**E-cigarette use and associated factors among smokers with severe mental illness**

**Peckham, Emily PhD1\*, Mishu, Masuma PhD1, Fairhurst, Caroline MSc1, Robson, Deborah PhD2, Bradshaw, Tim PhD3, Arundel, Catherine MSc1, Bailey, Della MSc1, Heron, Paul MRes1, Ker, Suzy MD4 and Gilbody, Simon DPhil1**

**Running head: E-cig use in SMI**

1. Department of Health Sciences, University of York, Heslington, YO10 5DD, UK
2. Institute of Psychiatry, Psychology and Neuroscience, King’ s College London, Denmark Hill, London, UK
3. School of Health Sciences, University of Manchester, Oxford Road, Manchester, M13 9PL,UK
4. Tees, Esk and Wear Valleys NHS Foundation Trust, Huntington, York, YO32 9XW, UK

\*corresponding author e-mail: emily.peckham@york.ac.uk

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# **Abstract**

Introduction: Smoking is more prevalent among people with severe mental illness (SMI) than the general population. E-cigarettes could provide an effective means of helping people to quit smoking. The aim of this paper is to explore the use of e-cigarettes and factors related to their use in ~~people~~ smokers with SMI.

Methods: This is a cross sectional study including adult smokers with a documented diagnosis of SMI (ICD-10) recruited to the SCIMITAR+ trial (2015-2016) from primary and secondary care. At baseline, participants were asked for demographic information and about their use of e-cigarettes. Data ~~was~~ were analysed to explore factors associated with e-cigarette use. After testing bivariate associations, logistic regressions were conducted.

Results: Among 526 participants, 58.7% were male, mean age 46 years (SD 12.1), the majority (70.3%) had tried an e-cigarette. Among those who had ever tried an e-cigarette, over half (54.6%) reported the reason was to quit smoking, while 13.9% reported that the reason was to reduce smoking. Having an educational qualification of GCSE or higher (odds ratio 2.17, 95% CI 1.22 to 3.86, p=0.008) and having made a quit attempt in the past six months (OR 1.66, 95% CI 1.04 to 2.63, p=0.032) was associated with ever having tried an e-cigarette.

Conclusions: Ever use of an e-cigarette was associated with education levels and recent quit attempts. Future trials could explore the effectiveness of e-cigarettes as a cessation aid in this participant group.

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# **Introduction**

People with severe mental illness (SMI) have a 15-20 year lower life expectancy than those in the general population and the biggest cause of this increased mortality is smoking-related illness.1 A recent study found that about half of the deaths of people hospitalised with a primary psychiatric diagnosis were caused by tobacco-related diseases.2 Therefore, smoking is a major public health concern, particularly among people who use specialist mental health services. In England, this has been highlighted in the recent National Health Service (NHS) long-term plan as an area for action.3 Individuals with SMI have been found to have a greater dependence on cigarettes and they smoke more than those in the general population do.4,5 Whilst the percentage of people who smoke in the general population in the UK has fallen to around 15% in 2018;6 the percentage of people with SMI who smoke has not seen the same decline.7 Currently around 40% of people with SMI smoke8 and this figure is likely to be higher in inpatient settings.9

Systematic review evidence indicates that the same smoking cessation strategies that work in the general population work for people with SMI10,11 and that people with SMI are just as likely to want to cut down or quit smoking as those in the general population.12 The lack of reduction in smoking prevalence among people with SMI therefore suggests that tobacco control initiatives that have driven down smoking prevalence in the general population have not had the same effect among smokers with SMI. Furthermore, NHS stop smoking services are becoming less available across the UK.13 To address this unmet need a bespoke smoking cessation intervention tailored to the needs of people with SMI was developed and tested in the SCIMITAR pilot 14 and SCIMITAR+ randomised controlled trials (RCTs).15 The use of e-cigarettes was not a specific part of the bespoke smoking cessation intervention; however, data was collected on e-cigarette use in trial participants in an attempt to better understand this emerging area.

An umbrella review of 14 systematic reviews of the effect of e-cigarettes on smoking cessation identified seven reviews that included a meta-analysis16. Due to methodological differences in how the reviews were conducted and synthesised, two systematic reviews found a positive effect, four found an inconclusive effect and one found a negative effect for the use of e-cigarettes for smoking cessation16. The umbrella review highlighted that those systematic reviews that found a negative or inconclusive effect synthesised several studies that were not specifically designed to test if e-cigarettes resulted in cessation or reduction. In the UK whilst e-cigarettes are utilised as a smoking cessation aid, people who have never smoked are advised not to start using an e-cigarette17. This is because although e-cigarettes are likely to be less harmful than smoking tobacco, the use of e-cigarettes is not completely harm free17.

A recent observational study in England assessed the effectiveness of commonly used smoking cessation aids among a nationally representative sample of nearly 19,000 adult smokers who had made at least one quit attempt in the previous year. It showed that use of e-cigarettes or varenicline were associated with higher abstinence rates following a quit attempt compared with other smoking cessation aids.18 Furthermore, a RCT of smokers attending UK NHS Stop Smoking Services found that e-cigarettes were more effective for smoking cessation than nicotine-replacement therapy (NRT), when both products were accompanied by behavioral support.19 However, to date little research has been conducted in the use of e-cigarettes amongst people with SMI.

There are currently no published studies that report on the prevalence of e-cigarette use (ever or current) in a UK sample of smokers with SMI17 nor the associations between e-cigarette use and smoking and clinical characteristics. One RCT, conducted in the US, of a smoking cessation intervention for people with SMI looked at participants’ e-cigarette use throughout the course of the trial and factors associated with e-cigarette use. Throughout the study period, they found that overall e-cigarette use among 956 smokers was 11%, increasing over the course of the trial from 0% in 2009 to 72% in 2013; use was associated with a younger adult age group (18-26) and users were at the preparation stage of change for quitting smoking rather than the pre-contemplation stage. However, this study relied on participants disclosing that they were using e-cigarettes when asked about ‘all forms of tobacco use’ at baseline and follow up rather than being directly asked about e-cigarette use.20 There have been population-based studies conducted in the US exploring the prevalence of e-cigarette use among people with mental health conditions, including those with psychological distress, common mental disorders such as depression or anxiety and SMI.21-23 These studies found that people with mental health conditions were more likely to smoke and more likely to ever or currently use an e-cigarette than those without a mental health condition, though these studies did not explore the factors that predicted e-cigarette use in an SMI population. Studies that recruited participants from clinical settings have also reported high rates of ever and current use of e-cigarettes.24,25 People with a mental health condition who smoke, report that they use e-cigarettes to help them quit or reduce smoking, to save money, and because they were less harmful to those around them.22,26 There have been a number of uncontrolled studies that have evaluated the effect of e-cigarettes for smoking cessation or reduction among people with SMI.27-29

Given the limited literature, particularly from a UK sample, there is a clear need to better understand the use of e-cigarettes in people with SMI, reasons for using e-cigarettes and factors associated with their use. The aim of this study is therefore to explore the use of e-cigarettes and associated factors among people with SMI who expressed a desire to cut down or quit smoking using data gathered from the SCIMITAR+ trial.

# **Methods**

## **Study participants**

SCIMITAR+ is a two-arm, pragmatic, parallel-group RCT (ISRCTN72955454). It is a multi-centre study (22 sites in the UK) and recruited from both primary care and specialist mental health services (secondary care). Ethical approval was sought from, and granted by, NRES Committee Yorkshire and The Humber - Leeds East Research Ethics Committee on 19th March 2015 (ref: 15/YH/0051261). Between October 2015 and December 2016, the trial recruited 526 smokers with SMI.

Participants were aged 18 years or over with a documented diagnosis of schizophrenia, delusional/psychotic illness (ICD 10 F20.X and F22.X or DSM-equivalent) or bipolar disorder (ICD F31.X or DSM-equivalent), who smoked five or more cigarettes per day and expressed a desire to cut down or quit smoking. Exclusion criteria were: non-English speaking, currently receiving advice from a stop smoking advisor, known co-morbid drug or alcohol dependency (recorded in primary care or psychiatric notes), lack of capacity to consent, pregnant or breast-feeding. Participants were followed up at six and 12 months post randomisation. Detailed methods for this study are reported elsewhere30 and the main clinical results published.15 People were randomised to usual stop smoking services (n=261) or to the bespoke smoking cessation (BSC) intervention (n=265).

## **Measures used in this study**

This analysis used the baseline data for SCIMITAR+ participants. Data were collected using the following questions: Have you ever tried an e-cigarette?; How often in the last 30 days have you used an e-cigarette?; How long have you been using e-cigarettes?; Has your use of tobacco changed since you started using e-cigarettes?; and, What was the reason you started using e-cigarettes?

The association of ever use of e-cigarettes with participant’s sociodemographic characteristics (age, gender, ethnicity, education and employment status); mental and physical well-being (anxiety, depression, general health and psychiatric diagnosis); and smoking behaviour data (number of cigarettes smoked per day and quit attempts in the past six months) was investigated.

For analysis, variables were considered as follows: age was used as a continuous variable; gender was categorised as Male/Female/Transgender; ethnicity as White/Other; educational qualification as None/GCSE, O level or higher; and employment status as Employed or Retired/Unemployed.

The GAD-731 and PHQ-932 were used to measure anxiety and depression respectively, and were categorised as Minimal/Mild/Moderate/Severe. General health was measured by the self-rated indicator question from the SF-12 questionnaire33, “In general, would you say your health is” with response options of Excellent/Very good/Good/Fair/Poor. For analysis purposes, these were re-categorised into three groups by merging ‘Excellent’ with ‘Very good’, and ‘Good’ with ‘Fair’. Psychiatric diagnosis was obtained from the participant’s medical notes and grouped as ‘bipolar disorder’, ‘schizophrenia and schizoaffective disorder’ and ‘psychotic illness and other’. Smoking behaviour data included number of cigarettes smoked per day, categorised as ‘Up to 20 cigarettes per day’ and ‘More than 20 cigarettes per day’, and number of attempts to give up smoking in the last six months (No attempt/One or more attempts).

## **Data analyses**

Bivariate associations between participants’ ever use of e-cigarettes at baseline and potentially associated factors also collected at baseline were tested using a t-test (for age) and chi-squared test for categorical variables. Descriptive statistics of self-reported pattern and reason for e-cigarette use in the population is reported and the chi-squared test was conducted to test any association with past 30 day use of e cigarette with number of cigarette per day and reason of first starting using e-cigarette. Logistic regressions were conducted considering the dichotomised variable of ever use of e-cigarettes as the outcome variable. Based on the socio-ecological model, we first tested the individual-level socio-demographic factors, and then mental and physical health related variables, and finally (smoking) behaviour related variables. Three models were constructed, with an increasing set of independent variables: Model 1 - ever use of e-cigarette was adjusted for age, gender, ethnicity, education and employment status; Model 2 - Model 1 additionally adjusted for anxiety, depression, general wellbeing and psychiatric diagnosis; and Model 3 - Model 2 additionally adjusted for number of cigarettes per day and number of quit attempts in the past six months.

Analyses were conducted in Stata v1534 using two-sided statistical tests at the 5% significance level. We conducted the analysis based on the complete cases. The variable with the maximum number of missing data was with ‘GAD-7’ variable (N=426). We conducted a sensitivity analysis excluding that variable from the model, which did not show any significant change in the associations.

# **Results**

In the study population of 526 participants, all of whom were smokers, 58.7% were male and the mean age was 46 (SD 12.1) years. The majority of participants were white (89.9%), 84.0% had an educational qualification of GCSE/O level or higher, and 23.6% were employed or retired. The majority of participants, 370 (70.3%) reported that they had ever used an e-cigarette (Table 1).

In the bivariate analysis, age was significantly associated with e-cigarette use. The mean age of participants who had ever tried an e-cigarette was 45.2 years (SD 11.8) compared to the mean age of 47.9 years (SD 12.7) of those who had never tried an e-cigarette (p=0.017). The chi-squared test showed that educational level was associated with the use of e-cigarettes, with 72.9% who had an educational qualification of GCSE/O level or above reporting e-cigarette use compared to 56.6% who had no educational qualifications (Pearson chi2=8.89, p=0.003). Among other socio-demographic variables, gender, ethnicity, and employment were not significantly associated with e-cigarette use (Table 1).

Based on the total score obtained from the GAD-7, 32.1% had minimal levels of anxiety, 28.1% mild, 21.0% moderate and 18.9% had severe levels. Based on the total score obtained from PHQ-9, 21.2% had minimal levels of depression, 26.5% mild, 25.2% moderate, and 27.1% had severe levels. Based on participants’ self-reported general health, 12.1% had excellent health, 61.4% had good to fair health and 26.6% had poor general health. The majority of the study population had schizophrenia and schizoaffective disorder (62.8%), followed by bipolar disorder (22.0%), and psychotic illness or other (15.3%). None of these variables (level of anxiety or depression, general health and psychiatric diagnosis) were statistically significantly associated with e-cigarette use. Among smoking behaviour variables, participants tended to have a long history of smoking (mean duration of smoking 29.9 years) and were heavy smokers (mean number of cigarettes smoked per day was 24). Over half (56.5%) the participants smoked up to 20 cigarettes per day, and 43.5% smoked 20 or more per day. Almost half (48.4%) of participants had attempted to give up smoking in the last six months one or more times. A quit attempt in the past six months was associated with e-cigarette use; 77.6% of participants who had made one or more quit attempts in the past six months reported ~~having used~~ ever having tried an e-cigarette, compared to 63.5% who had not tried to quit (Pearson chi2=12.46, p<0.001). The number of cigarettes smoked per day was not associated with e-cigarette use (Table 1).

The pattern and reason for ever using an e-cigarette in this study population are shown in Table 2. Among ever users, 35 (9.5%) reported that they had used an e-cigarette daily and a further 42 (11.4%) at least once a week, in the previous 30 days. The most commonly reported reason for starting to use e-cigarettes was to quit smoking (54.6%). Other reported reasons were: to reduce smoking (13.9%); as a safer alternative to tobacco (13.9%); wanting to try something new (7.8%); and ‘other’ reasons (9.8%). The ‘other’ reported reasons were clustered under the following four themes: as an alternative where smoking is not allowed (“to smoke inside/hospital inpatients/allowed in hospital, to use in non-smoking area/travel airport”); health issues (“ill health/health reasons/doctor encouraged/forced to it”); it’s considered trendy (“everyone is using them/people disapproving of smoking/interested/tried to enjoy got as gift/got as free sample”); and cost (“cheaper/cigarettes are too expensive”). Regarding the duration of use, 69 (20.7%) participants reported having used an e cigarette for a year or more and 126 (37.1%) reported that since starting to use e-cigarettes they were smoking less tobacco (Table 2). There was no significant association between past 30 day use of e cigarette and the reason of first starting to use e-cigarettes. However, there was a statistically significant association between past 30 day use of e cigarette and number of cigarettes smoked per day. Among the 35 participants reporting daily use of an e-cigarette, 74.3% reported smoking 5-20 cigarettes/day. In contrast, among the 252 participants reporting not using an e-cigarette in the past 30 days, 58.3% reported smoking 5-20 cigarettes/day.

Logistic regression analyses showed that in Model 1, age (OR 0.98, 95% CI 0.96 to 1.00, p=0.030) and education (OR 1.97, 95% CI 1.21 to 3.21, p=0.006) were statistically significantly associated with e-cigarette use. Age was statistically significant in the first two logistic regression models (Model 1 and Model 2); with a one year increase in age the odds of using an e-cigarette was 0.98 times lower. In Model 2, only education level (OR 2.49, 95% CI 1.42 to 4.38, p=0.002) was significantly associated with e-cigarette use. However, in the third model, after adjusting for smoking habit-related variables, age became non-significant. In the fully adjusted model (Model 3), education level and quit attempts in the past six months were significantly associated with e-cigarette use. Those with an educational qualification of GCSE or higher had 2.17 times higher odds (95% CI 1.22 to 3.86, p=0.008) of ever having tried an e-cigarette use compared to those who did have any educational qualification. Those who had attempted to quit smoking at least once in the past six months had 1.66 times higher odds (95% CI 1.04 to 2.63, p=0.032) of ever having tried an e-cigarette use compared to those who did not report any quit attempts in the past six months (Table 3).

# **Discussion**

In the study population, 370 participants (70.3%) reported ever use of e-cigarettes, and among those, 35 (9.5%) reported daily use of an e-cigarette in the past 30 days. Over half (54.6%) of the participants started using e-cigarettes in an attempt to quit smoking tobacco, and 69 (20.7%) participants reported having used e-cigarettes for a year or more. Whilst the SCIMITAR+ trial recruited mainly older participants, the mean age of those who reported ever having used an e-cigarette was lower than non-users; in the general population it is also younger people who are more likely to have tried an e-cigarette.35

The level of education and having had a quit attempt in the past six months were statistically significantly associated with e-cigarette use in the fully adjusted model. People with an education level of GCSE or higher and those who had one or more quit attempts in the past six months were more likely to have used an e-cigarette.

When the SCIMITAR programme of work was conceived in 2009 we did not anticipate the worldwide exponential increase in the use of e-cigarettes that subsequently occurred.36 In addition the Public Health England Joint statement on e-cigarettes was issued in 201637 after the SCIMITAR+ full trial had commenced. Despite this, at baseline (October 2015-December 2016) people who made one or more quit attempts in the last six months were more likely to have tried an e-cigarette. Use of other nicotine containing products is to be expected in a sample that comprises of a group of long-term smokers who want to stop smoking, half of whom have tried to give up smoking at least once in the past six months, and been unsuccessful. It is plausible that our sample’s use of e-cigarette was a sign of motivation to try everything to help them stop smoking .Our findings are ~~This is~~ similar to the result found by Prochaska20 where people who were planning a quit attempt were more likely to have used an e-cigarette.

The main reason people gave for starting to use an e-cigarette was to quit smoking (54%). This is similar to findings from two surveys of people with mental health problems in the US about e-cigarette use22,24,26 and slightly higher than the main reasons for use reported by Action on Smoking and Health, (ASH) in a recent about the use of e-cigarettes among adults in Great Britain.36 In the ASH survey, 40% of smokers cited wanting to quit or abstain from smoking as their reason for using e-cigarettes, the second most popular reason in both this study and the ASH survey was to cut down on smoking (14% and 17% respectively). The difference between this study and the ASH survey was that in the ASH survey 15% of participants reported using an e-cigarette to save money however this was not one of the reasons for respondents in the SCIMITAR+ study gave for using an e-cigarette although this could be because we did not specifically ask about money saving.

People with SMI may find e-cigarettes an appealing substitute for combustible cigarettes. A study found that those with mental health conditions were more likely to use e-cigarettes than those without.29 A small number of participants (n=35) were concurrent daily smokers and daily e-cigarette users, and a further 42 were at least weekly e-cigarette users. So called ‘dual users’ include a wide range of smoking and e-cigarette use patterns, from those who smoke many cigarettes a day and use e-cigarettes only very occasionally to those who use e-cigarettes several times a day and smoke only very occasionally, and every combination of behaviours in between16. Concurrent use is unlikely to be associated with reductions in harm, particularly when there is no substantial reduction in the number of cigarettes smoked (Shahab et al). However, studies that have compared concurrent users with exclusive smokers and exclusive e-cigarette users have not found an increase in harm among concurrent users.38,39 Some studies have reported increased harm associated with concurrent use;40 however given that almost all e-cigarette users are recent former or continuing smokers it is difficult to isolate the effects arising from past smoking from current vaping, something which studies often fail to do.

Although there are now several RCTs and observational studies evaluating the efficacy of e-cigarettes for smoking cessation among general population smokers16,18,19, there is currently a paucity in research in relation to their efficacy in people with SMI. A recent pilot study,27 conducted in England investigated the role of e-cigarettes for harm reduction in 50 individuals with a psychotic disorder. Participants were supplied with an e-cigarette for six weeks. Ten participants achieved over 50% reduction in cigarette per day at 24 week follow up and one had quit smoking. A prospective 12-month pilot study conducted in Italy with 14 smokers with schizophrenia, who were given an e-cigarette for 4-weeks reported 2/12 people had quit smoking at 12 month follow up and 7/14 (50%) participants had reduced their number of cigarettes per day by at least 50%. The authors concluded that the use of e-cigarette could substantially decrease cigarette consumption without causing significant side effects in people with schizophrenia who smoke and not intending to quit.28 Pratt et al29 assessed the effect of giving an e-cigarette for 4-weeks with 19 smokers with SMI. Participants significantly reduced their cigarettes smoked per week, from 204 at baseline to 75 at the end of the 4-week supply period.

Exploring factors associated with the use of an e-cigarette, as we have done in this analysis of the baseline data in the SCIMITAR+ study, could be helpful when considering how the use of an e-cigarette as a cessation or a harm reduction tool could be incorporated into a future study. Similarly, if e-cigarette use is accepted as an effective adjunct to successful quitting, then strategies could be developed to target populations who do not currently use e-cigarettes.

The study has the following limitations; firstly we have conducted a cross-sectional analysis rather than a longitudinal analysis and can therefore not provide any information about whether or not using an e-cigarette has been effective in helping people with SMI to quit smoking. Secondly the population we recruited as part of the SCIMITAR+ study are people who are current smokers who want to either cut down or quit smoking and we therefore do not know whether these results are generalisable to people who do not want to change their smoking behaviour. Finally, the data analysed in this study were collected in 2015 and 2016 and people’s interest in trying an e-cigarette may have changed. For example, since 2016, in the UK, e-cigarettes have been highly regulated (e.g. a cap on nicotine strength and a ban on all broadcast media and cross-border advertising). The variety and availability of e-cigarettes has increased and due to technological advances, devices are better at delivering nicotine.

There has been little research, as yet, into the use of e-cigarettes among people with SMI in the UK. Given that smoking prevalence remains high among people with mental ill health, particularly those with SMI, it is important that the acceptability of potential smoking cessation aids be explored for this population. The findings of our study are important, given that we found that use of an e-cigarette in people with SMI was associated with making a quit attempt in the past six months, a proxy measure of motivation to quit; indicating that people who have made a recent quit attempt are likely to have used an e-cigarette in the past and are therefore potentially open to trying an e-cigarette as a part of a supported quit attempt. This suggests that there is the potential for considering an e-cigarette as a cessation tool in this population. However, we do not know whether e-cigarettes are effective in helping this population to quit smoking and more research is required in this area and the long-term effects of an e-cigarette on mental and physical health also need to be assessed.

**Table 1: Distribution of the study sample (N, max=526)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Characteristic** | **Categories** | **mean age (SD)** | **Never tried e-cig,**  **Mean (SD)** | **Ever tried e-cig,**  **Mean (SD)** | **p-value (t-test)** |
| Age, years | N/A | 46.0 (12.1) | 47.9 (12.7) | 45.2 (11.8) | 0.017 |
| **Characteristic** | **Categories** | **n (%)** | **Never tried e-cig,**  **n (%)** | **Ever tried e-cig,**  **n (%)** | **p-value (chi-squared)** |
| **Gender** | Male | 309 (58.8) | 94 (30.4) | 215 (69.6) | 0.264 |
| Female | 216 (41.0) | 61 (28.2) | 155 (71.8) |
| Transgender | 1 (0.2) | 1 (100.0) | 0 (0.0) |
| **Ethnicity** | White | 472 (89.9) | 142 (30.1) | 330 (69.9) | 0.579 |
| Other | 53 (10.1) | 14 (26.4) | 39 (73.6) |
| **Education** | None | 83 (16.0) | 36 (43.4) | 47 (56.6) | 0.003 |
| GCSE-Higher and other | 436 (84.0) | 118 (27.1) | 318 (72.9) |
| **Employment** | Any work,  retired | 124 (23.6) | 37 (29.8) | 87 (70.1) | 0.960 |
| Unemployed | 402 (76.4) | 119 (29.6) | 283 (70.4) |
| **Number of cig/day** | Up to 20/day | 297 (56.5) | 83 (53.2) | 214 (57.8) | 0.328 |
| >20/day | 229 (43.5) | 73 (46.8) | 156 (42.2) |
| **Quit attempts in past six months** | 0 | 271 (51.6) | 99 (36.5) | 172 (63.5) | <0.001 |
| Once or more | 254 (48.4) | 57 (22.4) | 197 (77.6) |
| **Anxiety (GAD-7)** | Minimal | 168 (32.1) | 56 (30.3) | 129 (69.7) | 0.391 |
| Mild | 147 (28.1) | 35 (34.0) | 68 (66.0) |
| Moderate | 110 (21.0) | 22 (30.1) | 51 (69.9) |
| Severe | 99 (18.9) | 14 (21.5) | 51 (78.5) |
| **Depression (PHQ-9)** | Minimal | 111 (21.2) | 32 (28.8) | 79 (71.2) | 0.814 |
| Mild | 139 (26.5) | 37 (26.6) | 102 (73.4) |
| Moderate | 132 (25.2) | 40 (30.3) | 92 (69.7) |
| Severe | 142 (27.1) | 45 (31.69) | 97 (68.3) |
| **General wellbeing (SF-12)** | Excellent | 63 (12.1) | 17 (27.0) | 46 (73.0) | 0.740 |
| Good | 321 (61.4) | 99 (30.8) | 222 (69.2) |
| Poor | 139 (26.6) | 39 (28.1) | 100 (71.9) |
| **Psychiatric diagnosis** | Bipolar disorder | 115 (22.0) | 28 (24.4) | 87 (75.7) | 0.335 |
| Schizophrenia and schizoaffective disorder | 329 (62.8) | 104 (31.6) | 225 (68.4) |
| Psychotic illness and Other | 80 (15.3) | 23 (28.8) | 57 (71.3) |

**Table 2: E-cigarette use in the study population**

|  |  |  |
| --- | --- | --- |
| **E-cigarette use** | **Categories** | **n (%)** |
| **Ever used e-cigarettes (n=526)** | Yes  No | 370 (70.3)  156 (29.7) |
| **Past 30 day use**  **(n=368)** | Never  Less than once a week  At least once a week  Every day | 252 (68.5)  39 (10.6)  42 (11.4)  35 (9.5) |
| **Duration of using e-cigarettes**  **(n=334)** | <1 month  1-6 months  6-12 months  >1 year | 134 (40.1)  82 (24.6)  49 (14.7)  69 (20.7) |
| **Has using e-cigarettes changed tobacco use**  **(n=340)** | Yes, I smoke less tobacco  Yes, I smoke more tobacco  No, it has not changed | 126 (37.1)  16 (4.7)  198 (58.2) |
| **Reason for starting to use an e-cigarette**  **(n=346)** | To quit smoking tobacco  To try a safer alternative to tobacco  To try something new  To smoke less tobacco  Other | 189 (54.6)  48 (13.9)  27 (7.8)  48 (13.9)  34 (9.8) |

**Table 3: Association of baseline factors with ever having tried an e-cigarette use via adjusted logistic regression**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **Model 1**  **OR (95% CI)**  **p-value** | **Model 2**  **OR (95% CI)**  **p-value** | **Model 2**  **OR (95% CI)**  **p-value** |
| Age (continuous variable) | 0.98 (0.96, 1.00)  0.030 | 0.98 (0.96, 1.00)  0.050 | 0.98 (0.96, 1.00)  0.075 |
| Sex\* (ref=Male)  Female | 1.20 (0.81, 1.77)  0.369 | 1.11 (0.69, 1.76)  0.667 | 1.09 (0.67, 1.77)  0.719 |
| Ethnicity (ref= White)  Other | 1.06 (0.55, 2.06)  0.851 | 1.26 (0.56, 2.81)  0.573 | 1.14 (0.51, 2.58)  0.745 |
| Education (ref=None)  GCSE or Higher | 1.97 (1.21, 3.21)  0.006 | 2.49 (1.42, 4.38)  0.002 | 2.17 (1.22, 3.86)  0.008 |
| Employment (ref= Any work, retired)  Unemployed | 1.04 (0.66, 1.63)  0.857 | 1.40 (0.83, 2.34)  0.202 | 1.36 (0.81, 2.30)  0.247 |
| Anxiety (GAD-7)(ref=Minimal)  Mild |  | 0.88 (0.52, 1.55) 0.668 | 0.87 (0.49, 1.54) 0.639 |
| Moderate |  | 1.07 (0.55, 2.07)  0.849 | 1.05 (0.53, 2.05)  0.893 |
| Severe |  | 1.90 (0.87, 4.15)  0.107 | 2.02 (0.90, 4.51)  0.088 |
| Depression (PHQ-9)(ref=Minimal)  Mild |  | 0.88 (0.44, 1.73)  0.705 | 0.73 (0.36, 1.46)  0.375 |
| Moderate |  | 0.63 (0.31, 1.28)  0.202 | 0.57 (0.28, 1.19)  0.135 |
| Severe |  | 0.56 (0.26, 1.18)  0.128 | 0.47 (0.22, 1.02)  0.057 |
| General wellbeing (SF-12)  (ref=Excellent)  Good  Poor |  | 1.02 (0.51, 2.07)  0.947  1.22 (0.54, 2.78)  0.632 | 1.13 (0.55, 2.32)  0.727  1.34 (0.58, 3.10)  0.489 |
| Psychiatric diagnosis  (ref=Bipolar disorder)  Schizophrenia and schizoaffective disorder |  | 0.65 (0.35, 1.19)  0.159 | 0.65 (0.34, 1.22)  0.177 |
| Psychotic illness and Other |  | 0.52 (0.24, 1.13)  0.101 | 0.57 (0.25, 1.26)  0.163 |
| Number of Cig/day  (ref=Up to 20/day)  >20/day |  |  | 1.09 (0.84, 1.41)  0.502 |
| Quit attempt in past 6 month  (ref=0 attempts)  One or more attempt |  |  | 1.66 (1.04, 2.63)  0.032 |

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