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Sociodemographic Risk Indicators for Depressive Symptoms Among Persons With Oral Cancer or Oral Epithelial Dysplasia

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Abstract

Purpose. We report findings from a study that measured associations between sociodemographic risk indicators and depressive symptoms among individuals diagnosed with either oral cancer or a premalignant lesion.

Materials and Methods. Incident cases of oral cancer and oral epithelial dysplasia (OED) were identified by reviewing pathology reports generated by 3 oral pathology laboratories serving primarily community-based oral and maxillofacial surgeons. Subjects were interviewed by telephone to collect information on sociodemographic characteristics, depressive symptoms using the Center for Epidemiologic Studies-Depression (CES-D) Scale, and social support using the Berkman Social Network Inventory.

Results. The analysis included 167 oral cancer and 234 OED cases. Nineteen percent of the subjects had a CES-D score indicative of clinical depression (CES-D ≥16). Forward and backward stepwise logistic regression identified diagnosis (cancer/OED), age, social support, employment status, and gender as sociodemographic indicators of CES-D scores of 16+. In the final model, which also controlled for smoking and drinking, the odds of having elevated CES-D scores (16+) were 79% higher among oral cancer relative to OED cases. The odds of high CES-D scores were significantly reduced in persons over the age of 50 compared with those aged 50 years and younger as well as in

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persons with higher, relative to low, levels of social support and in persons employed outside the home compared with those who were not. Although not statistically significant, men were more likely to have CES-D scores indicative of clinical depression.

Conclusions. Knowledge of sociodemographic characteristics may assist the clinician in identifying those individuals with an elevated risk of concomitant depressive symptoms.

There is a substantial literature assessing quality of life and psychosocial outcomes among cancer patients in general.[1,2] The importance of these investigations is increasing as patients, clinicians, and researchers consider tradeoffs between treatments that prolong life and the associated quality of life that remains. However, in a 1999 review, Rogers, Fisher, and Woolgar[3] uncovered only 65 papers published between 1980 and 1997 on quality of life in relation to head and neck cancer, and fewer than 10 papers were specifically concerned with oral cancer. Since that review, head and neck cancer in general and, to a lesser extent, oral cancer have continued to receive attention in relation to quality of life issues.[4-11]

Psychosocial Impacts of Oral Cancer

Studies assessing the psychological status of oral cancer and of head and neck cancer patients indicate that the psychological impacts of the disease and its treatment are substantial and that the prevalence of depressive symptoms and/or anxiety ranges from 19% to 50% of those studied.[4,7,12-26] Moreover, the impact of oral cancer and its treatment persists over time, with Espie et al[25] reporting that 22% to 32% of their study participants were anxious or depressed 10 years after diagnosis and treatment. Factors previously identified as contributing to an increased risk of psychological distress among oral cancer patients[3] include persistent pain, age (generally, younger patients more than older patients), gender (females more than males), stage of cancer, type of treatment, and social support.[3]

Studies of general quality of life and functional status since 1999 reinforce earlier findings of the serious impact of oral cancer on these domains immediately following surgery as well as over the long term.[13,27-40] Oral functions, such as chewing and speech, were impaired. Social functioning also was significantly affected by surgery and pain in the rehabilitation period. Worse quality of life was associated with larger tumor size, type of surgical treatment, and more advanced stage of disease.[28,31,33,34,40]

A limited number of studies[41,42] have also assessed the psychological status of people undergoing biopsy for suspicious lesions and evaluated differences in psychological status after histopathologic diagnosis. These studies show that participants have high levels of depression and anxiety before biopsy and that after the diagnosis is established, those with malignant lesions are more depressed and anxious than those with negative findings. However, these studies consist of small samples and use various measures of psychological status, and few, if any, analyze risk factors that might contribute to the development of symptoms of psychological distress.

We report findings from a study that measured associations between sociodemographic risk indicators and depression among individuals diagnosed with oral cancer or a premalignant lesion. The analysis was part of a larger study on risk factors for oral epithelial dysplasia (OED), a precancerous condition, and oral cancer. As a component of that study, we assessed psychological distress and depressive symptoms among the study participants. We also obtained information on factors potentially associated with an increased or a decreased risk of depressive symptoms. We hypothesize that a primary risk indicator associated with depression is the diagnosis of a malignant, rather than a premalignant, lesion. Additionally, based on the results of Mathieson et al[20] in their study of oral cancer patients and the general literature on

social support,[43] we hypothesize that social support moderates the impact of oral cancer and dysplasia on depression such that those with high social support would have fewer depressive symptoms. Finally, we assess the effects of sociodemographic factors and socioeconomic status on risk for psychological distress.

Materials and Methods

SAMPLE

Incident cases of oral cancer and OED were identified by reviewing pathology reports generated by oral pathology laboratories at the University of Florida College of Dentistry, the New Jersey Dental School, and the University of Connecticut School of Dental Medicine. These pathology laboratories serve primarily community-based oral and maxillofacial surgeons as well as general dentists and other dental specialists. Patients were eligible for inclusion in the study if they were 30 to 79 years of age at the time of diagnosis, had been diagnosed with an invasive cancer or epithelial dysplasia of the oral cavity (excluding the lip and major salivary glands, ie, *ICD-0-3* C01.9 through C06.9), could provide reliable information, and could speak and read English.

Surgeons who submitted the biopsy specimen that gave rise to the identified pathology report were approached to obtain permission to contact their patient regarding the study. After obtaining surgeon permission, study personnel contacted potential subjects, first via mail and subsequently by telephone. Consenting individuals were interviewed over the telephone by trained interviewers who were blinded to both study hypotheses and each respondent's diagnostic status. Surrogate interviews were not conducted, and subjects were compensated $20 for the time required to participate. The study used a standardized, structured questionnaire that, in addition to obtaining demographic and environmental risk factor information, included questions regarding depression and social support.

VARIABLES

Depression was assessed using the Center for Epidemiologic Studies-Depression (CES-D) Scale,[44] a widely used measure of depressive symptoms and psychological distress that is utilized in community studies and for samples of patients with chronic diseases. The CES-D is a 20-item scale that assesses symptom frequency over the 2-week period preceding the interview. Scores can range from 0 to 60; the average score for community samples is 9, and the average score among patients institutionalized for depression is 22. A score of 16+ is considered indicative of clinical depression, although the CES-D is not a diagnostic interview and cannot be used to diagnose clinical depression.[44] In an early community-based study, 18% of whites and 26% of blacks had scores of 16+[45]; however, the reported prevalence is often higher among people with chronic diseases.[46]

The Berkman Social Network Inventory (BSNI)[47] measures the level of social support. This social support measure assesses the size of the social network and the degree of the individual's integration within the network. The BSNI is based on family size, marital status, number of memberships in organizations, and number of social contacts in a week. It is categorized into 4 levels (BSNI score): low (0 or 1), medium (2 to 5), medium-high (6 or 7), and high (8 to 12).

ANALYSIS

Bivariate and multivariate analyses of the data were conducted using standard statistical methods. Odds ratios (ORs) and their 95% confidence intervals (CIs) were obtained using unconditional logistic regression models in which CES-D score (dichotomized at <16, 16+) was the dependent variable of interest.[48] To assist in model building, we used both forward and backward stepwise regression with α levels for entry and exclusion set at $P = .15$ and based

on the likelihood ratio statistic. These program-driven stepwise regressions were confirmed manually.

The study protocol was reviewed and approved by the applicable institutional review boards.

Results

RECRUITMENT OF SUBJECTS

A total of 301 surgeons were approached for permission to contact their patients to recruit the sample of subjects who completed the questionnaire that included the CES-D and BSNI questions. Of these surgeons, 282 (94%) could be contacted regarding the study, and of these, 94% (265 of 282) were willing to assist with the project.

A total of 735 potentially eligible subjects were identified during the time in which the CES-D and BSNI questions were included in the study questionnaire. Of these subjects, 15 were too ill to participate and 50 had died before being contacted regarding the study. An additional 50 subjects were not contacted based on the wishes of the clinician who performed the biopsy, and 110 subjects could not be reached by letter or telephone. Among the individuals who could be contacted by telephone, 79% (404 of 510) agreed to participate in the study. Although all 404 subjects completed the environmental risk factor portion of the questionnaire, 3 subjects refused to answer all questions related to the CES-D and were excluded from the following analysis. All interviews were completed during the period April 1996 through December 2000.

DESCRIPTIVE CHARACTERISTICS OF THE SAMPLE

Table 1 presents the descriptive characteristics of the study subjects. The majority had a diagnosis of dysplasia (58%). As expected, most of the subjects were over the age of 50 and nearly one third were over the age of 70. There were more men than women in the sample, which was primarily white, non-Hispanic. Study subjects also tended to be married, not employed outside the home, have more than a high school education, and report incomes of $30,000 or over. Subjects appeared to have good social networks as measured by the BSNI; most scoring in the medium to high level, with only 24% reporting low social support. The majority of subjects were diagnosed at the University of Florida, and most were interviewed within 15 months of diagnosis. The overall CES-D score was 8.2 (SE = 0.48), slightly lower than that reported in community samples (CES-D = ~9).

BIVARIATE ANALYSIS

The mean CES-D score was 9.9 (SD = 11.2) for the cancer series and 7.1 (SD = 8.1) for the OED series. As seen in Figure 1, the distribution of CES-D scores for the cancer group was shifted somewhat to the right relative to that of the OED cases (P = .04 via Mann-Whitney). When we dichotomized CES-D scores at 9.0 (the mean score for community samples) or less and 10 or greater, cancer patients were more likely to score 10 or higher (35%) relative to persons with a diagnosis of OED (25%; OR = 1.61, 95% CI, 1.02 to 2.55; P = .03). The mean CES-D score was similar for males (8.2, SD = 10.0) and females (8.2, SD = 9.2) (P = .98).

In this analysis, CES-D scores of 16+ were considered indicative of clinical depression. Of the 401 respondents, 76 (19%) had scores of 16+ and 37 (9%) had scores of 22+. Table 1 presents the characteristics of the study participants by depression status. Although similar in terms of gender, race, employment status, education, the laboratory making the diagnosis, and months between the date of diagnosis and interview, the distribution of clinical depression status was statistically different in terms of age at interview, marital status, family income, and BSNI score. Those who were younger, were not married, had lower family incomes, and had lower BSNI scores were more likely to score 16+ on the CES-D compared with those who were older,

were married, had higher family incomes, and had higher scores on the BSNI. Although not statistically significant at the .05 level, a higher proportion of cancer patients (23%) relative to OED patients (16%) were classified as depressed (OR = 1.62, 95% CI, 0.95 to 2.76, $P = .06$).

MULTIVARIATE ANALYSIS

Logistic regression was used to assess relationships between elevated CES-D scores and the variables included in Table 1 while simultaneously controlling for each of the other independent variables in the model as well as drinking (7+ versus <7 drinks per week) and current smoking. Because a number of subjects refused to answer the question on annual income, we carried out separate analyses that either included or excluded that variable. Forward and backward stepwise selection of variables resulted in the same final model regardless of whether annual income was included in the list of available independent variables.

Table 2 presents the independent variables associated with depression that were included in the final model, along with their adjusted ORs and 95% CIs. We also fitted a model that included all of the variables listed in Table 1 (oral diagnosis, age, gender, race, marital status, employment, education, income, BSNI, pathology laboratory, and months between diagnosis and interview) as well as terms for drinking and current smoking. The further adjusted ORs were not meaningfully different than those presented in Table 2. In addition, to further evaluate whether the time span between the dates of diagnosis and interview may have influenced our findings, we also conducted separate analyses for persons interviewed within 12-months of diagnosis and those interviewed more than 12 months after diagnosis. The general trends observed in Table 2 were also identified in each of the stratified analyses; however, there was no association between gender and a CES-D score of 16+ (OR = 1.01) among those interviewed within 12 months of diagnosis.

The odds of CES-D scores indicative of depression (16+) were 79% higher among oral cancer patients relative to those of subjects with a diagnosis of OED. On the other hand, the odds of depression were reduced in persons over the age of 50 compared with those aged 50 years and under; in persons with higher, relative to low, levels of social support; and in persons who were employed outside the home compared with those who were not. Each of these ORs was statistically significant. BSNI was also fitted as a dummy variable; however, the similarity in estimated coefficients for the medium, high-medium, and high BSNI categories suggested that the variable be coded dichotomously, with the lowest quartile remaining the referent category (as presented in Table 2). Although not statistically significant ($P = .07$), CES-D scores indicative of clinical depression were more frequently observed among males than among females (adjusted OR = 1.73, 95% CI, 0.95 to 3.25).

No interactions between terms presented in Table 2 were statistically significant at the $P \leq .15$ level. However, adding an interaction term for oral diagnosis status (ie, cancer/OED) * age stratum to the main effects model ($P = .16$) suggested that young adults with cancer had the highest odds of depression (adjusted OR = 3.7, 95% CI, 1.2 to 11.6, relative to OED patients aged≤50 years).

Discussion

This study measured the association between sociodemographic risk indicators and depression in a sample of persons diagnosed with either OED or oral cancer.

On average, the subjects in this study had lower than expected levels of depressive symptoms. Relative to mean CES-D scores previously reported for community samples (~9), mean scores for subjects with a diagnosis of oral cancer (9.9) were only slightly elevated, whereas scores for persons with a diagnosis of OED (7.1) were actually lower. The proportion of subjects with

CES-D scores of 16+ (19%) was similar to the prevalence observed in community studies, while in the current study, the percentage of oral cancer patients with CES-D scores of 16+ (23%) was somewhat lower than the 26% recently reported for a series of 82 head and neck cancer cases treated in Toronto.[7]

We hypothesized that persons diagnosed with oral cancer were more likely to show signs of depression than were persons diagnosed with a precancerous lesion. Consistent with this hypothesis, our analyses revealed that the distribution of CES-D scores for the cancer cases was shifted toward higher scores compared with those of the OED cases. Further, the odds of having a CES-D score of 16+ were nearly 80% higher among the cancer cases compared with those cases diagnosed with OED after controlling for other covariates. The differences, however, were smaller than anticipated.

A number of factors may explain why we observed only minimal differences in the occurrence of depression between the OED and oral cancer cases. Our comparison group was composed of individuals with a precancerous lesion, and such persons would be expected to have a greater likelihood of depression than would persons without such lesions. This, in turn, would tend to attenuate group differences in terms of depression. While this may have occurred, it is notable that the OED cases in our sample had an average CES-D score that was *lower* than previously reported for community samples, and this would have *enhanced* any group difference in depression.

Another possible explanation for the small difference in depressive symptoms between the 2 groups is that the OED and cancer cases included in this analysis were all identified via oral pathology laboratories that serve primarily community-based oral surgeons and general dentists. Although we do not have information on stage at diagnosis, it is probable that the identified oral cancer cases were more likely than those diagnosed in a hospital setting to be of an earlier stage, with more favorable prognoses and less traumatic treatment needs. This could have minimized the level of depression in the cancer group relative to oral cancer patients as a whole. Had we included oral cancer cases identified via hospital-based pathology laboratories, those patients may well have reported higher levels of depression, thereby raising the mean CES-D score, the overall occurrence of depression within the cancer series, and the OR for depression among subjects with cancer relative to those with OED.

Other findings were generally consistent with results from previous studies investigating risk factors associated with elevated depression scores. Persons who were older, were employed outside the home, and reported good social support were less likely to have elevated scores than were persons who were younger, were unemployed, and had poor social support. Surprisingly, however, we also found that among these individuals diagnosed with either oral cancer or OED, men were more likely to have CES-D scores indicative of clinical depression than were women after we adjusted for potential confounding.

Persons aged 50 and under were more likely than older individuals to have CES-D scores of 16+. In fact, one third (23 of 69) of all patients aged 50 and younger were classified as depressed, a proportion notably higher than seen in the other age strata. The elevated CES-D scores in individuals aged 50 years and younger persisted even after controlling for oral diagnostic status, employment, social support, gender, drinking, and current smoking. These findings suggest that younger individuals carry a particularly high burden of depression among persons diagnosed with oral precancerous or cancerous lesions. Moreover, our analysis of interaction terms further suggests that oral cancer patients aged 50 and younger are at a notably elevated risk of depression. Practitioners should be particularly cognizant of depressive symptoms in these patients.

Although social support and psychological well-being have been studied extensively among cancer patients in general, it has been far less frequently investigated among people with oral cancer or those with precancerous oral lesions. Hassanein and colleagues[14] did find a weak relationship between functional status, social support, and satisfaction with social support among oral cancer patients. They also reported that better functional scores were associated with higher levels of support and greater satisfaction. Various measures of social support have also been inversely related to depression in head and neck patients.[5,20,49] In our study, social support, as measured by the BSNI, was inversely associated with a depression score of 16+. Persons with little or no social support were most likely to have elevated CES-D scores, but even moderate social support was associated with a notable reduction in the odds of a CES-D score of 16+. Given the cross-sectional nature of the data, however, it is not possible to ascribe a temporal relationship to the observed association or to make statements that social support leads to a reduced likelihood of depression. It is possible, for example, that depression occurs first and limits one's ability to engage in social interaction. A similar limitation exists in terms of the observed link between employment and the risk of depression. It remains to be seen if clinical interventions to assist in the maintenance of social support structures, or in establishing new ones, could improve the quality of life for oral cancer patients. In a recent report from Sweden, a psychosocial support intervention program for head and neck cancer patients did not reduce the proportion of persons with possible or probable depression as measured by the Hospital Anxiety and Depression Scale.[4]

Gender differences in CES-D scores and the proportion of persons with a score indicative of clinical depression were minimal before controlling for other covariates. After adjusting for potential confounding, however, the odds of having a CES-D score indicative of clinical depression was 70% higher among males relative to females, although this difference was seen only among individuals interviewed more than 12 months after diagnosis. By comparison, Katz et al[7] reported that, among head and neck cancer patients, women (40%) were more likely than were men (23%) to have CES-D scores of 16+.

In our study, clinical depression was defined as a CES-D score of 16+. Persons with a diagnosis of oral cancer were more likely to have depression than were OED patients. On the other hand, a protective association against depression was identified for persons over the age of 50 compared to those aged 50 years and younger, as well as for persons having higher, relative to low, levels of social support and for persons employed outside the home compared with those who were not. Although not statistically significant, men were more likely than women to have CES-D scores indicative of clinical depression.

Oral and maxillofacial surgeons who diagnose and treat patients with oral cancer and oral dysplasia are in a unique position to identify persons with an increased risk of depression. The characteristics presented here may assist the clinician in identifying those individuals with an elevated risk of concomitant depressive symptoms and may have use for researchers seeking to better understand depression in these patients.

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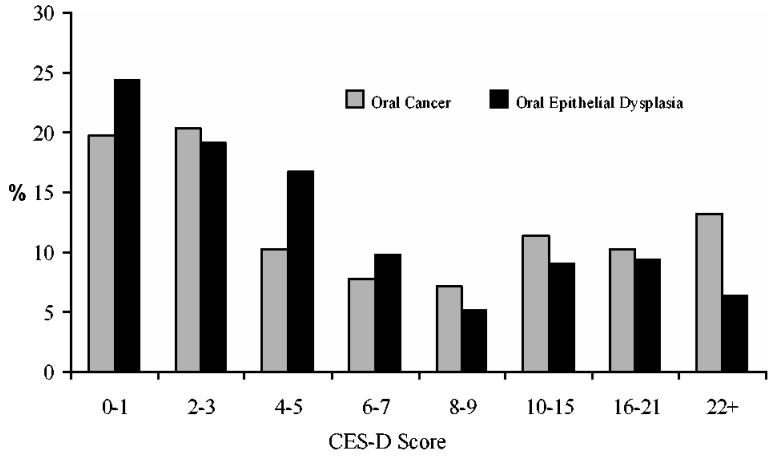

FIGURE 1.
Center for Epidemiologic Studies–Depression Scale (CES-D) score by diagnostic status (n = 401).

Table 1

CHARACTERISTICS OF STUDY SUBJECTS IN TOTAL AND BY CENTER FOR EPIDEMIOLOGIC STUDIES DEPRESSION SCALE (CES-D) SCORE DICHOTOMIZED AT ≤15 AND 16+ (n = 401)

Variable	Total Sample, n (%)	CES-D Score		*P* Value
		0 to 15	16+	
Oral diagnosis				
Oral epithelial dysplasia	234(58.4)	197(60.6)	37(48.7)	
Cancer	167(41.6)	128(39.4)	39(51.3)	.06*
Age at interview (yr)				
≤50	69 (17.2)	46 (14.2)	23 (30.3)	
51 to 60	81 (20.2)	65 (20.0)	16 (21.1)	
61 to 70	119 (29.7)	106 (32.6)	13 (17.1)	
71+	132 (32.9)	108 (33.2)	24 (31.6)	.002*
Mean (SD)	63.3 (11.9)	64.1 (11.4)	60.2 (13.3)	.04†
Gender				
Female	192 (47.9)	159 (48.9)	33 (43.4)	
Male	209 (52.1)	166 (51.1)	43 (56.6)	.39*
Race				
White, non-Hispanic	384 (95.8)	313 (96.3)	71 (93.4)	
Other	17 (4.2)	12 (3.4)	5 (6.6)	.26*
Currently Married				
No	135 (33.7)	100 (30.8)	35 (46.1)	
Yes	266 (66.3)	225 (69.2)	41 (53.9)	.01*
Employed outside the home				
No	256 (63.8)	203 (62.5)	53 (69.7)	
Yes	145 (36.2)	122 (37.5)	23 (30.3)	.24*
Education				
<12 yr	43 (10.7)	31 (9.5)	12 (15.8)	
12 yr	111 (27.7)	88 (27.1)	23 (30.3)	
Some college	123 (30.7)	99 (30.5)	24 (31.6)	
At least college	124 (30.9)	107 (32.9)	17 (22.4)	.19*
Annual income				
<$20,000	77 (21.2)	55 (18.8)	22 (31.4)	
$20,000 to $29,999	67 (18.5)	53 (18.1)	14 (20.0)	
$30,000 to $49,999	92 (25.3)	74 (25.3)	18 (25.7)	
$50,000+	127 (35.0)	111 (37.9)	16 (22.9)	.045*
Berkman Social Network Inventory				
Low (0 or 1)	95 (23.9)	65 (20.2)	30 (39.5)	
Medium (2 to 5)	160 (40.2)	131 (40.7)	29 (38.2)	
Medium-High (6 or 7)	55 (13.8)	49 (15.2)	6 (7.9)	
High (8+)	88 (22.1)	77 (23.9)	11 (14.5)	.002*
Participating institution				
University of Florida	204 (50.9)	164 (50.5)	40 (52.6)	
New Jersey Dental School	52 (13.0)	40 (12.3)	12 (15.8)	
University of Connecticut	145 (36.2)	121 (37.2)	24 (31.6)	.56*
Months between diagnosis and interview				
≤12	121 (30.2)	96 (29.5)	25 (32.9)	
13 to 15	189 (47.1)	153 (47.1)	36 (47.4)	
16+	91 (22.7)	76 (23.4)	15 (19.7)	.74*
Mean (SD)	13.4 (4.2)	13.5 (4.2)	13.0 (4.2)	.31†
CES-D score				
Mean (SD)	8.2 (9.6)			

NOTE. Percentages may not total to 100% due to rounding. Thirty-eight subjects refused to answer the question regarding income, and 3 subjects did not answer questions related to the Berkman Social Network Inventory.

*Based on Pearson χ^2 test.

†Based on Mann-Whitney test.

Table 2

ADJUSTED ODDS RATIOS FOR SYMPTOM SEVERITY INDICATIVE OF CLINICAL DEPRESSION (CENTER FOR EPIDEMIOLOGIC STUDIES DEPRESSION SCALE SCORE ≥16) ASSOCIATED WITH SOCIODEMOGRAPHIC VARIABLES AT THE FINAL STEP OF THE ANALYSIS

Variable	OR_{adj} *	95% Confidence Interval
Oral diagnosis		
Oral epithelial dysplasia	1.00	
Cancer	1.79	1.03 to 3.12
Age (yr)		
≤50	1.00	
51-60	0.38	0.17 to 0.87
61-70	0.13	0.05 to 0.34
71+	0.24	0.10 to 0.59
Berkman Social Network Inventory score		
Low	1.00	
≥Moderate	0.44	0.24 to 0.79
Employed outside the home		
No	1.00	
Yes	0.28	0.13 to 0.59
Gender		
Female	1.00	
Male	1.73	0.95 to 3.15

* Odds ratios adjusted for each of the other variables in the table as well as drinking (7+, <7 drinks per week) and current smoking (yes, no).