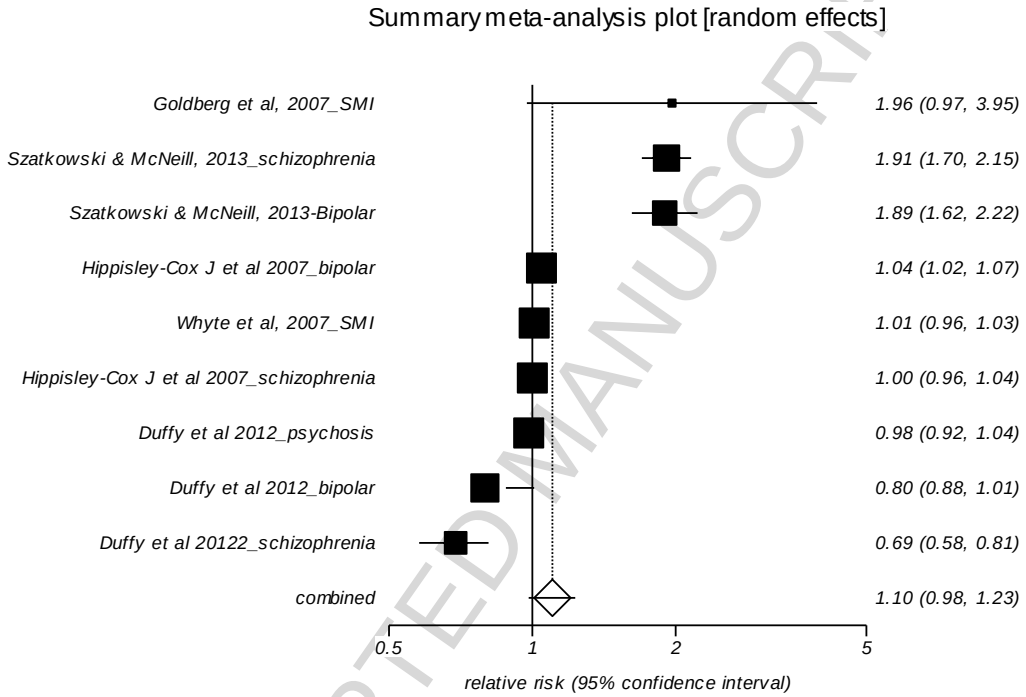
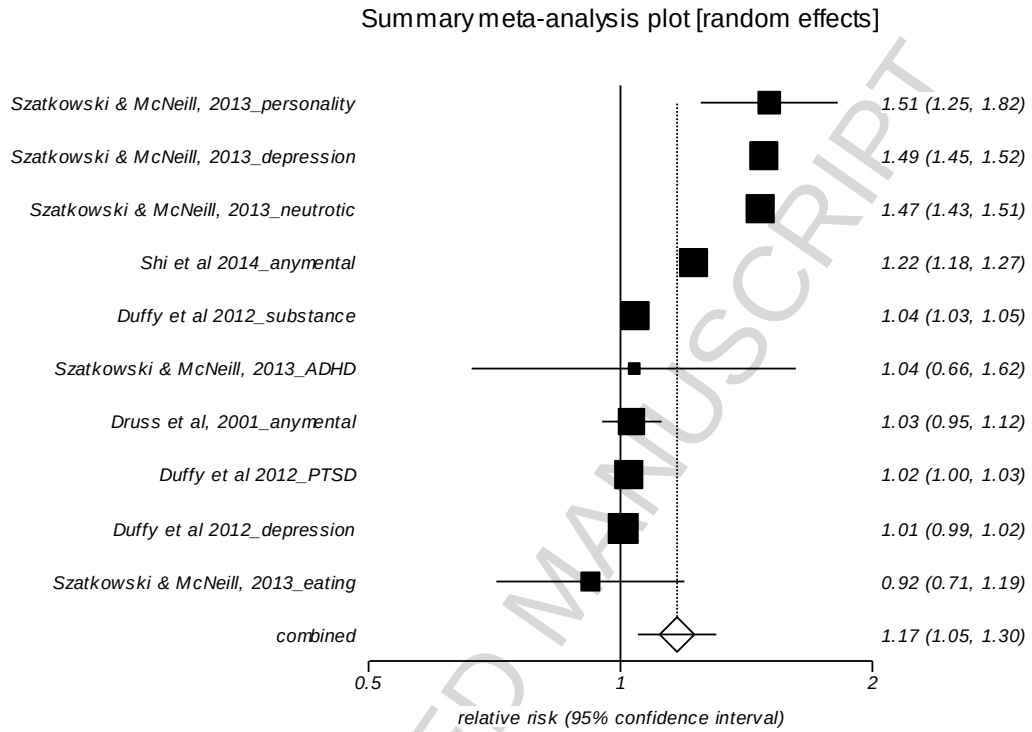


Figure 4. Pooled analysis of smoking cessation rates in people with non severe mental illness compared to those without any mental illness (n= mental illness=64,689, n control=515,517)



Study	Design and location	Details of participants	Diagnosis of mental illness	Details of smoking cessation	Results smoking cessation attendance rates	Other results	NOS score
Druss et al. 2001	USA, cross sectional, cohort study	83,577 Medicare patients hospitalised for a clinically confirmed Myocardial infarction without mental illness. Mean age 76.1 years, 52.7% female. 4664 had a mental illness, mean age 76 years, 47% female.	Any mental illness physician diagnosed	Smoking cessation counselling documented during hospitalisation	RR 1.03 (CI: 0.95-1.12)	Significant reduction in mortality among across the sample (including those with mental illness) in receipt of smoking cessation HR, 0.67 (CI: 0.62-0.72).	7
Hippisley-Cox et al 2007	UK, cross sectional, cohort study	127 231 patients with CHD and no mental illness, 40.8% female. 332 patient's schizophrenia and CHD, 47.3% female, 86%>55 years 369 with bipolar disorder and CHD, 57.7% female,	Schizophrenia and bipolar disorder based on GP records	Reported in smoking cessation status based on GP records in previous 15 months.	Schizophrenia: RR 0.99 (CI: 0.95-1.04) Bipolar disorder: RR 1.04 (CI:1.01-1.07)		8

		94%>55 years.					
Whyte et al 2007	UK, cross sectional, cohort study	10,000 randomly selected from 114,088 - patients with diabetes and no mental illness. 45.1% female, median age 67 (17 to 101) years 1043 people with SMI and diabetes (705 schizophrenia and 396 bipolar disorder & 58 had both), 53.8% female, median age 62 (23 to 93) years	GP records SMI (bipolar disorder and schizophrenia)	Smoking cessation advice given over the past 15 months as recorded on GP database.	RR 1.52 (CI: 0.6-3.86)	97% of people with SMI had smoking cessation advice compare to 96% of general population.	8
Goldberg et al 2007	USA, cross sectional study	99 patients with diabetes and no mental illness, 53.1 years, 47% female 201 patients with SMI and diabetes 50.1 years, 52% female	Medical records	Smoking cessation counselling.	RR 1.96 (CI: 0.97-3.95)	40.3% (n=42/104) people with SMI compared to 20.5% (n=7/34) without received smoking cessation counselling.	6

		(100 schizophrenia and 101 major mood disorder)					
Szatkowski & McNeill, 2013	UK, cross sectional, cohort study	387,246 patient's primary care without mental illness or taking psychotropic medication who smoked. Demographics not available. 32,154patients with mental illness who smoked: Schizophrenia 690 BPD 398 Depression 19,754 Neurotic, stress related somatoform disorders 13,703 Eating disorders 244 Personality disorders 322 Hyperkinetic disorders ADHD 75	Medical records	Smoking cessation advice offered.	**Whole sample:** RR 1.45 (CI: 1.43-1.48) Schizophrenia 1.91 (CI: 1.69-2.15) Bipolar disorder RR 1.89 (CI: 1.617-2.21) Depression RR 1.48 (CI: 1.45-1.52) Neurotic, stress related somatoform disorders RR 1.46 (CI: 1.42-1.51) Eating disorders RR 0.92(CI: 0.71-1.19) Personality disorders RR 1.50 (CI: 1.24-1.81) Hyperkinetic disorders ADHD RR 1.03 (CI: 0.66-1.62)	Prescription of smoking cessation medication higher in mental illness at 11.2% compared to 6.73% in those without mental illness. Smoking cessation advice offered in lower proportion of consultation in people with mental illness vs non mental illness; 7.9% of consultations with smokers with a mental health diagnosis vs. 8.2% in non-mental illness.	8
Duffy et al 2012	USA, cross section	27,652 smokers without a	Medical records	Physicians gave advice on smoking	Schizophrenia RR 0.69 (CI:	Significantly more people with	7

	al	mental illness. 1430 schizophrenia smokers 1612, bipolar disorder 450 other psychosis 11,068 depression 6,071 PTSD 7,520 substance user disorder. In eligible sample of smokers, 24.8% were female v 18.6% males		cessation.	0.58-0.82) Bipolar RR 0.79 (CI: 0.87-1.01) Other Psychosis RR 0.98 (CI: 0.91-1.04) Depression RR 1.00 (CI: 0.99-1.02) PTSD RR 1.02 (0.99-1.03) Substance Use disorder RR 1.04 (CI: 1.02-1.05)	mental illness were smokers. Schizophrenia OR 1.8, bipolar disorder OR 1.5, depression OR 1.2, substance use disorders OR 2.7.	
Shi et al 2014	USA, cross sectional	17,042 people with mental illness 1,897 with mental health problem.	Had seen a mental health professional (Psychiatrist, psychologist) in past year	Smoking cessation, advised to quit over the past year.	RR 1.22 (CI: 1.17-1.26)		6

Key: GP= general practitioner, NOS score = Newcastle Ottawa Scale Score, CI= confidence interval, CHD= coronary heart disease, PTSD= post traumatic distress disorder, USA= united states of America, UK= United Kingdom, RR= relative risk, OR = odds ratio, HR=hazard ratio

Note – All CI are reported at 95% unless otherwise stated.