Tobacco Use and Depression: A Hidden Epidemic among Smokers 18 Years and Older, Puerto Rico, 2018–2020

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Objective: According to the literature, depression and tobacco use are closely linked. This study's main objectives were to provide the first population-based epidemiological profile of smokers with depression (SWD) who were 18 years and older and living in Puerto Rico (PR) from 2018 to 2020 and identify any statistically significant differences between SWD and smokers without depression (SWOD).

Methods: A descriptive cross-sectional study was carried out using PR Behavioral Risk Factor Surveillance System (PRBRFSS) data (2018-2020). Univariate analysis was performed to obtain an epidemiological profile of smokers who had depression. Likewise, using bivariate analysis, SWD and SWOD were compared to identify statistically significant differences in terms of chronic conditions, risk factors, and quit attempts.

Results: Depression prevalence among smokers 18 years and over in PR from 2018-2020 was 23.7%. Smokers with depression were more likely to be physically inactive (*P* < .001), overweight or obese (*P* < .001), have arthritis (*P* < .001), chronic obstructive pulmonary disease (*P* < .001), asthma (*P* < .001), high cholesterol (*P* < .001), hypertension (*P* < .001), coronary heart disease (*P* < .001), diabetes (*P* < .001), stroke (*P* < .001), and heart attack (*P* < .001) compared with SWOD. Likewise, SWD made more quitting attempts in the past year than did SWOD (*P* < .001).

Conclusion: Our results indicate that SWD should be targeted in any health-based tobacco-control efforts to develop evidence-based strategies to reduce or eliminate tobacco use in this same population. [*P R Health Sci J 2023;42(4):298-303*]

Key words: Tobacco, Depression, Tobacco and depression, Tobacco use, Puerto Rico

Depression is one of the most common mental disorders, both in the United States (US) and worldwide. It has been estimated that 3.8% (279,606,279) of the world's population has depression (1). According to the Behavioral Risk Factor Surveillance System (BRFSS) for 2020, in the US (including Puerto Rico [PR]), approximately 19.2% of the population 18 years and over had depression (2). Likewise, in PR, alone, during the 2018-2020 period, the estimated depression prevalence was 17.5% (2). Moreover, tobacco use has been one of the leading causes of disease, disability, and death worldwide, despite substantial reductions in prevalence (3). Over the past 30 years, it is estimated that tobacco use has caused more than 200 million deaths, with an annual economic cost of $1 trillion (4, 5). In 2020, the prevalence of tobacco use in people 18 years and over was 15.5% in the US (including PR) and 9.8% in PR, alone (2).

According to the literature, there is a close relationship between mental illness and tobacco use. People with mental illnesses are estimated to have a prevalence of tobacco use of 34% to 40%, while that prevalence may fluctuate from 17 to 21% in the general population (6, 7).

Depression is twice as common in smokers than in non-smokers and can be 4 times more common in heavy smokers (8). It has been estimated that people who have or had depression are twice as likely to use tobacco and to smoke more cigarettes than

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people without depression are (9). At the same time, smokers with depression (SWD) have stronger nicotine dependence, suffer negative mood symptoms from withdrawal (10), and may face a disproportionate burden of disease and death related to tobacco use compared to their non-depressed counterparts (11–13).

Some population-based studies have shown that trends of decreased tobacco use observed in the general population are not the same in the population of individuals with mental illness (14, 15). Depression appears to play an important role in smoking cessation (10, 16). People with depression are more likely to have fewer days of continuous abstinence from tobacco use (16–18). Despite the above, tobacco use cessation has been shown to reduce depression and help improve the psychological quality of life in individuals (19). Taylor et al. conducted a meta-analysis in 2021 (which included 102 studies representing more than 169,500 people) in which smoking cessation was associated with reduced symptoms of depression, anxiety, mixed anxiety and depression, and stress and with increased positive affect (20). For this reason, experts recommend using tobacco cessation treatments for patients (smokers) with depression and other mental illnesses (21). However, tobacco use in patients with mental illnesses, including depression, has not been a priority issue in treating these conditions (22). Evidence of this is provided in the research conducted by the Centers for Disease Control and Prevention (CDC) and the Substance Abuse and Mental Health Services Administration (23). This research showed that among mental health treatment facilities in the US (including PR), only 48.9% reported screening patients for tobacco use; 37.6% of these facilities offered counseling for tobacco cessation, 25.2% offered nicotine replacement therapy, 21.5% offered non-nicotine tobacco cessation medications, and 48.6% were entirely smoke-free (23). Some of the myths that may be contributing to the fact that mental health treatment facilities are not offering tobacco cessation services are that patients are poorly motivated to quit smoking, tobacco use helps them said patients control their symptoms, and the smoking cessation process will aggravate symptoms and cause a relapse of the psychiatric disorder (21, 22). This demonstrates that some mental health professionals lack training regarding strategies to promote smoking cessation; unfortunately, this lack is not limited to this particular medical field. However, the issue is compounded by the fact that smokers with mental disorders are one of the populations that are most excluded from clinical trials because they are considered too complicated (21). Considering all the above, the main objective of this research was to provide the first population-based epidemiological profile of SWD who were 18 years and older and living in PR during the 2018-2020 period. Our secondary objective was to identify statistically significant differences between SWD and smokers without depression (SWOD) in terms of chronic disease, risk factors, and quit attempts to have a clear picture of the needs of this population.

Materials and Methods

Study sample

Using a cross-sectional study methodology, an analysis of the PR Behavioral Risk Factor Surveillance System (PR-BRFSS) database was performed with data from 2018-2020. The BRFSS is a population-based telephone survey funded by the CDC and is conducted annually in all 50 states, the District of Columbia, Guam, PR, and the US Virgin Islands. Annually, about 450,000 US adults are interviewed; for that reason, the BRFSS is considered the largest telephone health survey in the world. In PR, this survey began in 1996 and is part of the PR Department of Health. The BRFSS contains information on non-institutionalized adults 18 years and over, including sociodemographics, health conditions, and tobacco and alcohol use, among other variables. The response rates for this survey were calculated using the response-rate formula of the American Association of Public Opinion Research. For the study period, the response rates for the BRFSS were 43.4% in 2018, 49.4% in 2019, and 47.9% in 2020.

After performing quality control measures and cleaning and weighing the data for each year, the PR-BRFSS sent a copy of the database to the PR Tobacco Control Program (PRTCP) to analyze everything related to tobacco use on the island. This database does not contain any personal information about the participants that would allow the researchers to identify them individually. For this reason, it was not required that an institutional review board perform an ethics review or approve the research. The study sample consisted of 15,819 people who were 18 years and over and living in PR during the 2018-2020 period. The questionnaire is available in Spanish and English and was administered in whichever language was needed for a given participant.

Measures

The sample was divided into 4 groups: people with depression, people who use tobacco, SWD, and SWOD. People with depression were defined through the variable "Ever told you had a depressive disorder (including depression, major depression, dysthymia, or minor depression)?" The possible answers were "yes," "no," and "do not know/not sure"; for the analysis, there were 2 additional answer codes, which were "Refused" and "Not asked or Missing." The refusal rate for this question was 0.18%. The BRFSS identifies persons who smoke using the calculated variable "Adults who are current smokers." The possible answers to the question linked to the (current) smoking category are "yes" (includes people who report smoking some days and people who report smoking every day) and "no (includes people who report being former smokers and people who report that they have never smoked). The refusal rate for this question was 1.17%. For the purposes of analysis, the variables tobacco use and depression were created using the question "Ever told you had a depressive disorder (including depression, major depression, dysthymia, or minor depression)?" and the variable "Adults who

are current smokers." The possible answers to the question about depression and the question linked to the smoking category were "yes" (included people who reported being a current smoker and people who reported that they had depression) and "no" (included people who reported being a current smoker but who did not report having depression). This question does not have a refusal rate because it is a calculated variable. Other covariates used in the analysis were sex, age group, annual income, educational level, employment status, marital status, physical activity, overweight or obesity, heavy drinking, quit smoking in the past year, hypertension, cholesterol, arthritis, asthma, diabetes, chronic obstructive disease, heart attack, coronary heart disease, and stroke (Table 2, 3).

Statistical analysis

Using the statistical program STATA, version 14, a new weight variable was created to analyze the 2018-2020 data. The new variable was calculated by dividing the weighting variable that the CDC created for the 3 years under study. After performing the weighting for the period of 2018-2020, a univariate analysis was performed using frequency distributions for categorical variables; means and standard deviations were calculated for continuous variables. In the second part of the statistical analysis, SWD and SWOD were compared to identify statistically significant differences (Pearson's chi-squared test; $P < .05$) in sociodemographic characteristics, chronic diseases, risk factors, and quit attempts using bivariate analysis (with 95% CIs). Finally, a logistic regression (adjusted for age and sex) was performed to determine odds ratios and *P* values.

Results

Depression prevalence in smokers 18 years and over in PR in 2018 - 2020 was 23.7% (Table 1). In terms of sex, SWD males had a higher prevalence of depression than females did (53.7% vs. 46.3%) (Table 2). The mean age for SWD was 47 years (SD = 13.2), and the highest proportion of SWD was in the group of 55- to 64-year-olds (23.8%) (Table 2). Likewise, other groups with high proportions of SWD were people with an educational level of high school or less (61.4%), people with an annual income of less than $15,000 (58.2%), retired/disabled people (39.2%), and divorced people (46.2%) (Table 2). Regarding health risk factors, 54.0% of the SWD reported not performing any physical activity, 68.7% reported being overweight or obese, 23.6% reported being binge drinkers, and 8.9% reported being heavy drinkers (Table 3). It is important to mention that 63.0% of the SWD reported having tried to quit smoking in the past year (Table 3). When the data were analyzed by health condition, SWD had an average of 2 chronic conditions and 43% had at least 1. Hypertension had the highest prevalence among SWD, with 53.6%, followed by high cholesterol (44.2%), arthritis (35.2%), current asthma (18.7%), diabetes (17.4%), chronic obstructive disease (COPD) (16.0%), and coronary heart disease (11.2%) (Table 3).

When SWD and SWOD were compared in terms of sociodemographic characteristics, more than half were male in both groups (53.7% vs. 68.7%) ($P < .001$) (Table 2). The mean age for SWD was 47 years (SD = 13.2) and 45 years (SD = 15.3) ($P = .110$) for SWOD. The age group with the highest proportion

Table 1. Prevalences of tobacco use, depression, and both from 2018 through 2020*

	Counts	Prevalence % (95% CI)
Tobacco use	265,432	9.84 (9.2 – 10.6)
Depression	479,060	17.5 (16.7 – 18.4)
Tobacco use and depression	62,514	23.7 (20.8 – 26.8)

*This table shows weighted data.

Table 2. Sociodemographic characteristics of SWD and SWOD*

	SWD		SWOD		*P* value
	Counts	% (95% CI)	Counts	% (95% CI)	
Sex					
Female	28,966	46.3 (39.5 – 53.2)	63,077	31.3 (27.6 – 35.2)	< .001
Male	33,548	53.7 (46.7 – 60.5)	138,423	68.7 (64.8 – 72.4)	
Age group					
18 – 24	2,749	4.4 (2.3 – 8.3)	18,344	9.1 (6.5 – 12.6)	< .001
25 – 34	11,601	18.6 (13.1 – 25.7)	37,863	18.8 (15.4 – 22.6)	
35 – 44	13,081	20.9 (15.5 – 27.7)	45,038	22.3 (19.1 – 25.9)	
45 – 54	14,183	22.7 (17.4 – 29.0)	38,691	19.2 (16.2 – 22.6)	
55 – 64	14,845	23.8 (18.7 – 26.9)	39,803	19.8 (15.9 – 24.2)	
65+	6,055	9.7 (6.7 – 13.9)	21,762	10.8 (8.7 – 13.3)	
Annual income					
Less than $15,000	31,456	58.2 (50.5 – 65.4)	89,199	51.5 (46.6 – 56.4)	< .001
$15,000 – $24,999	13,724	25.4 (19.4 – 32.4)	48,712	28.1 (24.2 – 32.4)	
$25,000 or more	8,898	16.5 (11.6 – 22.9)	35,276	20.4 (17.1 – 24.0)	
Education					
≤ High school	38,254	61.4 (54.8 – 67.5)	78,121	38.8 (34.8 – 42.9)	< .001
> High school	24,104	38.7 (32.4 – 45.2)	123,294	61.2 (57.0 – 65.2)	
Employment status					
Salaried/self-employed	20,258	32.7 (26.5 – 39.5)	110,218	54.9 (50.3 – 59.5)	< .001
Homemaker/student	7,878	12.7 (8.9 – 17.9)	24,450	12.2 (9.8 – 15.0)	
Unemployed	9,557	15.4 (11.0 – 21.1)	31,370	15.6 (12.4 – 19.5)	
Retired/disabled	24,257	39.2 (32.3 – 46.5)	34,547	17.2 (13.5 – 21.8)	
Marital status					
Married/unmarried couple	18,212	29.1 (23.8 – 35.2)	68,857	34.2 (30.5 – 38.2)	< .001
Divorced/separated	28,867	46.2 (39.1 – 53.4)	83,112	41.3 (36.6 – 46.2)	
Widowed	5,438	8.7 (5.1 – 14.4)	15,002	7.5 (5.6 – 9.9)	
Never married	9,996	16.0 (12.5 – 20.3)	34,176	16.9 (14.5 – 19.9)	

*This table shows weighted data. Note: Boldface indicates statistical significance (Pearson's chi-squared test; $P < .001$). Abbreviations: SWD, smokers with depression; SWOD, smokers without depression

of SWD was the group of 55- to 64-year-olds (23.8%); the one with the highest proportion of SWOD was the group of 35- to 44-year-olds (22.3%) ($P < .001$) (Table 2). Of the SWD, 61.4% reported having an educational level of high school or less, but of the SWOD, 61.2% reported having an educational level higher than high school ($P < .001$) (Table 2). Both groups had high proportions of people who reported having an annual income of less than $15,000 (58.2% and 51.5%, respectively) ($P < .001$) (Table 2). When the data were analyzed by employment status, SWD had a lower proportion of salaried employees (32.7%) than did SWOD (54.9%) ($P < .001$) (Table 2). More than 40% of the individuals in each group reported being divorced or separated (46.2% and 41.3%, respectively) ($P < .001$) (Table 2).

Table 3. Prevalences of risk factors and health conditions of SWD and SWOD*

	SWD		SWOD		OR	
	Counts	% (95% CI)	Counts	% (95% CI)	Crude	Adjusted[a]
Risk factor						
Physically active (no)	33,773	54.0 (47.0 – 60.9)	96,855	48.4 (43.9 – 53.0)	1.25	1.19
Binge drinker	13,814	23.6 (18.0 – 30.3)	62,739	33.5 (29.3 – 37.9)	0.61	0.67
Heavy drinker	5,175	8.9 (5.7 – 13.6)	25,742	14.0 (11.1 – 17.6)	0.60	0.63
Overweight or obese	42,006	68.7 (61.8 – 74.9)	126,301	65.2 (60.3 – 69.8)	1.17	1.20
Health condition						
Arthritis	21,544	35.2 (25.6 – 42.4)	26,553	13.3 (10.9 – 16.0)	3.54	3.68
COPD	9,987	16.0 (11.6 – 21.6)	10,343	5.1 (3.6 – 7.2)	3.51	3.21
Current asthma	11,606	18.7 (14.3 – 24.2)	14,136	7.1 (5.4 – 9.2)	3.03	2.68
Diabetes	10,711	17.4 (13.1 – 22.7)	23,204	11.6 (9.4 – 14.2)	1.60	1.47
Hearth attack	3,041	4.9 (2.9 – 8.2)	6,969	3.5 (2.4 – 5.0)	1.43	1.38
Coronary heart disease	6,971	11.2 (7.6 – 16.2)	10,772	5.4 (3.8 – 7.5)	2.21	2.08
Stroke	1,584	2.6 (1.4 – 4.8)	2,296	1.1 (0.5 – 2.4	2.27	1.87
Hypertension[b]	34,157	53.6 (42.0 – 64.8)	69,617	36.5 (30.5 – 42.9)	2.01	2.27
High cholesterol[b]	27,031	44.2 (32.9 – 56.0)	47,779	27.1 (21.7 – 33.3)	2.12	2.36
Attempted to quit smoking	39,335	63.0 (9.6 – 96.4)	125,579	63.4 (37.6 – 83.3)	0.98	1.04
At least 1 chronic disease	62,514	43.4 (39.4 – 45.7)	81,530	56.6 (54.3 – 61.6)	3.27	3.54

*This table shows weighted data. Note: Boldface indicates statistical significance ($P < .001$). Abbreviations: SWD, smokers with depression; SWOD, smokers without depression; OR, odds ratio; COPD, chronic obstructive pulmonary disease. [a]Adjusted odds ratio, by sex and age. [b]This variable is collected every odd year.

Finally, SWD and SWOD were compared in terms of risk factors and chronic diseases, controlled by age and sex. Analyzing the risk factors, SWD were 1.19 ($P < .001$) times more likely to be physically inactive and 1.20 ($P < .001$) times more likely to be overweight or obese compared with SWOD (Table 3). Likewise, SWD were 1.04 ($P < .001$) times more likely to have attempted to quit smoking than SWOD were (Table 3). In terms of chronic disease, SWD were 3.54 ($P < .001$) times more likely to have at least 1 chronic disease compared with SWOD (Table 3). The SWD were 3.68 ($P < .001$) times more likely to have arthritis, 3.21 ($P < .001$) times more likely to have COPD, 2.68 ($P < .001$) times more likely to have current asthma, 2.36 ($P < .001$) times more likely to have high cholesterol, 2.27 ($P < .001$) times more likely to have hypertension, 2.08 ($P < .001$) times more likely to have coronary heart disease, 1.87 ($P < .001$) times more likely to have had a stroke, 1.47 ($P < .001$) times more likely to have diabetes, and 1.38 ($P < .001$) times more likely to have had a heart attack compared with SWOD (Table 3).

Discussion

Depression can be expressed in various ways in human nature and involves biological, psychological, and social elements. Although there is much information on depression and tobacco use, separately, it is not clear whether smoking leads to depression or whether depression encourages people to smoke (24). Most likely, there is a complex relationship between them (24). In general, researchers have recognized for years that there is a connection between smoking and depression. One fact that proves the above is that nicotine can influence the vulnerability to mental health conditions because it interacts with various patterns of neurotransmitters, such as acetylcholine and catecholamines, which neurotransmitters play an etiologic role in the development of depression and anxiety (25).

This is the first research on tobacco use and depression prevalence in PR, and the results show a high prevalence of depression in the smokers on the island in the period of 2018-2020. This result is compatible with those in the literature, which show that depression is more common in smokers compared to non-smokers (8). The epidemiological profile established by the results of this research demonstrates that the groups with the highest proportion of SWD were males, people aged 55- to 64-years-old, people with an educational level of high school or less, people with an annual income of less than $15,000, retired/disabled people, and divorced/separated people. Likewise, the results of this research show that a high proportion of SWD were not physically active, were overweight or obese, and were binge drinkers. In terms of chronic disease, it is well known that tobacco use is a risk factor for multiple chronic conditions, mainly those related to four groups of conditions including, cardiovascular disease, cancer, lung disease, and metabolic disease (26). The results of this research show that SWD had high prevalences of hypertension, high cholesterol, arthritis, current asthma, diabetes, COPD, and coronary heart disease.

Smokers with depression and SWOD were compared to identify statistically significant differences in terms of risk factors, chronic conditions, and quit attempts using bivariate analysis (with 95% CI) and logistic regression (adjusted by age and sex) to determine odds ratios and P values. The results of this research demonstrate that SWD were more likely to be

physically inactive and overweight or obese than SWOD. In terms of chronic diseases, the literature shows that SWD are more likely to have smoking-related morbidity than SWOD (7, 9, 27). This is consistent with the results of this research, where SWD are more likely to have at least 1 chronic condition compared with SWOD. Likewise, SWD was found to be more likely to have arthritis, COPD, current asthma, stroke, high cholesterol, hypertension, coronary heart disease, diabetes, and heart attack compared with SWOD.

Regarding quit attempts, the literature has shown that people who use tobacco and have depression experience more severe cravings and nicotine withdrawal symptoms, which makes it more challenging to quit smoking (9). However, and contrary to collective belief, evidence in the literature shows that SWD are highly motivated to quit smoking (9, 28, 29). This is consistent with the results of this research, in which it was shown that SWD had made slightly more quit attempts in the year previous to the survey compared to SWOD. Finally, regardless of one's health condition, smoking cessation is one of the most important things that a smoker can do to improve his or her health. For that reason, and considering the results of this research, SWD is an important group in terms of targeting health-based tobacco-control efforts (30).

There is no doubt that tobacco use in people with mental illness is a hidden epidemic that can cause serious physical, psychological, and even financial consequences in this vulnerable population (22). Consequently, the public health system has been challenged to improve the medical education of primary care physicians and grassroots workers involved at the community level regarding this public health problem. Therefore, it is important to develop evidence-based strategies to reduce or eliminate tobacco use in people with depression and/or other mental illness. Among the key strategies needed to reduce or eliminate tobacco use by people with depression and/or other psychiatric conditions are the following: provide training to mental health providers to eliminate the myth that people with psychiatric illnesses are not motivated to quit smoking, create or reinforce smoke-free policies in psychiatric hospitals and clinics, integrate evidence-based strategies on smoking cessation into mental health treatment protocols, and develop research to identify effective smoking cessation strategies for this population, as well as the effects of abstinence on treatment and the use of nicotine replacement therapy during or after treatment. Finally, it is crucial to continue developing research on this topic to see the effects of tobacco consumption on other mental illnesses and establish whether said consumption varies according to symptomatology, consumption of other substances, and/or socio-environmental factors (31).

This research had 3 main limitations. The first is that the BRFSS is a self-reported survey, and some respondents tend to underreport some behaviors that may be considered socially unacceptable, unhealthy, or illegal. The second is that the data collection was limited to a single time point (cross-sectional design), limiting the ability to establish an association or possible causality between the risk factor and outcome. Finally, the research results apply only to individuals who, at the time of the survey, were 18 years of age or older and lived in PR.

Resumen

Objetivo: Según la literatura, la depresión y el consumo de tabaco están estrechamente relacionados. Los objetivos principales de esta investigación fueron realizar el primer perfil epidemiológico de los fumadores con depresión (FCD) de 18 años o más en Puerto Rico (PR) e identificar alguna diferencia estadísticamente significativa entre los FCD y los fumadores sin depresión (FSD). Métodos: Se realizó un estudio transversal descriptivo con datos del Sistema de Vigilancia de Factores de Riesgo del Comportamiento de PR (2018 al 2020). De igual forma, se realizó un análisis univariado para obtener el perfil epidemiológico de los FCD y se comparados con los FSD para identificar diferencias estadísticamente significativas en relación con enfermedades crónicas, factores de riesgo e intentos de dejar de fumar. Resultados: La prevalencia de depresión entre los fumadores fue del 23.7%. Los FCD reportaron ser más físicamente inactivos ($P < .001$), tener sobrepeso u obesidad ($P < .001$), tener artritis ($P < .001$), enfermedad pulmonar obstructiva crónica ($P < .001$), asma actual ($P < .001$), accidente cerebrovascular ($P < .001$), colesterol alto ($P < .001$), hipertensión ($P < .001$), enfermedad coronaria ($P < .001$), diabetes ($P < .001$) e infarto de miocardio ($P < .001$) en comparación con los FSD. Los FCD hicieron más intentos de dejar de fumar en comparación con los FSD ($P < .001$). Conclusión: Los FCD deberían ser un grupo esencial en los esfuerzos de control del tabaco para desarrollar estrategias basadas en evidencia y reducir o eliminar el consumo de tabaco en esta población.

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References

1. World Health Organization. Depressive disorder (depression). World Health Organization. September 13, 2021. Updated March 31, 2023. Accessed April 5, 2022. https://www.who.int/news-room/fact-sheets/detail/depression
2. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System Survey Prevalence & Trends Data. Centers for Disease Control and Prevention. Revised September 13, 2017. Accessed April 5, 2022. https://www.cdc.gov/brfss/brfssprevalence/index.html
3. Hahad O, Beutel M, Gilan DA, et al. The association of smoking and smoking cessation with prevalent and incident symptoms of depression, anxiety, and sleep disturbance in the general population. J Affect Disord. 2022;313:100-109. doi:10.1016/j.jad.2022.06.083

4. GBD 2019 Tobacco Collaborators. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990-2019: a systematic analysis from the Global Burden of Disease Study 2019 [published correction appears in Lancet. 2021 Jun 19;397(10292):2336]. Lancet. 2021;397(10292):2337-2360. doi:10.1016/S0140-6736(21)01169-7
5. Goodchild M, Nargis N, Tursan d'Espaignet E. Global economic cost of smoking-attributable diseases [published correction appears in Tob Control. 2018 Jul;27(4):478]. Tob Control. 2018;27(1):58-64. doi:10.1136/tobaccocontrol-2016-053305
6. McClave AK, McKnight-Eily LR, Davis SP, Dube SR. Smoking characteristics of adults with selected lifetime mental illnesses: results from the 2007 National Health Interview Survey. Am J Public Health. 2010;100(12):2464-2472. doi:10.2105/AJPH.2009.188136
7. Morozova M, Rabin RA, George TP. Co-morbid tobacco use disorder and depression: A re-evaluation of smoking cessation therapy in depressed smokers. Am J Addict. 2015;24(8):687-694. doi:10.1111/ajad.12277
8. Krebs P, Rogers E, Smelson D, et al. Relationship between tobacco cessation and mental health outcomes in a tobacco cessation trial. J Health Psychol 2018;23(8):1119-1128. doi: 10.1177/1359105316644974.
9. Mendelsohn C. Smoking and depression--a review. Aust Fam Physician 2012;41(5):304-7.
10. Gierisch JM, Bastian LA, Calhoun PS, McDuffie JR, Williams JW Jr. Comparative Effectiveness of Smoking Cessation Treatments for Patients With Depression: A Systematic Review and Meta-analysis of the Evidence. VA-ESP Project #09-010; 2010.
11. Tam J, Warner KE, Zivin K, Taylor GMJ, Meza R. The Potential Impact of Widespread Cessation Treatment for Smokers With Depression. Am J Prev Med. 2021;61(5):674-682. doi:10.1016/j.amepre.2021.04.024
12. Weinberger AH, Chaiton MO, Zhu J, Wall MM, Hasin DS, Goodwin RD. Trends in the Prevalence of Current, Daily, and Nondaily Cigarette Smoking and Quit Ratios by Depression Status in the U.S.: 2005-2017. Am J Prev Med. 2020;58(5):691-698. doi:10.1016/j.amepre.2019.12.023
13. Fluharty M, Taylor AE, Grabski M, Munaf_o MR. The association of cigarette smoking with depression and anxiety: a systematic review. Nicotine Tob Res 2017;19(1):3–13. doi:10.1093/ntr/ntw140.
14. Cook BL, Wayne GF, Kafali EN, Liu Z, Shu C, Flores M. Trends in smoking among adults with mental illness and association between mental health treatment and smoking cessation. JAMA 2014;311(2):172-182. doi:10.1001/jama.2013.284985.
15. Weinberger AH, Gbedemah M, Wall MM, et al. Cigarette use is increasing among people with illicit substance use disorders in the United States, 2002-14: emerging disparities in vulnerable populations. Addiction 2018;113(4):719-728. doi:10.1111/add.14082.
16. Secades-Villa R, Vallejo-Seco G, García-Rodríguez O, López-Núñez C, Weidberg S, González-Roz A. Contingency management for cigarette smokers with depressive symptoms. Exp Clin Psychopharmacol. 2015;23(5):351-360. doi:10.1037/pha0000044
17. Minami H, Kahler CW, Bloom EL, et al. Effects of sequential fluoxetine and gender on prequit depressive symptoms, affect, craving, and quit day abstinence in smokers with elevated depressive symptoms: a growth curve modeling approach. Exp Clin Psychopharmacol. 2014;22(5):392-406. doi:10.1037/a0037156
18. Redner R, White TJ, Harder VS, Higgins ST. Examining vulnerability to smokeless tobacco use among adolescents and adults meeting diagnostic criteria for major depressive disorder. Exp Clin Psychopharmacol. 2014;22(4):316-322. doi:10.1037/a0037291
19. Taylor GMJ, Munafò MR. Does smoking cause poor mental health? Lancet Psychiatry. 2019;6(1):2-3. doi:10.1016/S2215-0366(18)30459-0
20. Taylor GM, Lindson N, Farley A, et al. Smoking cessation for improving mental health. Cochrane Database Syst Rev. 2021;3(3):CD013522. Published 2021 Mar 9. doi:10.1002/14651858.CD013522.pub2
21. Prochaska JJ. Integrating tobacco treatment into mental health settings. JAMA. 2010;304(22):2534-2535. doi:10.1001/jama.2010.1759
22. Legacy Foundation. A hidden epidemic: Tobacco use and mental illness. University of California San Francisco. Jun 2011. Accessed May 11, 2022. https://smokingcessationleadership.ucsf.edu/sites/smokingcessationleadership.ucsf.edu/files/Documents/FactSheets/a_hidden_epidemic_legacy_june_2011.pdf
23. Marynak K, VanFrank B, Tetlow S, et al. Tobacco Cessation Interventions and Smoke-Free Policies in Mental Health and Substance Abuse Treatment Facilities - United States, 2016. MMWR Morb Mortal Wkly Rep. 2018;67(18):519-523. Published 2018 May 11. doi:10.15585/mmwr.mm6718a3
24. Dobson KS, Dozois DJA. Introduction: assessing risk and resilience factors in models of depression. In: Dobson KS, ed. Risk factors in depression. Elsevier Academic Press; 2008:1-16.
25. Costa M, Esteves M. Cigarette smoking and sleep disturbance. Addict Disord Their Treat. 2017;17(1):40-48. doi: 10.1097/ADT.0000000000000123
26. Münzel T, Hahad O, Kuntic M, Keaney JF, Deanfield JE, Daiber A. Effects of tobacco cigarettes, e-cigarettes, and waterpipe smoking on endothelial function and clinical outcomes. Eur Heart J. 2020;41(41):4057-4070. doi:10.1093/eurheartj/ehaa460
27. Callaghan RC, Veldhuizen S, Jeysingh T, et al. Patterns of tobacco-related mortality among individuals diagnosed with schizophrenia, bipolar disorder, or depression. J Psychiatr Res. 2014;48(1):102-110. doi:10.1016/j.jpsychires.2013.09.014
28. Siru R, Hulse GK, Tait RJ. Assessing motivation to quit smoking in people with mental illness: a review. Addiction. 2009;104(5):719-733. doi:10.1111/j.1360-0443.2009.02545.x
29. Rafful C, García-Rodríguez O, Wang S, Secades-Villa R, Martínez-Ortega JM, Blanco C. Predictors of quit attempts and successful quit attempts in a nationally representative sample of smokers. Addict Behav. 2013;38(4):1920-1923. doi:10.1016/j.addbeh.2012.12.019
30. Mathew AR, Robinson JD, Norton PJ, Cinciripini PM, Brown RA, Blalock JA. Affective trajectories before and after a quit attempt among smokers with current depressive disorders. Nicotine Tob Res. 2013;15(11):1807-1815. doi:10.1093/ntr/ntt036
31. Johnson JL, Ratner PA, Malchy LA, Gender-specific profiles of tobacco use among non-institutionalized people with serious mental illness. BMC Psychiatry 2010;10:101. doi: 10.1186/1471-244X-10-101.