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Exploring Smoking, Mental Health and Smoking-related Disease in a Nationally Representative Sample of Older Adults in Ireland: a Retrospective Secondary Analysis

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Exploring smoking, mental health and smoking-related disease in a nationally representative sample of older adults in Ireland – a retrospective secondary analysis

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Abstract

Objective: Smoking is the leading preventable cause of death among individuals with mental health difficulties (MHD). The aim of the current study was to determine the impact of smoking on the physical health of older adults with MHD in Ireland and to explore the extent to which smoking mediated or moderated associations between MHD and smoking-related diseases.

Methods: Cross-sectional analysis of a nationally representative sample of 8,175 community-dwelling adults aged 50 and over from The Irish Longitudinal Study on Ageing (TILDA) was undertaken. Multivariate adjusted logistic regression models were used to assess the association between MHD, smoking (current/past/never) and smoking-related diseases (respiratory disease, cardiovascular disease, smoking-related cancers). A number of variables were employed to identify individuals with MHD, including prescribed medication, self-reported diagnoses and self-report scales.

Results: MHD was associated with current (RRRs ranging from 1.84 [1.50 to 2.26] to 4.31 [2.47 to 7.53]) and former (RRRs ranging from 1.26 [1.05 to 1.52] to 1.99 [1.19 to 3.33]) smoking and also associated with the presence of smoking-related disease (ORs ranging from 1.24 [1.01 to 1.51] to 1.62 [1.00 to 2.62]). Smoking did not mediate and rarely moderated associations between MHD and smoking-related disease.

Conclusions: Older adults in Ireland with MHD are more likely to smoke than those without such difficulties. They also experience higher rates of smoking-related disease, although smoking had no mediating and no consistent moderating role in these analyses. Findings underscore the need for attention to the physical health of those with MHD including support in smoking cessation.

Key words: Smoking, Mental Health Disorders, Smoking-related Disease, Older adults, Ireland

Highlights

- Secondary analysis of a nationally representative sample of older adults in Ireland.
- Examined associations between mental health difficulties (MHD) and smoking and between MHD and smoking-related disease.
- MHD was associated with both smoking and smoking-related disease.
- Smoking did not mediate or consistently moderate associations between MHD and smoking-related disease.
- Need for attention to the physical health of those with MHD including intensive smoking cessation support.

Introduction

Background

General population smoking prevalence has reached an all-time low of 19% in the UK and 19.5% in Ireland^{1,2}. Mental health difficulties (MHD) as identified via various indicators including diagnostic or clinical interview, medical records, current psychiatric treatment, reported doctor diagnosed conditions or medication use, are consistently associated with higher smoking prevalences with rates cited ranging from 25.5 to 59%³⁻⁹. These increased smoking rates are most pronounced in those with substance use disorders and more severe mental illness (SMI) diagnoses such as bipolar **disorder**, schizophrenia or psychosis^{6,7,10-13}. In general, those with MHD tend to smoke more heavily than other smokers⁷ and also appear to be less likely to quit smoking⁷. While those with schizophrenia appear to be less likely to quit smoking¹⁴, common mental illnesses such as anxiety or depression also seem to affect quitting behaviour¹⁵. **For instance, meta-analyses have shown that in patients with chronic respiratory conditions or coronary heart disease patients with depressive symptoms are less likely to quit smoking than those without such depressive symptoms**^{16,17}.

This higher prevalence of smoking has been associated with significant health consequences in those with MHD. People with mental health conditions die on average 10 to 20 years younger than the general population¹⁸⁻²² and smoking has been reported as the largest contributor to this premature mortality^{23,24}. In the US, Callaghan et al. found significantly heightened patterns of tobacco-related mortality in terms of respiratory disease, smoking-related cancers and cardiovascular disease in patients with schizophrenia (standardised mortality ratio [SMR] 2.45 95%CI 2.41-2.48), bipolar disorder (SMR 1.57 95%CI 1.53-1.62) and depression (SMR 1.95 95%CI 1.93-1.98)²⁵. Earlier studies have also shown increased risk of death from cardiovascular disease^{4,22,26,27} and cancer^{22,26}. Morbidity studies have also shown those with SMI have a significantly higher prevalence of pulmonary illness^{3,28-33}, cancer²⁸ and cardiovascular diseases (including stroke, congestive heart failure, angina and myocardial infarction)²⁸⁻³⁰ compared to matched samples or general population counterparts²⁸⁻³². While smoking is thought to account for the majority of morbidity and mortality in these populations, studies have **also** found associations between mental illness and respiratory disease, cardiovascular disease and risk of death from cardiovascular disease which seems to persist after adjustment for smoking^{4,28,34}. However, the literature is limited by the range of conditions investigated, and the samples used are not always generalisable. For example, many of these studies focus on schizophrenia-related disorders and psychosis, though some have also included affective disorder diagnoses^{28,32}. Partti et al.'s study of respiratory disease was population-based but only explored psychosis³, while other studies were based on clinical populations with some reliant on small samples ranging from 80-100^{28,30,32}. The last study to address the impact of smoking on the physical health of those with MHD in Ireland is now over 30 years old, was specific to schizophrenia and was not population-based³⁵. More generally, morbidity and mortality studies have tended to rely upon one or two indicators, **such as structured clinical interviews, medical records, medical service claims or scale scores, but never more than two indicators when** identifying those with MHD^{3,4,25,27,29,34}. The use of a number of different methods is preferable to enhance the reliability of the findings.

In addition, chronic diseases such as cardiovascular disease and cancers usually occur later in life. Most cancer diagnoses occur in individuals older than 65 years³⁶ and CHD risk increases in both men and women after age 55³⁷. In spite of this, some studies of smoking prevalence in those with MHD

have been limited to younger samples with age ceilings of 54 and 64^{7,10} and there are almost no studies of smoking or smoking-related morbidity or mortality specific to older populations. To our knowledge only one study exploring excess mortality in those with MHD concerns those aged 65 and older²⁷. The impact of smoking on the physical health of older adults with MHD therefore remains unclear.

In summary, few population studies have explored smoking-related morbidity in older individuals with MHD and there are no recent studies addressing the health impacts of smoking in those with MHD in Ireland. This study had two aims. Firstly, to determine whether there is a higher prevalence of smoking and of smoking-related disease in older adults with mental health problems. Secondly, to assess whether smoking mediates or moderates the relationship between mental health difficulties and smoking-related disease at a population level. Given the absence of diagnostic interviews, several indicators were used both individually and in combination to reliably identify those with MHD. We hypothesized that persons with MHD would be more likely to have higher levels of smoking-related diseases, which would be explained by a higher rate of smoking.

Methods

The Irish Longitudinal Study on Ageing (TILDA)

TILDA provides a stratified clustered nationally representative sample of community dwelling adults aged 50 and over living in Ireland³⁸. Private residential dwellings were assigned to clusters stratified by geography and socioeconomic group to produce a population representative sample. Across households where it was possible to make contact to confirm eligibility a response rate of 62% was achieved³⁹. Population weighting was employed to counteract bias introduced by differential nonresponse³⁹. The main sample was compared to Quarterly National Household Survey respondents on age, sex and educational attainment and consequent weights assigned³⁸. A more detailed description of the study sample and response rates has been described elsewhere⁴⁰. The current analysis involves the first wave which was collected between 2009 and 2011. Data collection involved an extensive face-to-face computer assisted home interview, a self-completion questionnaire for data deemed more sensitive and a health assessment. Health assessments were conducted at TILDA Assessment Centres in Dublin and Cork, or for those not willing to travel to TILDA Assessment Centres a shorter assessment carried out in their home by a qualified, trained nurse was offered. At wave one 5,894 (72.1%) of the 8,175 participants aged 50 and over completed a health assessment. All variables included in the current analysis were collected at both health centre and home assessments.

Outcomes

Smoking status: Self-reported current smoking status.

Those who reported ever smoking 'cigarettes, cigars, cigarillos or a pipe daily for a period of at least one year' and answered 'Yes' when asked if they smoked at the present time (including if smoked in past 3 months) were categorised as current smokers. In the initial part of this paper **lifetime** smoking prevalence (current/former/never) is the outcome, **later it** was explored as a potential mediator/effect modifier (to achieve the second aim). Smoking status data was available for 8,174 respondents due to the refusal of one participant to answer this question.

Smoking-related disease: The presence of any one or more **self-reported doctor diagnosed** smoking-related diseases i.e. respiratory disease, cardiovascular disease **or** smoking-related cancers.

For the purposes of this analysis smoking-related cancer was defined as answering 'Yes' when asked if they were ever told by a doctor that they had cancer in any of the following sites: lung; colon or

rectum; stomach; oesophagus; bladder; liver; cervix; kidney; pancreas; oral cavity; larynx; other pharynx (including nasopharynx, oropharynx, laryngopharynx or hypopharynx). These sites were identified based on the 2014 Surgeon General's report ⁴¹. Cancer of the lip, the renal pelvis and acute myeloid leukaemia were not included as these were not specified in the TILDA study.

Respiratory disease was defined as answering 'Yes' when asked if they were ever told by a doctor that they had 'chronic lung disease such as chronic bronchitis or emphysema'.

Cardiovascular disease was defined as answering 'Yes' when asked if they were ever told by a doctor that they had 'angina', 'a heart attack (including myocardial infarction or coronary thrombosis)', 'congestive heart failure', 'high cholesterol', 'a stroke (cerebral vascular disease)' or 'Ministroke or TIA'.

Due to low numbers in two categories (respiratory disease (n=330); smoking-related cancers (n=135)) all three disease groups were combined to indicate having a chronic smoking-related disease (score=1) or not (score=0) for the purposes of this analysis.

Exposure variables

MHD: A number of variables were taken as indicators of evidence of MHD and used individually and in combination to model the association between MHD and smoking and between MHD and smoking-related disease.

An emotional, nervous or psychiatric problem was defined as answering 'Yes' when asked if they were ever told by a doctor that they had 'any emotional, nervous or psychiatric problems, such as depression or anxiety'.

Alcohol or substance abuse was defined as answering 'Yes' when asked if they were ever told by a doctor that they had an 'alcohol or substance abuse' condition.

Psychiatric medication use: Participants were asked to bring medications to interviewer during the face-to-face home interview and all anxiolytics, antipsychotics and anti-depressants were included (ATC codes: N05B; N05A; N06A). Any participant who was taking one of these medications was considered to have MHD.

Psychometric scales:

CES-D: The Center for Epidemiologic Studies Depression Scale (CES-D) is a 20-item self-report depression scale designed for epidemiological studies of depression ⁴². Each item is measured on a 4-point Likert scale reflecting frequency of occurrence. A cutoff score of ≥ 16 is said to indicate clinically significant or severe depressive symptoms **while a score of 8-15 is defined as moderate depressive symptoms** ⁴³⁻⁴⁵. This measure was administered during the face-to-face computer assisted home interview ³⁹ and 8,044 (98.4%) responded to all 20-items.

HADS-A: The HADS-A is the 7-item anxiety subscale of the Hospital Anxiety and Depression Scale ⁴⁶. This self-report measure with a four option Likert-type response format was included in the self-completion questionnaire and returned by 6,637 of the 8,175 (81.2%) TILDA participants aged 50 and over. Zigmond and Snaith recommended cutoffs of >8 and >11 to detect possible and probable anxiety caseness ⁴⁶.

For categorical scale variables, the 'probable anxiety' and 'severe depressive symptoms' categories were assessed as indicators of MHD.

Covariates

We adjusted for demographic variables (age, sex, education and marital status) when modelling smoking status. In modelling smoking-related disease other known confounders (physical activity, waist circumference, alcohol use and diabetes (self-reported doctor diagnosed)) were also included. Age and waist circumference were continuous, while all other covariates were ordinal/categorical. Physical activity was assessed using the short form 8-item version of The International Physical Activity Questionnaire (IPAQ) ⁴⁷, which estimates time spent performing physical activities (moderate to vigorous) as well as inactivity (time spent sitting) ⁴⁸. Alcohol problems were identified using the CAGE questionnaire, a widely used and extensively validated screening tool for alcoholism, which was included in the self-completion questionnaire. A CAGE test score of 2 or more is said to identify problem drinkers ^{48,49}. Waist circumference was measured at the health assessment during wave one and so was only available for participants completing that component.

Statistical analyses

Key variables and demographic characteristics of the sample were compared according to smoking status using analysis of variance models and chi-square statistics as appropriate.

Multinomial regression analysis was performed to investigate the association between MHD and smoking. The models were weighted and adjusted for age, sex, education and marital status as these were all significantly associated with the outcome smoking status. The *margins* command in Stata provided adjusted prevalence estimates.

Multivariate logistic regression models were **then** employed to explore the association between MHD and smoking-related disease. These models were weighted and adjusted for potential confounders including socio-demographic characteristics (age, sex, education) and additional known risk factors (physical activity, waist circumference, alcohol use and diabetes (self-reported doctor diagnosed)). These covariates were identified based on the literature.

Baron and Kenny's four step approach was employed to test for mediation ⁵⁰. Firstly, as above, we tested to see if the independent variable, MHD, predicted the dependent variable smoking-related disease. Secondly, and also already encompassed in aim one, we tested to see if MHD predicted smoking. Thirdly, it was assessed whether the mediator, smoking status, predicted smoking-related disease even while adjusting for MHD. Finally, smoking status was added to models predicting smoking-related disease and changes in the association between MHD and smoking-related disease were observed for mediation effects.

Then, to test for any moderating role of smoking, interaction terms were also built and added to models.

Data analysis was performed using Stata 13.0 ⁵¹.

Results

Sample Description

This analysis of TILDA included 8,175 participants aged 50 years and over. As described above, due to missing values related to issues such as health assessment attendance and completion of the HADS-A the analytic sample ranged from 5,024 to 8,158. Sample sizes for each model are included below (Tables 2-4).

Overall 18.24% of respondents were current smokers and 38.1% were former smokers. The prevalence of MHD ranged from 1.60% (self-reported alcohol or substance use problem) to 9.49% (severe depressive symptoms as per CES-D) based on the various indicator variables. Almost half of respondents (45.9%) had at least one smoking-related disease at baseline. Cardiovascular disease

was most prevalent (43.1%), followed by respiratory diseases (4.04%) and finally smoking-related cancers (1.65%).

Table 1 illustrates the main characteristics of the sample broken down by current smoking status. Age, sex, education and marital status were all significantly related to current smoking status. Current smokers were younger and more women had never smoked. Overall just 17.3% of those with a smoking-related disease were current smokers. Over half of those reporting a diagnosed smoking-related cancer were former smokers and almost a third of those reporting diagnosed respiratory conditions were current smokers.

Table 1

Demographics, physical and mental health and health behaviour characteristics of TILDA cohort (8,174)

	Current smoker (n=1,491)		Former smoker (n=3,117)		Never smoker (n=3,566)			
	18.2%		38.1%		43.6%			
Continuous	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>F</i>	<i>p Value</i>
Age	61.3	8.87	64.9	9.82	64.0	9.93	69.7	<.001**
Categorical	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	χ^2	<i>p Value</i>
Women	811	18.3%	1,387	31.3%	2,233	50.4%	220.0	<.001**
Men	680	18.2%	1,730	46.2%	1,333	35.6%		
Education								
Primary/None	571	22.8%	990	39.5%	942	37.6%	113.2	<.001**
Secondary	619	19.0%	1,165	35.7%	1,479	45.3%		
Third/Higher	300	12.5%	960	39.9%	1,144	47.6%		
Marital status								
Married	920	16.3%	2,179	38.7%	2,538	45.0%	110.8	<.001**

<i>Never married</i>	162	20.5%	311	39.3%	318	40.2%
<i>Separated/Divorced</i>	186	33.8%	186	33.8%	179	32.5%
<i>Widowed</i>	223	18.7%	441	36.9%	531	44.4%

**MHD indicator variables
(Exposure variables)**

Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) <i>Lifetime prevalence</i>	190	27.4%	254	36.6%	249	35.9%	45.7	<.001**
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Self-reported psychiatric medication use(antidepressant, antipsychotic or anxiolytic) (Self-reported) <i>Current prevalence</i>	200	27.2%	269	36.6%	266	36.2%	46.4	<.001**
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<i>Antidepressant</i>	148	26.4%	206	36.8%	206	36.8%	28.8	<.001**
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<i>Antipsychotic</i>	40	36.0%	32	28.8%	39	35.1%	23.9	<.001**
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<i>Anxiolytic</i>	49	28.6%	65	38.0%	57	33.3%	14.6	.001*
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Alcohol/substance abuse (self-reported doctor diagnosed) <i>Lifetime prevalence</i>	57	43.5%	50	38.2%	24	18.3%	66.2	<.001**
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Depression (CES-D) (n=8,044)

Current prevalence

<i>None/mild (7 or less)</i>	737	15.2%	1,873	38.7%	2,230	46.1%	129.4	<.001**
<i>Moderate (8-15)</i>	422	19.0%	856	38.5%	944	42.5%		
<i>Severe (16+)</i>	296	30.2%	342	34.9%	343	35.0%		

Anxiety (HADS-A) (n=6,637)

Current prevalence

<i>Normal (7 or less)</i>	756	15.1%	1,978	39.4%	2,286	45.5%	78.6	<.001**
<i>Possible (8-10)</i>	199	19.4%	381	37.2%	444	43.4%		
<i>Probable (11+)</i>	172	29.0%	201	33.9%	220	37.1%		

**Any smoking-related disease
(outcomes)**

**Lifetime prevalence (self-reported
doctor diagnosed)**

<i>Respiratory</i>	107	32.4%	143	43.3%	80	24.2%	70.0	<.001**
<i>Smoker-related cancers</i>	26	19.3%	69	51.1%	40	29.6%	12.3	.002*
<i>CVD</i>	583	16.5%	1,479	42.0%	1,463	41.5%	40.0	<.001**

Other covariates

IPAQ (Physical Activity)(n=8,096)

Current

<i>Low</i>	517	19.9%	955	36.8%	1,120	43.2%	11.5	.022*
<i>Moderate</i>	459	16.5%	1,087	39.0%	1,241	44.5%		
<i>High</i>	500	18.4%	1,044	38.4%	1,173	43.2%		

Alcohol problem (CAGE score of 2 or more) (<i>n</i> =6,758) <i>Lifetime prevalence</i>	215	26.4%	390	47.8%	210	25.8%	142.9	<.001**
Diabetes (self-reported doctor diagnosed) <i>Lifetime prevalence</i>	110	17.3%	293	46.2%	231	36.4%	20.2	<.001**
Waist cm (mean and (SD)) (<i>n</i> =5,863) <i>Current</i>	93.77	(13.9)	97.79	(14.0)	93.95	(13.5)	F=55.9	<.001**

Smoking among individuals with MHD

As shown in Table 2, MHD was significantly associated with smoking status with **relative risk ratios for former and current smoking** ranging from **1.26 to 1.99** and **1.84 to 4.31** respectively when adjusting for potential confounders. **Never smoker was taken as the base category.** The adjusted current smoking prevalence ranged from **25-39%** and was highest in the alcohol or substance abuse group. This compares to the crude smoking prevalence of 18.24% in the sample overall. **Adjusted former smoking prevalence ranged from 38-41% which compares to 38% in the overall sample.** The never smoking prevalence was particularly low in the self-reported doctor diagnosed alcohol/substance abuse group (Model 5) at 22%, albeit from the initially low absolute prevalence of 1.6%.

Table 2

Adjusted multinomial regression models of smoking status (current/past/never) according to various indicators of MHD for TILDA cohort

Model		<i>n</i>	Adjusted prevalence	Adjusted prevalence for no MHD	Adjusted RRR	95% CI	P value
1	Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) Lifetime prevalence	8,154					
	Never smoker		34%	44%	(base)		
	Former smoker		39%	37%	1.33	1.10-1.60	.003*
	Current smoker		26%	19%	1.84	1.50-2.26	<.001**
2	Psychiatric medication use (Self-reported) Current prevalence	8,158					
	Never smoker		35%	44%	(base)		
	Former smoker		38%	38%	1.26	1.05-1.52	.012*
	Current smoker		27%	19%	1.84	1.51-2.25	<.001**
3	Self-reported doctor diagnosed emotional, nervous or psychiatric problem(Lifetime) and self-reported any psychiatric medication (Current)	8,158					
	Never smoker		33%	43%	(base)		
	Former smoker		41%	38%	1.44	1.11-1.86	.006*

4	Current smoker		26%	19%	1.90	1.40-2.55	<.001**
	Self-reported doctor diagnosed emotional, nervous or psychiatric problem(Lifetime) or self-reported any psychiatric medication (Current)	8,158					
	Never smoker		35%	44%	(base)		
	Former smoker		38%	38%	1.26	1.08-1.46	.003*
	Current smoker		26%	18%	1.87	1.58-2.21	<.001**
5	Alcohol/Substance abuse (self-reported doctor diagnosed) Lifetime prevalence	8,158					
	Never smoker		22%	43%	(base)		
	Former smoker		38%	38%	1.99	1.19-3.33	.009*
	Current smoker		39%	19%	4.31	2.47-7.53	<.001**
6	Alcohol/Substance abuse or Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) Lifetime prevalence	8,158					
	Never smoker		34%	44%	(base)		
	Former smoker		38%	38%	1.33	1.11-1.60	.002*
	Current smoker		28%	18%	2.04	1.68-2.47	<.001**
7	CES-D Current prevalence	8,029					
	NONE/MILD	(base)					
	Never smoker		46%		(base)		
	Former smoker		38%				
	Current smoker		17%				
	MODERATE						

	Never smoker	41%	(base)		
	Former smoker	38%	1.14	1.01-1.29	.036*
	Current smoker	21%	1.33	1.15-1.54	<.001**
	SEVERE				
	Never smoker	35%	(base)		
	Former smoker	38%	1.37	1.15-1.63	<.001**
	Current smoker	26%	2.27	1.88-2.75	<.001**
8	HADS-A	6,626			
	<i>Current prevalence</i>				
	NORMAL	(base)			
	Never smoker	45%	(base)		
	Former smoker	38%			
	Current smoker	17%			
	POSSIBLE ANXIETY				
	Never smoker	41%	(base)		
	Former smoker	39%	1.12	0.96-1.32	.141
	Current smoker	21%	1.30	1.06-1.60	.011*
	PROBABLE ANXIETY				
	Never smoker	36%	(base)		
	Former smoker	38%	1.27	1.02-1.59	.034*
	Current smoker	25%	2.02	1.59-2.56	<.001**

Weighted and adjusted for age, sex, education and marital status.

Smoking-related diseases among individuals with MHD

MHD was also significantly associated with smoking-related disease with odds ratios ranging from 1.24 to **1.62** (Table 3). The adjusted prevalence of smoking-related disease ranged from 53 to 60% and was highest in the alcohol or substance abuse group. This compares to a crude prevalence of 46% in the overall sample. As per Baron and Kenny's four steps for mediation, the independent variable, MHD, therefore predicted the dependent variable smoking-related disease (Table 3, middle columns) fulfilling the first step in Baron and Kenny's approach⁵⁰. As per Table 2, the independent variable, MHD, also predicted smoking status thus fulfilling the second step. Further regression analyses confirmed that smoking status predicted smoking-related disease, with significant associations for former smoking (step 3). Finally in relation to step four, the addition of smoking status to models had virtually no impact indicating that smoking status was not a mediator of the association between MHD and smoking-related disease (Table 3, right columns)⁵⁰.

Table 3

Adjusted logistic regression models of any smoking-related disease (respiratory disease, cardiovascular disease or smoking-related cancer) according to various indicators of MHD for TILDA cohort and with mediational analysis adjusting for smoking status (never/past/current)

Model		Mediation analysis								
		n	Adjusted prevalence smoking-related disease	Adjusted prevalence smoking-related disease for no MHD	Adjusted OR	95% CI	P value	Adjusted OR	95% CI	P value
1	Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) Lifetime prevalence	5,176	53%	48%	1.24	1.01-1.51	.036*	1.23	1.01-1.51	.039*
2	Psychiatric medication use (self-reported) Current prevalence	5,176	55%	48%	1.38	1.12-1.70	.002*	1.38	1.12-1.70	.002*
3	Self-reported doctor diagnosed emotional, nervous or psychiatric problem(Lifetime) and self-reported any psychiatric medication (Current)	5,176	57%	48%	1.46	1.11-1.93	.007*	1.45	1.10-1.92	.008*
4	Self-reported doctor diagnosed emotional, nervous or psychiatric problem(Lifetime) or self-reported any psychiatric	5,176	53%	47%	1.27	1.07-1.50	.006*	1.27	1.07-1.50	.006*

medication (**Current**)

5	Alcohol/Substance abuse (self-reported doctor diagnosed) Lifetime prevalence	5,176	60%	48%	1.62	1.00-2.62	.048	1.63	1.01-2.61	.044*
6	Alcohol/Substance abuse or Emotional, nervous or psychiatric problem (self- reported doctor diagnosed) Lifetime prevalence	5,176	54%	48%	1.30	1.07-1.58	.008*	1.30	1.07-1.58	.008*
7	CES-D Current prevalence	5,114								
	NONE/MILD		46%							
	MODERATE		50%		1.10	0.96-1.26	.160	1.10	0.96-1.26	.190
	SEVERE		54%		1.44	1.18-1.75	<.001**	1.43	1.18-1.74	<.001**
8	HADS-A Current prevalence	5,024								
	NORMAL		47%							
	POSSIBLE ANXIETY		51%		1.10	0.93-1.29	.261	1.10	0.93-1.30	.256
	PROBABLE ANXIETY		55%		1.50	1.21-1.85	<.001**	1.50	1.21-1.85	<.001**

Weighted and adjusted for age, sex, education, physical activity (IPAQ), waist circumference, alcohol problem (CAGE) and diabetes.

Table 4

Moderation analysis: Odds ratios for smoking and MHD interaction terms for any smoking-related disease (respiratory disease, cardiovascular disease or smoking-related cancer)

Model		<i>n</i>	Adjusted OR	95% CI	P value
1	Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) <i>Lifetime prevalence</i>	5,176			
	^x <i>Past Smoking</i>		0.62	0.39-0.98	.041*
	^x <i>Current Smoking</i>		0.66	0.38-1.15	.142
2	Psychiatric medication use (Self-reported) <i>Current prevalence</i>	5,176			
	^x <i>Past Smoking</i>		1.10	0.69-1.74	.699
	^x <i>Current Smoking</i>		1.14	0.68-1.91	.627
3	Self-reported doctor diagnosed emotional, nervous or psychiatric problem(<i>Lifetime</i>) and self-reported any psychiatric medication (<i>Current</i>)	5,176			
	^x <i>Past Smoking</i>		1.02	0.53-1.96	.962
	^x <i>Current Smoking</i>		1.26	0.63-2.55	.513
4	Self-reported doctor diagnosed emotional, nervous or psychiatric problem(<i>Lifetime</i>) or self-reported any psychiatric medication (<i>Current</i>)	5,176			
	^x <i>Past Smoking</i>		0.76	0.52-1.11	.160
	^x <i>Current Smoking</i>		0.77	0.49-1.21	.257
5	Alcohol/Substance abuse (self-reported doctor diagnosed) <i>Lifetime prevalence</i>	5,176			
	^x <i>Past Smoking</i>		2.08	0.52-8.34	.301
	^x <i>Current Smoking</i>		0.83	0.22-3.08	.779
6	Alcohol/Substance abuse or Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) <i>Lifetime prevalence</i>	5,176			

	^x Past Smoking		0.74	0.47-1.15	.177
	^x Current Smoking		0.68	0.41-1.13	.139
7	CES-D	5,114			
	Current prevalence				
	MODERATE				
	^x Past Smoking		0.93	0.70-1.24	.638
	^x Current Smoking		0.84	0.56-1.25	.389
	SEVERE				
	^x Past Smoking		1.03	0.67-1.57	.899
	^x Current Smoking		1.14	0.69-1.88	.605
8	HADS-A	5,024			
	Current prevalence				
	POSSIBLE ANXIETY				
	^x Past Smoking		1.23	0.85-1.77	.270
	^x Current Smoking		1.20	0.76-1.91	.437
	PROBABLE ANXIETY				
	^x Past Smoking		1.05	0.65-1.70	.834
	^x Current Smoking		0.86	0.50-1.48	.588

Weighted and adjusted for age, sex, education, physical activity (IPAQ), waist circumference, alcohol problem (CAGE) and diabetes.

Table 4 presents results from the moderation analysis (see Appendix B for full models). All smoking and MHD interaction terms were non-significant when main effects were included in the model, except one. Past smoking appeared to have a negative moderating effect on the association between self-reported doctor diagnosed emotional, nervous or psychiatric problems and smoking-related diseases while current smoking had no significant moderating role, although effect sizes were similar. This would suggest that those who self-reported a doctor diagnosed emotional, nervous or psychiatric problem and were former smokers were less likely to have a smoking-related disease, although this result was not replicated in any other model, suggesting it may be spurious.

Discussion

We reported a number of important findings in a population-based dataset of older people, using multiple indicators of MHD to ensure robustness of findings. MHD, as evidenced by self-reported doctor diagnosed problems, psychiatric medication use and scores on anxiety and depression scales, was associated with smoking status in community living adults aged 50 and over in Ireland. MHD was also associated with the presence of a smoking-related disease i.e. respiratory disease, cardiovascular disease or a smoking-related cancer in this cohort. Contrary to our hypothesis, respondents' smoking status did not mediate the association between MHD and smoking-related disease. While it was expected that higher rates of smoking would be an important factor in the relationship between MHD and smoking-related disease, smoking did not fully explain the increased disease prevalence in this population. The various indicators of MHD revealed similar results. Associations with both current smoking and with smoking-related disease were strongest for self-

reported doctor diagnosed alcohol/substance use. This was the first study to examine the burden of smoking on the physical health of those with MHD in Ireland at a population level.

The first aim of the current study was to establish the prevalence of smoking and the prevalence of smoking-related disease in older adults with MHD in Ireland. The higher rates of smoking among those with MHD compared to the general population have already been established in the UK, the US and Australia^{7,9,23}. Between 2009 and 2011 the general population smoking prevalence among those aged 15 and over in Ireland fell from 24.6% to 22.9%⁵². In the current study adjusted current smoking prevalences of 25 to 39% were found among those with MHD while former smoking prevalences were 38 to 41%. This compares to current smoking prevalences of 25.5 to 59% among those with MHD³⁻⁹ found in previous studies and lifetime prevalences between 55.3 and 81% with higher rates observed in those with psychosis^{7,10,11}.

Increased rates of tobacco-related disease^{3,28-33} have also been shown. The adjusted prevalences of smoking-related disease in the current study ranged from 53 to 60%. Previous studies have found prevalences ranging from 0.9 (peripheral vascular disorder) to 61% (raised cholesterol) for cardiovascular conditions including cardiac disease and stroke. In relation to respiratory conditions, COPD prevalences of 6.8-45.7%^{3,29-32} have been reported in previous studies. Cancer morbidity studies reporting prevalence according to MHD appear to be rare though a number of mortality studies have been published.

The second aim of this study was to uncover the impact of smoking on the association between MHD and smoking-related disease. However, although the diseases included were selected by the authors to show the burden of tobacco on the physical health of those with MHD in Ireland, in the current study smoking did not mediate this association. In general, smoking status had no moderating role in the association between MHD and smoking-related diseases either. The only exception was a significant negative moderating effect of past smoking on the association between self-reported doctor diagnosed emotional, nervous or psychiatric problems and smoking-related diseases. However given this was present in just one model and not a pattern seen across exposure variables no strong conclusions can be drawn. Previous studies involving psychiatric populations or those with SMI have found elevated odds of respiratory illness, cardiovascular disease and risk of death from cardiovascular disease which were not fully explained by smoking^{4,28,34}. Researchers have suggested antipsychotic medications, diet, exercise⁴ smoking intensity (dose-response relationship), inhaling more deeply (as has been indicated in schizophrenia)^{53,54} and greater second-hand smoke exposure²⁸ may form part of the explanation. It should also be noted that in the current study, cardiovascular disease, which is known to have risk factors beyond smoking, accounted for the vast majority of smoking-related disease. High cholesterol was also responsible for a large proportion of this CVD and 66% of the overall smoking-related disease outcome variable was accounted for by those with high cholesterol alone. However, only minor changes were present in a few models when cholesterol was excluded as an outcome, and the overall pattern of results remained (see Appendix C). Respiratory disease and smoking-related cancers accounted for just 4% of the smoking-related disease outcome modelled. Other risk factors for cardiovascular disease such as physical activity were assessed in this study but may not have been accurate enough to account for all excess risk. For instance, while the IPAQ is said to have reasonable measurement properties for 18-65 year olds⁴⁷ its reliability with those aged 65 and over has been questioned⁵⁵. It is also possible that other risk factors that were not assessed may be more important.

Overall, individuals with MHD are known to die younger¹⁸⁻²² and tobacco-related deaths specifically also seem to occur at an earlier age than in the general population⁵⁶. Given that the current study involved those aged 50 and over it is likely that a proportion of those with MHD are missing from the dataset as they have already died or were terminally ill and therefore not participating. Support for this is provided by the fact that for most MHD indicators (with the exception of medications) case

respondents were significantly younger compared to the rest of the sample (data not shown). Only one of the studies cited above in describing excess morbidity and mortality was limited to an older population and it concerned those aged 65 and older and hospitalised for acute myocardial infarction ²⁷. Another study, linking 1,213 inpatient records to death index data, found cigarette smoking contributed to an increased risk of death in schizophrenia patients particularly in those aged 35-54 years but that in older ages (55-69 years) mortality risk was actually lower for smokers ⁵⁷. Similarly, Bandiera et al. found persons with MHD, including substance abuse, experience tobacco-related deaths at earlier ages than the general population but that after age 70 this pattern is reversed and tobacco-related deaths occur more often in the general population ⁵⁶.

Although descriptive data indicated that former smokers had higher estimates of smoking-related disease and only former smoking (and not current) was predictive of smoking-related disease, as stated results from the mediation and moderation analysis show that past smoking did not explain the association between MHD and smoking-related disease. We should note in this older sample 38.1% were former smokers. Furthermore as stated this is a relatively healthy sample, missing those who have already died or were too unwell to participate.

Strengths and Limitations

Strengths of the current study include the large nationally representative sample of older adults. The TILDA study with its robust methodology provides a detailed and rich population weighted dataset and the necessary power to adjust for many confounders. This large representative sample means results can be generalised to the population ³⁹. This study also included multiple measures of MHD from self-reported doctor diagnosed conditions to medication use to standardised scales.

This study was limited in that it is representative only of those aged 50 and over who are living in the community. Datasets which do not include younger people or other sectors of society, such as those not living in the community do not provide a full picture and are therefore likely to underestimate disease prevalence, particularly if those excluded tend to experience higher rate of disease and decreased life expectancy as is the case for those with severe mental illness ²¹. Osborn et al. accessed the UK General Practitioners Research Database and achieved a large nationally representative community sample of people with SMI which included those in long-term care. However, as they acknowledged, homeless people may not be well-represented and as such the estimated risk of CHD death may still be even greater than it appears ⁴. This is again especially relevant in the case of MHD given, as noted in the UK, the striking disparity of prevalence of psychiatric disorders in different subsections of the population ⁵⁸. In addition to these challenges in gaining representative samples of those with SMI the exclusion of those in residential care is also an issue as while this covers only around 2% of those aged 50 and over, it represents a greater proportion of those in older age categories and people in residential care tend to have more chronic disease ⁵⁹. Future research could look to include surveys of institutions and the homeless in addition to households.

This study also largely relied on self-reported doctor diagnosed conditions and involved an older population introducing issues including under diagnosis of conditions and under-reporting. This older sample in particular may potentially under-report conditions and medications due to memory but also due to stigma and social desirability bias ⁶⁰, particularly in the case of questions around mental health within the context of a face-to-face interview. A 2007 national survey in Ireland revealed just over half of respondents agreed with the statement 'If I was experiencing mental health problems, I wouldn't want people knowing about it' ⁶¹. Self-report data in relation to smoking has however been shown to be accurate in most studies ⁶².

In addition to potential underreporting, psychiatric medications such as benzodiazepines can be prescribed for short term conditions such as insomnia or as muscle relaxants for pain and thus would not necessarily indicate MHD. Furthermore the role which psychiatric medications themselves can play in terms of weight gain and metabolic effects is also a factor⁶³. Nonetheless the similar pattern of results across models (including those based on self-reported doctor diagnosed MHD and scale scores) provides reassurance that this alone was not responsible for the increased risk of disease in those with indicated MHD after controlling for smoking.

Arguably some models were overfitted due to the inclusion of the CAGE questionnaire (for consistency of models) as a covariate when modelling the presence of smoking-related disease based on self-reported doctor diagnosed alcohol/substance abuse however removal had little impact on results (data not shown).

As with all observational studies we cannot rule out the potential for residual confounding. Finally, the fact that it was not possible to include cancers of the lip, the renal pelvis and acute myeloid leukaemia is a further limitation.

Conclusion

Among older community living adults in Ireland indicators of MHD was associated with a higher prevalence of current smoking and self-reported doctor diagnosed cardiovascular disease, respiratory diseases and smoking-related cancers. This increased risk of smoking-related disease remained even after adjusting for smoking status.

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Declaration of Interests

The authors declare no conflicts of interest.

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Appendices

Variables Key:

OUTCOMES:

_IBEHsmoker1= former smoker

_IBEHsmoker2= current smoker

smokcond= smoking-related disease

EXPOSURES:

anymhprob= Emotional, nervous or psychiatric problem (self-reported doctor diagnosed)

SRpsychmeduse = Psychiatric medication use (self-reported)

SRmed_prob = Self-reported doctor diagnosed emotional, nervous or psychiatric problem **and** self-reported any psychiatric medication

SRmedORprob = Self-reported doctor diagnosed emotional, nervous or psychiatric problem **or** self-reported any psychiatric medication

ph301_08 = Alcohol/Substance abuse (self-reported doctor diagnosed)

SUorMHprob = Alcohol/Substance abuse **or** Emotional, nervous or psychiatric problem (self-reported doctor diagnosed)

_IMHdep3_1 = Mild/Moderate depressive symptoms as per CES-D

_IMHdep3_2 = Severe depressive symptoms as per CES-D

_lhadsacat_1 = possible anxiety as per HADS-A

_lhadsacat_2 = probable anxiety as per HADS-A

COVARIATES:

FRwaist= waistcm

BEHcage2= Alcohol problem as per CAGE

ph201_05= diabetes (self-reported doctor diagnosed)

_IFRexercis_1 = Moderate engagement in Physical activity

_IFRexercis_2 = High engagement in Physical activity

_ledu3_2 = Secondary education (High School) highest achieved

_ledu3_3 = Third level education (Higher education) achieved

Appendix A

Table 3: Full models

Model 1

(a) Without smoking

```
. xi: svy:logistic smokcond anymh age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercia_0-2 (naturally coded; _IFRexercia_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(10, 609)	=	14.56
			Prob > F	=	0.0000

smokcond	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
anymhprob	1.237551	.1257682	2.10	0.036	1.013651	1.510906
age	1.0265	.0036739	7.31	0.000	1.01931	1.03374
sex	1.0685	.0719664	0.98	0.326	.9361194	1.219601
_Iedu3_2	1.009032	.0742629	0.12	0.903	.8732433	1.165936
_Iedu3_3	1.085357	.0848508	1.05	0.295	.9308866	1.265459
_IFRexercia_1	.9041984	.0694445	-1.31	0.190	.7776089	1.051396
_IFRexercia_2	.7165416	.0561189	-4.26	0.000	.6143916	.8356753
FRwaist	1.008298	.0025244	3.30	0.001	1.003352	1.013268
BEHcage2	1.095218	.0932107	1.07	0.286	.9266484	1.294452
ph201_05	1.787601	.2289432	4.54	0.000	1.390083	2.298795
_cons	.0775207	.0294089	-6.74	0.000	.0368014	.1632941

Note: Variances scaled within each stage to handle strata with a single sampling unit.

(b) With smoking

```
. xi: svy:logistic smokcond anymh age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercia_0-2 (naturally coded; _IFRexercia_0 omitted)
i.BEHsmoker _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(12, 607)	=	14.22
			Prob > F	=	0.0000

smokcond	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
anymhprob	1.234538	.1254472	2.07	0.039	1.011207	1.507192
age	1.025631	.0036762	7.06	0.000	1.018437	1.032876
sex	1.100587	.0747171	1.41	0.159	.9632173	1.257548
_Iedu3_2	1.01341	.0748605	0.18	0.857	.8765635	1.17162
_Iedu3_3	1.087542	.0860915	1.06	0.290	.930961	1.270459
_IFRexercia_1	.8953813	.0687301	-1.44	0.150	.7700891	1.041058
_IFRexercia_2	.7107963	.0561118	-4.32	0.000	.6087102	.8299798
FRwaist	1.007606	.0025262	3.02	0.003	1.002657	1.012579
BEHcage2	1.059326	.0925939	0.66	0.510	.8922396	1.257702
ph201_05	1.80079	.2315685	4.57	0.000	1.398911	2.318122
_IBEHsmoker_1	1.310613	.0874873	4.05	0.000	1.149589	1.494191
_IBEHsmoker_2	1.040272	.0884299	0.46	0.642	.8803338	1.229268
_cons	.07522	.0285066	-6.83	0.000	.0357368	.1583257

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 2

(a) Without smoking

```
. xi: svy:logistic smokcond SRpsych age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercia_0-2 (naturally coded; _IFRexercia_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(10, 609)	=	14.80
			Prob > F	=	0.0000

smokcond	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
SRpsychmeduse	1.379983	.1447372	3.07	0.002	1.123108	1.695609
age	1.025881	.0036755	7.13	0.000	1.018668	1.033124
sex	1.059975	.0713581	0.87	0.387	.9287095	1.209794
_Iedu3_2	1.017984	.0752703	0.24	0.810	.8803984	1.177071
_Iedu3_3	1.102589	.0862986	1.25	0.213	.9454967	1.285781
_IFRexercia_1	.9145195	.0705879	-1.16	0.247	.7858929	1.064198
_IFRexercia_2	.723978	.0568187	-4.12	0.000	.6205702	.8446169
FRwaist	1.008206	.0025265	3.26	0.001	1.003257	1.01318
BEHcage2	1.090501	.0925329	1.02	0.308	.9231174	1.288236
ph201_05	1.760399	.2249526	4.43	0.000	1.369705	2.262535
_cons	.0802973	.0304096	-6.66	0.000	.0381687	.1689252

Note: Variances scaled within each stage to handle strata with a single sampling unit.

(b)With smoking

```
. xi: svy:logistic smokcond SRpsych age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3  _IFRexercia_0-2      (naturally coded; _IFRexercia_0 omitted)
i.BEHsmoker   _IBEHsmoker_0-2      (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(12, 607)	=	14.55
			Prob > F	=	0.0000

smokcond	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
SRpsychmeduse	1.382203	.1451107	3.08	0.002	1.12469	1.698676
age	1.024981	.0036761	6.88	0.000	1.017787	1.032226
sex	1.091599	.0741571	1.29	0.197	.9552644	1.24739
_Iedu3_2	1.021925	.0758016	0.29	0.770	.8833995	1.182173
_Iedu3_3	1.104022	.0874545	1.25	0.212	.9449696	1.289845
_IFRexercia_1	.9054861	.0698403	-1.29	0.198	.7782151	1.053571
_IFRexercia_2	.7180903	.0568022	-4.19	0.000	.6147739	.8387697
FRwaist	1.007508	.0025286	2.98	0.003	1.002555	1.012486
BEHcage2	1.055053	.0919675	0.61	0.539	.8890592	1.252039
ph201_05	1.773583	.2275213	4.47	0.000	1.378612	2.281712
_IBEHsmoker_1	1.310537	.0875631	4.05	0.000	1.149384	1.494286
_IBEHsmoker_2	1.034043	.0882866	0.39	0.695	.8744207	1.222804
_cons	.0782138	.0295853	-6.74	0.000	.0372112	.1643966

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 3

(a) Without smoking

```
i.FRexercise3  _IFRexercia_0-2      (naturally coded; _IFRexercia_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(10, 609)	=	14.76
			Prob > F	=	0.0000

smokcond	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
Srmed_prob	1.464173	.2068191	2.70	0.007	1.109485	1.932249
age	1.026241	.0036845	7.21	0.000	1.019031	1.033502
sex	1.065686	.0715629	0.95	0.344	.9340218	1.215909
_Iedu3_2	1.006909	.0742678	0.09	0.926	.8711316	1.163848
_Iedu3_3	1.086845	.0850237	1.06	0.287	.9320683	1.267324
_IFRexercia_1	.9056727	.0696059	-1.29	0.198	.7787954	1.05322
_IFRexercia_2	.7159475	.056035	-4.27	0.000	.613945	.8348969
FRwaist	1.008132	.0025264	3.23	0.001	1.003183	1.013106
BEHcage2	1.096178	.0932248	1.08	0.281	.9275737	1.29543
ph201_05	1.787929	.228844	4.54	0.000	1.390554	2.298861
_cons	.080527	.030505	-6.65	0.000	.03827	.1694433

Note: Variances scaled within each stage to handle strata with a single sampling unit.

(b)With smoking

```
. xi: svy:logistic smokcond SRmed_pr age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3  _IFRexercia_0-2      (naturally coded; _IFRexercia_0 omitted)
i.BEHsmoker   _IBEHsmoker_0-2      (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(12, 607)	=	14.39
			Prob > F	=	0.0000

smokcond	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
Srmed_prob	1.45431	.2052323	2.65	0.008	1.1023	1.918732
age	1.025382	.0036856	6.97	0.000	1.018169	1.032645
sex	1.097712	.0743531	1.38	0.169	.960991	1.253884
_Iedu3_2	1.011404	.0748538	0.15	0.878	.8745888	1.169622
_Iedu3_3	1.089272	.0862692	1.08	0.281	.9323728	1.272573
_IFRexercia_1	.896905	.0688903	-1.42	0.157	.7713267	1.042929
_IFRexercia_2	.7102466	.0560302	-4.34	0.000	.6083135	.8292603
FRwaist	1.00745	.0025278	2.96	0.003	1.002498	1.012427
BEHcage2	1.060262	.0925926	0.67	0.503	.8931658	1.25862
ph201_05	1.801525	.2316062	4.58	0.000	1.399568	2.318924
_IBEHsmoker_1	1.309521	.0873705	4.04	0.000	1.148707	1.492848
_IBEHsmoker_2	1.041459	.0884907	0.48	0.633	.8814043	1.230577
_cons	.0780183	.0295173	-6.74	0.000	.0371127	.1640101

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 4

(a) Without smoking

```

. xi: svy:logistic smoxcond SRMedOPro age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(10, 609)	=	14.77
			Prob > F	=	0.0000

smkcond	Odds Ratio	Linearized Std. Err.	z	P> z	[95% Conf. Interval]
SRmedOProph	1.266851	.108994	2.75	0.006	1.069912 1.50003
sex	1.026288	-.0036703	7.26	0.000	1.019105 1.03322
sex	1.0619	.0715968	0.89	0.373	.930208 1.21252
edu3	1.017199	-.0750028	0.23	0.817	.880078 1.17568
edu3	1.096644	-.0857285	1.18	0.239	.9404845 1.25873
IFRexercis1	.9109257	.0701193	-1.21	0.226	.7832173 1.07975
IFRexercis2	.722995	.0567135	-4.13	0.000	.6197748 1.04345
FRwast	1.008326	.0025264	0.30	0.001	.881405 1.08309
B88155	.088155	-.092511	9.99	0.32	.9208344 .081405
ph201_05	1.765129	-.225762	4.44	0.000	1.373071 2.26913
con1	.0773209	-.0293822	-6.75	0.000	.0337612 .162852

Note: Variances scaled within each stage to handle strata with a single sampling unit.

(b) With smoking

```

. xi: svy:logistic smokcond SRmedQrpro age sex i.educ3 i.FRexercis3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
i.educ3 _Ieduc3_1-3 (naturally coded; _Ieduc3_1 omitted)
i.FRexercis3 _IFRexercis3_0-2 (naturally coded; _IFRexercis3_0 omitted)
i.BEHsmoker _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(12, 607)	=	14.47
			Prob > F	=	0.0000

smokcond	Odds Ratio	Std. Err.	t	P> t	(95% Conf. Interval)
SMed0Eprop	1.269649	1.094227	2.77	0.006	1.071964 1.503785
age	1.025382	0.036724	7.00	0.000	1.018195 1.032616
sex	1.093462	0.074355	1.31	0.189	.956059 1.249630
edu3_2	1.021053	0.075597	0.28	0.778	.882980 1.180711
_edu3_3	1.09778	0.080306	1.18	0.239	.939673 1.282486
_IFFexercis_1	.9018409	.0693701	-1.34	0.180	.7754013 .1048893
_IFFexercis_2	1.710925	0.566933	-4.21	0.000	.61397 8.875355
FRwaist	1.007616	0.002582	3.02	0.003	1.002663 1.012593
BH05cap2	1.052865	.0919195	0.59	0.555	.868987 1.281745
ph20_1	1.748448	2.282504	1.48	0.145	1.186192 2.287947
_IBHsmoker_1	1.010445	0.01043	0.97	0.33	1.449123 1.484123
_IBHsmoker_2	0.923335	0.081112	0.37	0.709	0.873025 1.220715
_cons	1.025488	0.285646	-6.82	0.000	0.358474 1.586725

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 5

(c) Without smoking

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(10, 609)	=	14.40
			Prob > F	=	0.0000

	Linearized				
smokcond	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]
ph301_08	1.621718	.3960678	1.98	0.048	1.003877 2.619837
age	1.026179	.0036752	7.22	0.000	1.018987 1.033422
sex	1.088015	.0735384	1.25	0.212	.9527399 1.2424545
_iedu3_02	1.093965	.0743475	0.13	0.893	.8740232 1.1670505
_iedu3_1	1.090482	.0850749	-1.11	0.267	.9355801 1.2710133
_fRexercis2_1	.9045659	.0697455	-1.30	0.194	.7774493 1.0524627
_fRexercis2_2	.7136885	.0560787	-4.29	0.000	.6116366 .8237678
FRwaist	1.008419	.002524	3.35	0.001	1.003475 1.013388
BEHcage2	1.089362	.0927134	1.01	0.315	.9216928 1.2875534
ph201_05	.7191575	.2293781	4.55	0.000	.3932827 2.3037119
_cons	0.0685484	.0291881	-6.76	0.000	.0364562 .1620234

Note: Variances scaled within each stage to handle strata with a single sampling unit.

(b) With smoking

```
. xi: svy:logistic smokcond ph301_08 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 i.BEHsmoker ph201_05
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata = 3 Number of obs = 5,176
Number of PSUs = 621 Population size = 735,169.58
Design df = 618
F( 12, 607) = 14.28
Prob > F = 0.0000
```

smokcond	Linearized					
	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]	
ph301_08	1.626877	.3915438	2.02	0.044	1.014127	2.60986
age	1.025301	.0036757	6.97	0.000	1.018108	1.032545
sex	1.120745	.0763921	1.67	0.095	.9803328	1.281269
_Iedu3_2	1.014118	.0749238	0.19	0.850	.877158	1.172464
_Iedu3_3	1.09231	.086246	1.12	0.264	.935417	1.275518
_IFRexercis_1	.8956376	.0690385	-1.43	0.153	.769822	1.042016
_IFRexercis_2	.707908	.0560795	-4.36	0.000	.6059175	.827066
FRwaist	1.00772	.0025279	3.07	0.002	1.002768	1.012697
BEHcage2	1.053633	.0921944	0.60	0.551	.8872828	1.251172
_IBEHsmoker_1	1.311328	.0878709	4.04	0.000	1.149638	1.495758
_IBEHsmoker_2	1.037771	.088609	0.43	0.664	.8775665	1.227222
ph201_05	1.804705	.232084	4.59	0.000	1.401934	2.323192
_cons	.0746714	.0283481	-6.83	0.000	.0354301	.1573755

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 6

(a) Without smoking

```
. xi: svy:logistic smokcond SUorMHprob age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata = 3 Number of obs = 5,176
Number of PSUs = 621 Population size = 735,169.58
Design df = 618
F( 10, 609) = 14.81
Prob > F = 0.0000
```

smokcond	Linearized					
	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]	
SUorMHprob	1.299556	.1278101	2.66	0.008	1.071312	1.576428
age	1.026585	.0036754	7.33	0.000	1.019393	1.033829
sex	1.070687	.0720582	1.01	0.311	.9381311	1.221973
_Iedu3_2	1.009466	.0743245	0.13	0.898	.8735683	1.166505
_Iedu3_3	1.084879	.0847556	1.04	0.297	.9305742	1.26477
_IFRexercis_1	.9043058	.069484	-1.31	0.191	.7776486	1.051592
_IFRexercis_2	.7166433	.0561191	-4.25	0.000	.6144919	.8357762
FRwaist	1.008295	.0025262	3.30	0.001	1.003346	1.013268
BEHcage2	1.084347	.092782	0.95	0.344	.9166266	1.282756
ph201_05	1.782171	.2283116	4.51	0.000	1.385763	2.291973
_cons	.0764754	.0290256	-6.77	0.000	.0362929	.1611469

Note: Variances scaled within each stage to handle strata with a single sampling unit.

(b) With smoking

```
. xi: svy:logistic smokcond SUorMHprob age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 i.BEHsmoker ph201_05
i.edu3          _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3   _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker     _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(12, 607)	=	14.43
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized		t	P> t	[95% Conf. Interval]	
		Std. Err.					
SUorMHprob	1.29964	.1273904	2.67	0.008	1.072074	1.575511	
age	1.025686	.0036773	7.07	0.000	1.01849	1.032933	
sex	1.102559	.0748111	1.44	0.151	.9650113	1.259711	
_Iedu3_2	1.013347	.0748816	0.18	0.858	.8764662	1.171606	
_Iedu3_3	1.08616	.0859171	1.04	0.297	.9298874	1.268696	
_IFRexercis_1	.895241	.068751	-1.44	0.150	.7699149	1.040968	
_IFRexercis_2	.7107426	.0561063	-4.33	0.000	.6086763	.8299241	
FRwaist	1.007591	.0025271	3.02	0.003	1.002641	1.012566	
BEHcage2	1.049351	.0921615	0.55	0.584	.8831109	1.246884	
_IBEHsmoker_1	1.30967	.087511	4.04	0.000	1.148613	1.49331	
_IBEHsmoker_2	1.033824	.08788	0.39	0.696	.8748801	1.221645	
ph201_05	1.795832	.2310084	4.55	0.000	1.39494	2.311934	
_cons	.0745693	.0282587	-6.85	0.000	.0354288	.1569508	

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 7

(a) Without smoking

```
. xi: svy:logistic smokcond i.MHdep3 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.MHdep3        _IMHdep3_0-2    (naturally coded; _IMHdep3_0 omitted)
i.edu3          _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3   _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,114
Number of PSUs	=	621	Population size	=	726,602.54
			Design df	=	618
			F(11, 608)	=	14.06
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized		t	P> t	[95% Conf. Interval]	
		Std. Err.					
_IMHdep3_1	1.102078	.0761348	1.41	0.160	.962262	1.262209	
_IMHdep3_2	1.437912	.1418919	3.68	0.000	1.1846	1.745392	
age	1.026604	.0037083	7.27	0.000	1.019347	1.033912	
sex	1.052126	.0710983	0.75	0.452	.9213708	1.201438	
_Iedu3_2	1.023082	.0763908	0.31	0.760	.8835456	1.184656	
_Iedu3_3	1.108003	.0878865	1.29	0.197	.948181	1.294763	
_IFRexercis_1	.932721	.0723014	-0.90	0.369	.8010137	1.086084	
_IFRexercis_2	.7390371	.0590413	-3.79	0.000	.6317289	.8645731	
FRwaist	1.008697	.0025629	3.41	0.001	1.003677	1.013743	
BEHcage2	1.07402	.0932652	0.82	0.411	.9056303	1.273718	
ph201_05	1.776224	.2281291	4.47	0.000	1.380255	2.28579	
_cons	.0696026	.0269832	-6.87	0.000	.0325078	.1490264	

Note: Variances scaled within each stage to handle strata with a single sampling unit.

(b)With smoking

```
. xi: svy:logistic smokcond i.MHdep3 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.MHdep3        _IMHdep3_0-2    (naturally coded; _IMHdep3_0 omitted)
i.edu3          _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3   _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker     _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,114
Number of PSUs	=	621	Population size	=	726,602.54
			Design df	=	618
			F(13, 606)	=	13.93
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized		t	P> t	[95% Conf. Interval]	
		Std. Err.					
_IMHdep3_1	1.095576	.0761712	1.31	0.190	.955753	1.255855	
_IMHdep3_2	1.443219	.1425743	3.63	0.000	1.179865	1.743407	
age	1.025623	.0037076	7.00	0.000	1.018367	1.03293	
sex	1.086124	.073997	1.21	0.226	.9501101	1.24161	
_Iedu3_2	1.025595	.0768492	0.34	0.736	.8852565	1.188182	
_Iedu3_3	1.107285	.0887752	1.27	0.204	.9459786	1.296096	
_IFRexercis_1	.9230285	.0714861	-1.03	0.301	.7927979	1.074652	
_IFRexercis_2	.7324825	.0586865	-3.87	0.000	.6253697	.8579415	
FRwaist	1.007977	.00257	3.12	0.002	1.002943	1.013037	
BEHcage2	1.04071	.0926855	0.45	0.654	.8737219	1.239614	
ph201_05	1.790972	.2306301	4.53	0.000	1.390789	2.306302	
_IBEHsmoker_1	1.323108	.0878426	4.22	0.000	1.161374	1.507365	
_IBEHsmoker_2	1.024225	.0878383	0.28	0.780	.8654713	1.2121	
_cons	.0680809	.026369	-6.94	0.000	.0318194	.1456661	

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 8

(a) Without smoking

```
. xi: svy:logistic smokcond i.hadsacat age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.hadsacat      _Ihadsacat_0-2      (naturally coded; _Ihadsacat_0 omitted)
i.edu3          _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3   _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =      3      Number of obs   =      5,024
Number of PSUs    =     621      Population size = 710,730.54
                                   Design df       =      618
                                   F( 11, 608)       =     13.64
                                   Prob > F         =     0.0000
```

smokcond	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
_Ihadsacat_1	1.09858	.0917952	1.13	0.261	.9323246	1.294482
_Ihadsacat_2	1.496827	.1632717	3.70	0.000	1.208208	1.854392
age	1.027706	.00382	7.35	0.000	1.020231	1.035235
sex	1.035845	.0699892	0.52	0.602	.9071275	1.182826
_Iedu3_2	1.015245	.076344	0.20	0.841	.8758641	1.176805
_Iedu3_3	1.116682	.0892559	1.38	0.168	.9544645	1.306469
_IFRexercis_1	.9101549	.0710517	-1.21	0.228	.7807922	1.060951
_IFRexercis_2	.7301481	.0579354	-3.96	0.000	.6247953	.8532654
FRwaist	1.009017	.0024844	3.65	0.000	1.00415	1.013907
BEHcage2	1.051524	.0920491	0.57	0.566	.8854409	1.248758
ph201_05	1.753067	.2281942	4.31	0.000	1.35763	2.263683
_cons	.0674473	.0258426	-7.04	0.000	.0317822	.1431347

Note: Variances scaled within each stage to handle strata with a single sampling unit.

(b)With smoking

```
. xi: svy:logistic smokcond i.hadsacat age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.hadsacat      _Ihadsacat_0-2      (naturally coded; _Ihadsacat_0 omitted)
i.edu3          _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3   _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker     _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =      3      Number of obs   =      5,024
Number of PSUs    =     621      Population size = 710,730.54
                                   Design df       =      618
                                   P( 19, 606)       =     13.38
                                   Prob > F         =     0.0000
```

smokcond	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
_Ihadsacat_1	1.100201	.0923482	1.14	0.256	.933005	1.297358
_Ihadsacat_2	1.495448	.1628773	3.69	0.000	1.207481	1.85209
age	1.026886	.0038213	7.13	0.000	1.019409	1.034418
sex	1.064812	.0726421	0.92	0.358	.9312998	1.217465
_Iedu3_2	1.018793	.0767206	0.25	0.805	.8787394	1.181168
_Iedu3_3	1.118151	.0901461	1.39	0.166	.9544236	1.309964
_IFRexercis_1	.9006629	.0702896	-1.34	0.181	.7726849	1.049838
_IFRexercis_2	.7239247	.0578765	-4.04	0.000	.6187394	.8469814
FRwaist	1.008335	.0024879	3.36	0.001	1.003461	1.013233
BEHcage2	1.017081	.0910507	0.19	0.850	.8531103	1.212568
ph201_05	1.764122	.2305717	4.34	0.000	1.364765	2.280339
_IBEHsmoker_1	1.295249	.0894389	3.75	0.000	1.130997	1.483356
_IBEHsmoker_2	1.038245	.0892794	0.44	0.663	.8769218	1.229246
_cons	.0657427	.0250815	-7.13	0.000	.0310791	.1390681

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Appendix B

Table 4: Full models

Model 1

. svy:logistic smokcond anymh##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata = 3
Number of PSUs = 621

Number of obs = 5,176
Population size = 735,169.58
Design df = 618
F(14, 605) = 12.66
Prob > F = 0.0000

smokcond	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
anymhprob						
Any emotional, nervous or psychiatric...	1.630822	.2719888	2.93	0.003	1.175343	2.262813
BEHsmoker						
Past	1.359658	.0933449	4.48	0.000	1.188167	1.555902
Current	1.078698	.0969985	0.84	0.400	.9040821	1.287038
anymhprob#BEHsmoker						
Any emotional, nervous or psychiatric... #						
Past	.6183188	.1454773	-2.04	0.041	.389538	.9814657
Any emotional, nervous or psychiatric... #						
Current	.6641042	.184828	-1.47	0.142	.3844784	1.147098
age	1.025475	.0036751	7.02	0.000	1.018283	1.032717
sex	1.103302	.0750582	1.45	0.149	.9653241	1.261002
edu3						
Secondary	1.009462	.0744968	0.13	0.898	.8732713	1.166892
Third/higher	1.084939	.0858814	1.03	0.303	.9287398	1.26741
FRexercise3						
1	.8935618	.0685223	-1.47	0.143	.7686393	1.038787
2	.7095864	.0560543	-4.34	0.000	.60762	.828664
FRwaist	1.007671	.0025332	3.04	0.002	1.002708	1.012658
BEHcage2	1.060296	.0925472	0.67	0.503	.8932738	1.258567
ph201_05	1.80406	.2317361	4.59	0.000	1.401836	2.321691
_cons	.0739615	.028082	-6.86	0.000	.0350901	.1558932

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 2

. svy:logistic smokcond SRpsych##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata = 3
Number of PSUs = 621

Number of obs = 5,176
Population size = 735,169.58
Design df = 618
F(14, 605) = 12.48
Prob > F = 0.0000

smokcond	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
1.SRpsychmeduse	1.297284	.2088335	1.62	0.106	.9456745	1.779623
BEHsmoker						
Past	1.301294	.0883692	3.88	0.000	1.138827	1.486938
Current	1.020256	.0925037	0.22	0.825	.8538504	1.219093
SRpsychmeduse#BEHsmoker						
1#Past	1.095841	.2592987	0.39	0.699	.6885583	1.744033
1#Current	1.136532	.299006	0.49	0.627	.6779581	1.905288
age	1.024967	.0036764	6.88	0.000	1.017773	1.032212
sex	1.091953	.0741545	1.30	0.196	.9556201	1.247735
edu3						
Secondary	1.022185	.0759219	0.30	0.768	.8834529	1.182704
Third/higher	1.103937	.0875675	1.25	0.213	.9446958	1.290021
FRexercise3						
1	.9050218	.0698351	-1.29	0.196	.7777644	1.053101
2	.717635	.0568227	-4.19	0.000	.6142892	.8383675
FRwaist	1.007516	.0025304	2.98	0.003	1.002559	1.012498
BEHcage2	1.055762	.0921665	0.62	0.534	.88943	1.253201
ph201_05	1.772415	.2271999	4.46	0.000	1.377967	2.279776
_cons	.0785821	.029747	-6.72	0.000	.0373656	.1652628

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 3

```
. svy:logistic smokcond SRmed_pr##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(14, 605)	=	12.33
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
1.SRmed_prob	1.369492	.3150943	1.37	0.172	.8716256	2.151738
BEHsmoker						
Past	1.309271	.0885333	3.99	0.000	1.146458	1.495206
Current	1.028553	.0900576	0.32	0.748	.8660671	1.221525
SRmed_prob#BEHsmoker						
1#Past	1.01601	.3398438	0.05	0.962	.526771	1.959629
1#Current	1.264095	.4529284	0.65	0.513	.6254513	2.554852
age	1.025372	.0036867	6.97	0.000	1.018157	1.032637
sex	1.098424	.07434	1.39	0.166	.9617202	1.25456
edu3						
Secondary	1.011671	.0749477	0.16	0.876	.8746933	1.170099
Third/higher	1.089545	.0863739	1.08	0.280	.932467	1.273083
FRexercise3						
1	.8970542	.0689331	-1.41	0.158	.7714019	1.043174
2	.7108355	.0561511	-4.32	0.000	.6086926	.8301186
FRwaist	1.007474	.0025307	2.96	0.003	1.002516	1.012456
BEHcage2	1.060054	.0927677	0.67	0.505	.8926707	1.258823
ph201_05	1.802646	.2317644	4.58	0.000	1.400418	2.320403
_cons	.0779327	.0295152	-6.74	0.000	.0370437	.1639553

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 4

```
. svy:logistic smokcond SRmedORprob##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)
```

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(14, 605)	=	12.69
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
1.SRmedORprob	1.492947	.2021675	2.96	0.003	1.144334	1.947763
BEHsmoker						
Past	1.353024	.0934111	4.38	0.000	1.181474	1.549482
Current	1.072893	.1005177	0.75	0.453	.8925902	1.289617
SRmedORprob#BEHsmoker						
1#Past	.759972	.1481897	-1.41	0.160	.5181947	1.114557
1#Current	.7684323	.1784267	-1.13	0.257	.4870488	1.21238
age	1.025347	.0036754	6.98	0.000	1.018155	1.03259
sex	1.094029	.074277	1.32	0.186	.9574687	1.250066
edu3						
Secondary	1.01931	.0754276	0.26	0.796	.8814442	1.178739
Third/higher	1.097228	.0868643	1.17	0.242	.9392424	1.281788
FRexercise3						
1	.9017799	.0692617	-1.35	0.179	.775524	1.04859
2	.7173392	.0566842	-4.20	0.000	.6142293	.8377579
FRwaist	1.007644	.0025315	3.03	0.003	1.002685	1.012628
BEHcage2	1.053643	.0918697	0.60	0.549	.887829	1.250424
ph201_05	1.778446	.228083	4.49	0.000	1.382488	2.287812
_cons	.0739991	.0280826	-6.86	0.000	.0351206	.1559161

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 5

. svy:logistic smokcond ph301_08##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(14, 605)	=	12.16
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
ph301_08						
Alcohol or substance abuse	1.312154	.7531831	0.47	0.636	.4250424	4.05077
BEHsmoker						
Past	1.298639	.0872515	3.89	0.000	1.138117	1.481803
Current	1.052447	.0915118	0.59	0.557	.8872409	1.248414
ph301_08#BEHsmoker						
Alcohol or substance abuse#Past	2.078484	1.470453	1.03	0.301	.5180486	8.339173
Alcohol or substance abuse#Current	.829078	.5544593	-0.28	0.779	.2229583	3.082955
age	1.025382	.0036766	6.99	0.000	1.018187	1.032628
sex	1.120976	.0763352	1.68	0.094	.9806598	1.28137
edu3						
Secondary	1.011261	.0748969	0.15	0.880	.874374	1.169579
Third/higher	1.091663	.0862662	1.11	0.268	.9347433	1.274926
FRexercise3						
1	.8958383	.0691116	-1.43	0.154	.7698972	1.042381
2	.7068867	.0559638	-4.38	0.000	.6051018	.8257929
FRwaist	1.007664	.0025283	3.04	0.002	1.002711	1.012641
BEHcage2	1.06011	.0928484	0.67	0.505	.8925928	1.259067
ph201_05	1.801502	.2318459	4.57	0.000	1.39918	2.319508
_cons	.0748855	.0284376	-6.83	0.000	.035524	.1578607

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 6

. svy:logistic smokcond SUorMHprob##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(14, 605)	=	12.71
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
1.SUorMHprob	1.602668	.2608603	2.90	0.004	1.164192	2.206289
BEHsmoker						
Past	1.342062	.0924768	4.27	0.000	1.172207	1.53653
Current	1.077734	.0984324	0.82	0.413	.9007751	1.289456
SUorMHprob#BEHsmoker						
1#Past	.7375661	.1659904	-1.35	0.177	.4740901	1.147469
1#Current	.6824651	.1758956	-1.48	0.139	.4114006	1.132129
age	1.025623	.0036808	7.05	0.000	1.01842	1.032877
sex	1.101907	.0747553	1.43	0.153	.9644609	1.258941
edu3						
Secondary	1.010323	.0746615	0.14	0.890	.8738446	1.168117
Third/higher	1.083708	.0857933	1.02	0.310	.9276698	1.265992
FRexercise3						
1	.8945133	.0686612	-1.45	0.147	.7693464	1.040044
2	.7095178	.0560336	-4.35	0.000	.6075868	.828549
FRwaist	1.007603	.0025321	3.01	0.003	1.002643	1.012588
BEHcage2	1.051392	.0923735	0.57	0.569	.8847751	1.249386
ph201_05	1.799012	.2312319	4.57	0.000	1.397694	2.31556
_cons	.0738442	.0280062	-6.87	0.000	.0350635	.1555166

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 7

. svy:logistic smokcond i.MHdep3##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,114
Number of PSUs	=	621	Population size	=	726,602.54
			Design df	=	618
			F(17, 602)	=	10.79
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
MHdep3						
Moderate	1.159126	.1152498	1.49	0.138	.9535233	1.409062
Severe	1.368344	.2151222	1.99	0.047	1.004876	1.863281
BEHsmoker						
Past	1.343824	.1144614	3.47	0.001	1.136837	1.588497
Current	1.054529	.1220281	0.46	0.647	.8401677	1.323584
MHdep3#BEHsmoker						
Moderate#Past	.9340227	.1352615	-0.47	0.638	.7028261	1.241272
Moderate#Current	.83789	.171955	-0.86	0.389	.5599605	1.253766
Severe#Past	1.027574	.2202592	0.13	0.899	.6745301	1.5654
Severe#Current	1.140164	.2889548	0.52	0.605	.6931415	1.875482
age	1.025675	.0037	7.03	0.000	1.018434	1.032967
sex	1.084525	.0739956	1.19	0.235	.948526	1.240023
edu3						
Secondary	1.026095	.0769611	0.34	0.731	.8855618	1.18893
Third/higher	1.107539	.0889296	1.27	0.204	.945971	1.296702
FRexercise3						
1	.9237316	.0715353	-1.02	0.306	.7934107	1.075458
2	.7335202	.0592091	-3.84	0.000	.6259923	.8595184
FRwaist	1.007916	.0025758	3.09	0.002	1.00287	1.012987
BEHcage2	1.041551	.0931108	0.46	0.649	.87385	1.241435
ph201_05	1.786459	.230155	4.50	0.000	1.387123	2.300759
_cons	.0676514	.0262549	-6.94	0.000	.0315707	.1449671

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Model 8

. svy:logistic smokcond i.hadsacat##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,024
Number of PSUs	=	621	Population size	=	710,730.54
			Design df	=	618
			F(17, 602)	=	10.40
			Prob > F	=	0.0000

smokcond	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
hadsacat						
Possible	.9845129	.1232845	-0.12	0.901	.7698773	1.258987
Probable	1.528822	.2663601	2.44	0.015	1.085837	2.152529
BEHsmoker						
Past	1.249145	.1002776	2.77	0.006	1.066957	1.462443
Current	1.028897	.1079946	0.27	0.786	.837246	1.264418
hadsacat#BEHsmoker						
Possible#Past	1.228629	.2293027	1.10	0.270	.8516216	1.772535
Possible#Current	1.201007	.2829365	0.78	0.437	.7561771	1.907512
Probable#Past	1.052647	.2577016	0.21	0.834	.6508615	1.702459
Probable#Current	.8614548	.2369222	-0.54	0.588	.501962	1.478408
age	1.026921	.0038267	7.13	0.000	1.019434	1.034464
sex	1.064691	.0727707	0.92	0.359	.9309591	1.217634
edu3						
Secondary	1.020503	.0767904	0.27	0.787	.8803147	1.183017
Third/higher	1.121494	.0903907	1.42	0.155	.9573197	1.313824
FRexercise3						
1	.901794	.070335	-1.33	0.186	.7737274	1.051058
2	.7245489	.0578781	-4.03	0.000	.6193539	.8476108
FRwaist	1.008291	.0024944	3.34	0.001	1.003404	1.013201
BEHcage2	1.013822	.0908063	0.15	0.878	.8502982	1.208793
ph201_05	1.773076	.2318277	4.38	0.000	1.371561	2.292131
_cons	.0667862	.025566	-7.07	0.000	.0314923	.1416344

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Appendix C

Models for smoking-related disease without High Cholesterol

. xi: svy:logistic smokcondw anymh age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(10, 609)	=	28.15
			Prob > F	=	0.0000

smokcondw	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
anymhprob	1.22178	.1871988	1.31	0.192	.9043103	1.650701
age	1.05948	.0054799	11.17	0.000	1.048773	1.070296
sex	.6012562	.0576319	-5.31	0.000	.4980921	.7257874
_Iedu3_2	.7656137	.0775376	-2.64	0.009	.6275308	.9340806
_Iedu3_3	.6363177	.0734374	-3.92	0.000	.5072757	.7981857
_IFRexercis_1	.9344513	.0949063	-0.67	0.505	.7654836	1.140716
_IFRexercis_2	.5698032	.0627627	-5.11	0.000	.4589684	.7074032
FRwaist	1.008683	.0037207	2.34	0.019	1.001403	1.016017
BEHcage2	.9058755	.1309752	-0.68	0.494	.6819567	1.203318
ph201_05	1.37402	.2099374	2.08	0.038	1.017847	1.854829
_cons	.0055841	.0033247	-8.71	0.000	.0017344	.0179783

Note: Variances scaled within each stage to handle strata with a single sampling unit.

. xi: svy:logistic smokcondw anymh age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(12, 607)	=	26.83
			Prob > F	=	0.0000

smokcondw	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
anymhprob	1.176805	.1789214	1.07	0.285	.8730398	1.586263
age	1.060529	.0054983	11.34	0.000	1.049786	1.071382
sex	.6564685	.0639991	-4.32	0.000	.5420851	.7949874
_Iedu3_2	.7906697	.0806304	-2.30	0.022	.6471747	.9659813
_Iedu3_3	.6622479	.0773455	-3.53	0.000	.5265161	.8329704
_IFRexercis_1	.9384052	.0952712	-0.63	0.531	.7687815	1.145455
_IFRexercis_2	.5730999	.0631814	-5.05	0.000	.4615358	.7116316
FRwaist	1.008371	.0037073	2.27	0.024	1.001117	1.015678
BEHcage2	.8166668	.1190619	-1.39	0.165	.6133447	1.08739
ph201_05	1.356291	.2108596	1.96	0.050	.9994446	1.840547
_IBEHsmoker_1	1.758815	.161222	6.16	0.000	1.469067	2.105711
_IBEHsmoker_2	1.768436	.2304527	4.37	0.000	1.36914	2.284182
_cons	.0033439	.002013	-9.47	0.000	.0010253	.0109059

Note: Variances scaled within each stage to handle strata with a single sampling unit.

. xi: svy:logistic smokcondw SRpsych age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(10, 609)	=	28.36
			Prob > F	=	0.0000

smokcondw	Linearized		t	P> t	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
SRpsychmeduse	1.513881	.1977889	3.17	0.002	1.171288	1.956679
age	1.058939	.005455	11.11	0.000	1.04826	1.069686
sex	.59009	.0569132	-5.47	0.000	.4882702	.7131424
_Iedu3_2	.7776889	.0796243	-2.46	0.014	.6360393	.9508846
_Iedu3_3	.6510767	.0754319	-3.70	0.000	.5185861	.8174167
_IFRexercis_1	.949848	.0969502	-0.50	0.614	.7773242	1.160663
_IFRexercis_2	.5802694	.0638166	-4.95	0.000	.4675553	.7201557
FRwaist	1.008472	.0037343	2.28	0.023	1.001165	1.015832
BEHcage2	.8935293	.1291474	-0.78	0.436	.6727255	1.186806
ph201_05	1.34197	.2043657	1.93	0.054	.9950867	1.809776
_cons	.0057971	.003461	-8.63	0.000	.0017948	.0187238

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcondw SRpsych age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,176
Number of PSUs = 621         Population size = 735,169.58
                               Design df = 618
                               F( 12, 607) = 27.16
                               Prob > F = 0.0000
```

smokcondw	Linearized				
	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]
SRpsychmeduse	1.461301	.1903324	2.91	0.004	1.131499 1.887231
age	1.05991	.0054673	11.28	0.000	1.049227 1.070701
sex	.6444071	.0633032	-4.47	0.000	.5313475 .7815233
_Iedu3_2	.800668	.0824072	-2.16	0.031	.6541424 .9800148
_Iedu3_3	.6744456	.0790557	-3.36	0.001	.5357876 .8490376
_IFRexercis_1	.9513966	.0969949	-0.49	0.625	.7787738 1.162283
_IFRexercis_2	.5820102	.0641185	-4.91	0.000	.4687831 .7225855
FRwaist	1.008123	.0037243	2.19	0.029	1.000835 1.015463
BEHcage2	.8079197	.1174856	-1.47	0.143	.6072195 1.074956
ph201_05	1.326571	.2058163	1.82	0.069	.9781561 1.799089
_IBEHsmoker_1	1.753284	.160784	6.12	0.000	1.464334 2.099252
_IBEHsmoker_2	1.73706	.226581	4.23	0.000	1.344519 2.244207
_cons	.0035257	.0021271	-9.36	0.000	.0010782 .011529

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcondw SRmed_pr age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,176
Number of PSUs = 621         Population size = 735,169.58
                               Design df = 618
                               F( 10, 609) = 28.26
                               Prob > F = 0.0000
```

smokcondw	Linearized				
	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]
SRmed_prob	1.036016	.2196739	0.17	0.868	.6831655 1.571111
age	1.059108	.0054658	11.13	0.000	1.048428 1.069896
sex	.6051377	.0582446	-5.22	0.000	.5009163 .7310436
_Iedu3_2	.765306	.0776293	-2.64	0.009	.6270808 .9339996
_Iedu3_3	.6388293	.0736766	-3.89	0.000	.5093573 .8012115
_IFRexercis_1	.9328765	.0947697	-0.68	0.494	.764156 1.138849
_IFRexercis_2	.5671466	.0622671	-5.17	0.000	.4571496 .7036105
FRwaist	1.008749	.0037202	2.36	0.018	1.00147 1.016082
BEHcage2	.9152475	.1318568	-0.61	0.539	.6897124 1.214532
ph201_05	1.3806	.2105077	2.12	0.035	1.023353 1.862558
_cons	.0057111	.0033845	-8.72	0.000	.0017836 .0182869

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcondw SRmed_pr age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsm
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,176
Number of PSUs = 621         Population size = 735,169.58
                               Design df = 618
                               F( 12, 607) = 27.04
                               Prob > F = 0.0000
```

smokcondw	Linearized				
	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]
SRmed_prob	.9828814	.2034953	-0.08	0.934	.65452 1.475976
age	1.06024	.005486	11.30	0.000	1.049521 1.071069
sex	.661134	.0647043	-4.23	0.000	.5455317 .8012332
_Iedu3_2	.7905718	.0807351	-2.30	0.022	.6469101 .9661369
_Iedu3_3	.6649546	.0775543	-3.50	0.001	.5288357 .8361097
_IFRexercis_1	.9369666	.0951782	-0.64	0.522	.7675177 1.143826
_IFRexercis_2	.5706786	.0627217	-5.10	0.000	.4598908 .7081551
FRwaist	1.008491	.003708	2.30	0.022	1.001235 1.015799
BEHcage2	.8236899	.1197096	-1.33	0.183	.6191745 1.095758
ph201_05	1.362124	.2114356	1.99	0.047	1.004222 1.847581
_IBEHsmoker_1	1.761938	.1612925	6.19	0.000	1.47203 2.108943
_IBEHsmoker_2	1.785016	.2325139	4.45	0.000	1.382128 2.305346
_cons	.0033704	.0020216	-9.49	0.000	.0010378 .0109456

Note: Variances scaled within each stage to handle strata with a single sampling unit.


```
. xi: svy:logistic smokcondw SRmedORpro age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,176
Number of PSUs = 621        Population size = 735,169.58
                              Design df = 618
                              F( 10, 609) = 28.85
                              Prob > F = 0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
SRmedORprob	1.530582	.1740639	3.74	0.000	1.224235	1.913589
age	1.059618	.0054779	11.20	0.000	1.048914	1.07043
sex	.5874139	.056422	-5.54	0.000	.4864348	.7093553
_Iedu3_2	.7790613	.07941	-2.45	0.015	.6377318	.9517112
_Iedu3_3	.6467977	.0748766	-3.76	0.000	.5152709	.8118977
_IFRexercis_1	.9517123	.0973107	-0.48	0.629	.7785764	1.163349
_IFRexercis_2	.5838203	.0646583	-4.86	0.000	.4697029	.7256632
FRwaist	1.008656	.0037331	2.33	0.020	1.001352	1.016014
BEHcage2	.8826204	.1277523	-0.86	0.389	.6642439	1.17279
ph201_05	1.334966	.2040263	1.89	0.059	.9888348	1.802258
_cons	.0053831	.0032248	-8.72	0.000	.00166	.0174564

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcondw SRmedORpro age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsm
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker _IBEHsmoker_0-2 (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,176
Number of PSUs = 621        Population size = 735,169.58
                              Design df = 618
                              F( 12, 607) = 27.56
                              Prob > F = 0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
SRmedORprob	1.484346	.1693906	3.46	0.001	1.186334	1.857219
age	1.060529	.0054899	11.35	0.000	1.049802	1.071365
sex	.6412521	.0627373	-4.54	0.000	.5291607	.7770878
_Iedu3_2	.8022218	.0823027	-2.15	0.032	.6558363	.9812813
_Iedu3_3	.670078	.0785357	-3.42	0.001	.5323111	.8435003
_IFRexercis_1	.9534111	.0973783	-0.47	0.641	.7801366	1.165171
_IFRexercis_2	.5855039	.0649395	-4.83	0.000	.4709078	.7279871
FRwaist	1.008256	.0037231	2.23	0.026	1.000971	1.015594
BEHcage2	.7988129	.1164069	-1.54	0.124	.6000127	1.063481
ph201_05	1.321441	.205602	1.79	0.074	.9735314	1.793682
_IBEHsmoker_1	1.75461	.1610513	6.13	0.000	1.465202	2.101181
_IBEHsmoker_2	1.719187	.2243939	4.15	0.000	1.330465	2.221481
_cons	.0033138	.0020045	-9.44	0.000	.0010102	.0108699

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcondw i.MHdep3 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.MHdep3 _IMHdep3_0-2 (naturally coded; _IMHdep3_0 omitted)
i.edu3 _Iedu3_1-3 (naturally coded; _Iedu3_1 omitted)
i.FRexercise3 _IFRexercis_0-2 (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,114
Number of PSUs = 621        Population size = 726,602.54
                              Design df = 618
                              F( 11, 608) = 27.43
                              Prob > F = 0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
_IMHdep3_1	1.12346	.1152116	1.14	0.257	.9185337	1.374106
_IMHdep3_2	2.200019	.2687292	6.45	0.000	1.73081	2.796427
age	1.061846	.005574	11.43	0.000	1.050956	1.072849
sex	.5771161	.055727	-5.69	0.000	.477429	.6976177
_Iedu3_2	.8020906	.082157	-2.15	0.032	.6559412	.9808033
_Iedu3_3	.6804589	.0797751	-3.28	0.001	.5405222	.8566241
_IFRexercis_1	.9812816	.101013	-0.18	0.854	.8016764	1.201125
_IFRexercis_2	.6057035	.0677972	-4.48	0.000	.4861799	.754611
FRwaist	1.00931	.0037014	2.53	0.012	1.002068	1.016606
BEHcage2	.8657007	.1257532	-0.99	0.321	.6508458	1.151483
ph201_05	1.354147	.2067818	1.99	0.048	1.003298	1.827686
_cons	.0039908	.0023684	-9.31	0.000	.0012442	.0127998

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcondw i.MHdep3 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
      _IMHdep3_0-2      (naturally coded; _IMHdep3_0 omitted)
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3      _IFRexercis_0-2      (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker      _IBEHsmoker_0-2      (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3      Number of obs =      5,114
Number of PSUs =     621      Population size = 726,602.54
                                Design df      =      618
                                F( 13, 606)      =     26.28
                                Prob > F        =     0.0000
```

smokcondw	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]
_IMHdep3_1	1.100742	.1139192	0.93	0.354	.8982959 1.348814
_IMHdep3_2	2.111721	.2599864	6.07	0.000	1.65819 2.689296
age	1.062521	.0055978	11.51	0.000	1.051585 1.073571
sex	.6306986	.0621918	-4.67	0.000	.5196632 .7654586
_Iedu3_2	.8227505	.0851115	-1.89	0.060	.6714918 1.008081
_Iedu3_3	.7020685	.0833815	-2.98	0.003	.5560166 .8864845
_IFRexercis_1	.9801624	.1011308	-0.19	0.846	.8003883 1.200315
_IFRexercis_2	.6042924	.0679503	-4.48	0.000	.4845571 .7536145
FRwaist	1.00886	.0037054	2.40	0.017	1.00161 1.016163
BEHcage2	.7898529	.1154629	-1.61	0.107	.5927493 1.052498
ph201_05	1.339399	.2085073	1.88	0.061	.9866006 1.818354
_IBEHsmoker_1	1.770713	.1635737	6.19	0.000	1.476938 2.122923
_IBEHsmoker_2	1.660015	.2163422	3.89	0.000	1.285171 2.144188
_cons	.0025306	.0015267	-9.91	0.000	.000774 .0082746

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcondw i.hadsac age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
      _Ihadsacat_0-2      (naturally coded; _Ihadsacat_0 omitted)
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3      _IFRexercis_0-2      (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3      Number of obs =      5,024
Number of PSUs =     621      Population size = 710,730.54
                                Design df      =      618
                                F( 11, 608)      =     26.42
                                Prob > F        =     0.0000
```

smokcondw	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]
_Ihadsacat_1	1.365408	.1613651	2.64	0.009	1.082603 1.722089
_Ihadsacat_2	1.629866	.2456955	3.24	0.001	1.21223 2.191385
age	1.06081	.0056154	11.15	0.000	1.049839 1.071895
sex	.5675623	.0554162	-5.80	0.000	.4685328 .6875228
_Iedu3_2	.781669	.0812576	-2.37	0.018	.6373286 .958699
_Iedu3_3	.6706229	.0793047	-3.38	0.001	.5316451 .8459312
_IFRexercis_1	.9403825	.0999393	-0.58	0.563	.7632476 1.158627
_IFRexercis_2	.5816905	.065245	-4.83	0.000	.4666917 .7250264
FRwaist	1.009383	.003814	2.47	0.014	1.001921 1.016901
BEHcage2	.8840232	.1306649	-0.83	0.405	.6613071 1.181746
ph201_05	1.377217	.2101152	2.10	0.036	1.020667 1.858322
_cons	.0046641	.0028583	-8.76	0.000	.0013999 .0155391

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcondw i.hadsac age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
      _Ihadsacat_0-2      (naturally coded; _Ihadsacat_0 omitted)
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3      _IFRexercis_0-2      (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker      _IBEHsmoker_0-2      (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3      Number of obs =      5,024
Number of PSUs =     621      Population size = 710,730.54
                                Design df      =      618
                                F( 13, 606)      =     24.63
                                Prob > F        =     0.0000
```

smokcondw	Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]
_Ihadsacat_1	1.353942	.1619265	2.53	0.012	1.070533 1.712381
_Ihadsacat_2	1.569477	.2384689	2.97	0.003	1.164577 2.115153
age	1.061901	.0056491	11.29	0.000	1.050865 1.073053
sex	.6160451	.0611649	-4.88	0.000	.5069137 .748671
_Iedu3_2	.8065753	.0842846	-2.06	0.040	.656935 .9903014
_Iedu3_3	.6975698	.0833439	-3.01	0.003	.5516809 .8820356
_IFRexercis_1	.9429412	.0998852	-0.55	0.579	.7658443 1.160991
_IFRexercis_2	.5847238	.0655394	-4.79	0.000	.4691975 .728695
FRwaist	1.00912	.0038057	2.41	0.016	1.001674 1.016621
BEHcage2	.7991633	.119154	-1.50	0.133	.5963122 1.07102
ph201_05	1.359485	.2120355	1.97	0.049	1.000816 1.846694
_IBEHsmoker_1	1.696681	.1609752	5.57	0.000	1.408259 2.044173
_IBEHsmoker_2	1.758777	.2348069	4.23	0.000	1.353155 2.285989
_cons	.0028551	.0017711	-9.44	0.000	.0008444 .0096536

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcndw ph301_08 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3      _IFRexercia_0-2      (naturally coded; _IFRexercia_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3      Number of obs =      5,176
Number of PSUs  =     621      Population size = 735,169.58
                                   Design df   =      618
                                   F( 10,    609) =     29.25
                                   Prob > F      =     0.0000
```

smokcndw	Odds Ratio	Linearized		t	P> t	[95% Conf. Interval]	
		Std. Err.					
ph301_08	2.233721	.6120081	2.93	0.003	1.304229	3.825637	
age	1.059315	.0054559	11.19	0.000	1.048655	1.070084	
sex	.6165045	.0596289	-5.00	0.000	.5098538	.7454642	
_Iedu3_2	.7686454	.077992	-2.59	0.010	.6297785	.9381325	
_Iedu3_3	.6412493	.0739961	-3.85	0.000	.5112237	.8043459	
_IFRexercia_1	.934036	.0951677	-0.67	0.505	.7664552	1.140937	
_IFRexercia_2	.5671102	.0624435	-5.15	0.000	.4568349	.7040048	
FRwaist	1.008804	.0037295	2.37	0.018	1.001507	1.016155	
BEHcage2	.8717492	.1282382	-0.93	0.351	.6530258	1.163731	
ph201_05	1.378422	.210473	2.10	0.036	1.021306	1.860408	
_cons	.0053888	.0032002	-8.80	0.000	.0016788	.0172975	

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcndw ph301_08 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3      _IFRexercia_0-2      (naturally coded; _IFRexercia_0 omitted)
i.BEHsmoker      _IBEHsmoker_0-2      (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3      Number of obs =      5,176
Number of PSUs  =     621      Population size = 735,169.58
                                   Design df   =      618
                                   F( 12,    607) =     27.77
                                   Prob > F      =     0.0000
```

smokcndw	Odds Ratio	Linearized		t	P> t	[95% Conf. Interval]	
		Std. Err.					
ph301_08	2.064727	.5696788	2.63	0.009	1.20101	3.549592	
age	1.060348	.00548	11.34	0.000	1.04964	1.071164	
sex	.6715011	.0660054	-4.05	0.000	.5536221	.8144792	
_Iedu3_2	.7921703	.0809291	-2.28	0.023	.6481688	.9681642	
_Iedu3_3	.6653733	.0776344	-3.49	0.001	.5293153	.8369072	
_IFRexercia_1	.937584	.0954633	-0.63	0.527	.7676658	1.145113	
_IFRexercia_2	.5706542	.0628943	-5.09	0.000	.4595939	.7085522	
FRwaist	1.008449	.0037159	2.28	0.023	1.001178	1.015772	
BEHcage2	.7914049	.116748	-1.59	0.113	.5923565	1.057339	
ph201_05	1.360076	.211288	1.98	0.048	1.002465	1.845257	
_IBEHsmoker_1	1.754968	.1612936	6.12	0.000	1.465158	2.102103	
_IBEHsmoker_2	1.74146	.2282002	4.23	0.000	1.346337	2.252545	
_cons	.0032641	.0019648	-9.51	0.000	.0010009	.0106449	

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcndw SUorMRprob age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3      _IFRexercia_0-2      (naturally coded; _IFRexercia_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3      Number of obs =      5,176
Number of PSUs  =     621      Population size = 735,169.58
                                   Design df   =      618
                                   F( 10,    609) =     28.32
                                   Prob > F      =     0.0000
```

smokcndw	Odds Ratio	Linearized		t	P> t	[95% Conf. Interval]	
		Std. Err.					
SUorMRprob	1.352862	.1871792	2.18	0.029	1.030984	1.775232	
age	1.059714	.005487	11.20	0.000	1.048993	1.070544	
sex	.6013963	.057782	-5.29	0.000	.497986	.7262806	
_Iedu3_2	.7660956	.0775466	-2.63	0.009	.6279898	.9345732	
_Iedu3_3	.6352288	.0733146	-3.93	0.000	.5064032	.7968267	
_IFRexercia_1	.9353498	.0949836	-0.66	0.511	.7662421	1.141779	
_IFRexercia_2	.571175	.0628372	-5.09	0.000	.4601945	.7089195	
FRwaist	1.008633	.003723	2.33	0.020	1.001348	1.015971	
BEHcage2	.8885526	.129375	-0.81	0.417	.6675801	1.182668	
ph201_05	1.368528	.2095017	2.05	0.041	1.013191	1.848485	
_cons	.0054672	.0032594	-8.74	0.000	.0016956	.0176286	

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. xi: svy:logistic smokcndw SUorMRprob age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsm
i.edu3      _Iedu3_1-3      (naturally coded; _Iedu3_1 omitted)
i.FRexercise3      _IFRexercia_0-2      (naturally coded; _IFRexercia_0 omitted)
i.BEHsmoker      _IBEHsmoker_0-2      (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3      Number of obs =      5,176
Number of PSUs  =     621      Population size = 735,169.58
                                   Design df   =      618
                                   F( 12,    607) =     26.97
                                   Prob > F      =     0.0000
```

smokcndw	Odds Ratio	Linearized		t	P> t	[95% Conf. Interval]	
		Std. Err.					
SUorMRprob	1.300407	.1781703	1.92	0.056	.9936333	1.701893	
age	1.060717	.005504	11.36	0.000	1.049963	1.071581	
sex	.656196	.0640918	-4.31	0.000	.5416667	.7949413	
_Iedu3_2	.7907759	.0806052	-2.30	0.022	.6473195	.9660246	
_Iedu3_3	.6605649	.0771472	-3.55	0.000	.5251808	.8308491	
_IFRexercia_1	.939085	.0953003	-0.62	0.536	.7693766	1.146163	
_IFRexercia_2	.5743352	.0632493	-5.04	0.000	.4626388	.7129988	
FRwaist	1.008297	.0037094	2.25	0.025	1.001039	1.015608	
BEHcage2	.8039634	.1178616	-1.49	0.137	.6028437	1.07218	
ph201_05	1.351368	.2104875	1.93	0.054	.9952477	1.834915	
_IBEHsmoker_1	1.756687	.161172	6.14	0.000	1.467051	2.103504	
_IBEHsmoker_2	1.751391	.228801	4.30	0.000	1.35627	2.261595	
_cons	.0033034	.0019902	-9.48	0.000	.0010119	.0107843	

Note: Variances scaled within each stage to handle strata with a single sampling unit.

Appendix D

Interaction effects without High Cholesterol

. svy:logistic smokcondw anymh##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(14, 605)	=	23.52
			Prob > F	=	0.0000

	smokcondw	Linearized					
		Odds Ratio	Std. Err.	t	P> t	[95% Conf. Interval]	
anymhprob							
Any emotional, nervous or psychiatric problems, such..		1.18834	.3413512	0.60	0.548	.6760094	2.088952
BEHsmoker							
Past		1.795784	.1734683	6.06	0.000	1.485487	2.170898
Current		1.674623	.2382228	3.62	0.000	1.266462	2.214329
anymhprob#BEHsmoker							
Any emotional, nervous or psychiatric problems, such.. #							
Past		.7674927	.2834624	-0.72	0.474	.3716023	1.585149
Any emotional, nervous or psychiatric problems, such.. #							
Current		1.448171	.6200752	0.86	0.387	.6246529	3.357383
age							
		1.060376	.0055226	11.26	0.000	1.049586	1.071277
sex							
		.6578597	.0641915	-4.29	0.000	.5431418	.7968072
edu3							
Secondary		.7915038	.0807963	-2.29	0.022	.6477274	.9671942
Third/higher		.6644617	.0775516	-3.50	0.000	.528358	.8356253
FRexercise3							
1		.9364541	.0953085	-0.65	0.519	.7668045	1.143637
2		.573695	.0632279	-5.04	0.000	.4620453	.7123239
FRwaist							
		1.008518	.0037018	2.31	0.021	1.001274	1.015814
BEHcage2		.8067435	.1183252	-1.46	0.144	.6048458	1.076035
ph201_05		1.364672	.2123312	2.00	0.046	1.005377	1.85237
_cons		.0033144	.0019917	-9.50	0.000	.0010183	.0107876

Note: Variances scaled within each stage to handle strata with a single sampling unit.

. svy:logistic smokcondw SRpsych##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata	=	3	Number of obs	=	5,176
Number of PSUs	=	621	Population size	=	735,169.58
			Design df	=	618
			F(14, 605)	=	23.40
			Prob > F	=	0.0000

smokcondw	Linearized					[95% Conf. Interval]	
	Odds Ratio	Std. Err.	t	P> t			
1.SRpsychmeduse	1.157096	.2947086	0.57	0.567	.7016907	1.908065	
BEHsmoker							
Past	1.711713	.1653646	5.56	0.000	1.415915	2.069307	
Current	1.615377	.2374722	3.26	0.001	1.210307	2.156017	
SRpsychmeduse#BEHsmoker							
1#Fast	1.278069	.4094863	0.77	0.444	.6812381	2.397783	
1#Current	1.648508	.6345066	1.30	0.195	.7741456	3.510422	
age							
sex	1.059847	.0054565	11.29	0.000	1.049186	1.070617	
	.6465358	.0633954	-4.45	0.000	.5332922	.7838266	
edu3							
Secondary	.8022392	.0826634	-2.14	0.033	.6552745	.9821651	
Third/higher	.674168	.0792226	-3.36	0.001	.5352365	.8491619	
FRexercise3							
1	.9502328	.0967789	-0.50	0.616	.7779775	1.160628	
2	.5804056	.0640517	-4.93	0.000	.4673169	.7208613	
FRwaist							
BEHcage2	1.008169	.0037199	2.21	0.028	1.00089	1.015501	
ph201_05	.8090678	.1178659	-1.45	0.146	.6077677	1.077041	
_cons	1.325562	.2058405	1.81	0.070	.9771501	1.798202	
	.0035896	.0021633	-9.34	0.000	.0010991	.0117229	

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. svy:logistic smokcondw SRmed_pr##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3          Number of obs   =      5,176
Number of PSUs   =     621          Population size = 735,169.58
                                   Design df       =       618
                                   F( 14, 605)      =      22.90
                                   Prob > F        =      0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
1.SRmed_prob	.4143275	.2231586	-1.64	0.102	.1438744	1.193175
BEHsmoker						
Past	1.711965	.1611716	5.71	0.000	1.42299	2.059623
Current	1.704207	.2305622	3.94	0.000	1.306584	2.222836
SRmed_prob#BEHsmoker						
1#Past	2.788676	1.757905	1.63	0.104	.8086695	9.616676
1#Current	3.459546	2.374841	1.81	0.071	.8985793	13.31931
age	1.060509	.0055068	11.31	0.000	1.04975	1.071379
sex	.6600092	.0647436	-4.24	0.000	.5443617	.8002257
edu3						
Secondary	.7919887	.0808575	-2.28	0.023	.6481055	.9678149
Third/higher	.6654237	.0777342	-3.49	0.001	.5290133	.8370088
FRexercise3						
1	.9395112	.0955518	-0.61	0.540	.7694169	1.147208
2	.5711605	.0629027	-5.09	0.000	.4600766	.7090652
FRwaist	1.008486	.0037158	2.29	0.022	1.001215	1.01581
BEHcage2	.8251179	.1202514	-1.32	0.188	.6197547	1.098531
ph201_05	1.350999	.2110519	1.93	0.055	.994077	1.836073
_cons	.0033901	.0020338	-9.48	0.000	.0010436	.0110121

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. svy:logistic smokcondw SRmedORprob##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata =      3          Number of obs   =      5,176
Number of PSUs   =     621          Population size = 735,169.58
                                   Design df       =       618
                                   F( 14, 605)      =      24.08
                                   Prob > F        =      0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
1.SRmedORprob	1.472727	.3050825	1.87	0.062	.9804957	2.212069
BEHsmoker						
Past	1.801313	.1788483	5.93	0.000	1.482209	2.189117
Current	1.571302	.2447424	2.90	0.004	1.157226	2.133541
SRmedORprob#BEHsmoker						
1#Past	.8330579	.2253659	-0.68	0.500	.4897214	1.417103
1#Current	1.411644	.4675189	1.04	0.298	.7366562	2.705115
age	1.060349	.0054924	11.31	0.000	1.049617	1.071119
sex	.644594	.0631507	-4.48	0.000	.5317783	.7813432
edu3						
Secondary	.8050038	.082776	-2.11	0.035	.6578089	.9851357
Third/higher	.672192	.0787211	-3.39	0.001	.5340878	.8460073
FRexercise3						
1	.9511481	.0973017	-0.49	0.625	.7780367	1.162777
2	.5847472	.0648894	-4.84	0.000	.4702459	.7271288
FRwaist	1.008525	.0037168	2.30	0.022	1.001252	1.01585
BEHcage2	.7936025	.1155667	-1.59	0.113	.5962184	1.056333
ph201_05	1.324806	.2054783	1.81	0.070	.976948	1.796526
_cons	.0032417	.0019559	-9.50	0.000	.0009912	.0106015

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. svy:logistic smokcondw ph301_08##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,176
Number of PSUs = 621        Population size = 735,169.58
                             Design df = 618
                             F( 14, 605) = 24.28
                             Prob > F = 0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
ph301_08						
Alcohol or substance abuse	.9953103	1.059573	-0.00	0.996	.1230327	8.051866
BEHsmoker						
Past	1.746209	.1612341	6.04	0.000	1.456623	2.093366
Current	1.712074	.23467	3.92	0.000	1.308041	2.240906
ph301_08#BEHsmoker						
Alcohol or substance abuse#Past	2.054481	2.171275	0.68	0.496	.2578374	16.37037
Alcohol or substance abuse#Current	2.526982	2.914865	0.80	0.422	.2623114	24.34372
age	1.06036	.0054898	11.32	0.000	1.049633	1.071196
sex	.6725472	.0661322	-4.03	0.000	.5544458	.8158052
edu3						
Secondary	.7928453	.0809493	-2.27	0.023	.6487994	.9688722
Third/higher	.6671965	.077867	-3.47	0.001	.5305387	.8390551
FRexercise3						
1	.9378614	.095481	-0.63	0.529	.7679099	1.145426
2	.5725097	.0632547	-5.05	0.000	.4608419	.7112361
FRwaist	1.008465	.0037195	2.29	0.023	1.001187	1.015796
BEHcage2	.794065	.1184894	-1.55	0.123	.592368	1.064438
ph201_05	1.362223	.2117084	1.99	0.047	1.003922	1.848402
_cons	.0032586	.0019619	-9.51	0.000	.0009989	.0106299

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. svy:logistic smokcondw SUorMlprob##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,176
Number of PSUs = 621        Population size = 735,169.58
                             Design df = 618
                             F( 14, 605) = 23.77
                             Prob > F = 0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
1.SUorMlprob	1.208155	.3381078	0.68	0.499	.6973362	2.093162
BEHsmoker						
Past	1.785904	.1733871	5.97	0.000	1.475896	2.161028
Current	1.611281	.2374574	3.24	0.001	1.206374	2.152091
SUorMlprob#BEHsmoker						
1#Past	.8568521	.2941629	-0.45	0.653	.4366258	1.681521
1#Current	1.64961	.66553	1.24	0.215	.7469519	3.643089
age	1.060493	.0055244	11.27	0.000	1.049699	1.071398
sex	.6588418	.0644744	-4.26	0.000	.5436494	.798442
edu3						
Secondary	.7921048	.0807876	-2.29	0.023	.6483318	.9677607
Third/higher	.6628534	.0773579	-3.52	0.000	.5270886	.8335879
FRexercise3						
1	.936184	.0951911	-0.65	0.517	.7667279	1.143092
2	.5755076	.0633903	-5.02	0.000	.4635643	.7144834
FRwaist	1.00849	.0037048	2.30	0.022	1.001241	1.015792
BEHcage2	.7889383	.1170974	-1.60	0.111	.5894628	1.055917
ph201_05	1.360917	.2120385	1.98	0.048	1.002189	1.848051
_cons	.0032868	.0019757	-9.51	0.000	.0010095	.0107015

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. svy:logistic smokcondw i.MHdep3##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,114
Number of PSUs  = 621       Population size = 726,602.54
                               Design df     = 618
                               F( 17, 602)    = 19.96
                               Prob > F      = 0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
MHdep3						
Moderate	1.347004	.227378	1.76	0.078	.9669453	1.876446
Severe	2.52346	.5265525	4.44	0.000	1.675073	3.801537
BEHsmoker						
Past	2.095327	.2589793	5.98	0.000	1.643759	2.670948
Current	1.639725	.3091302	2.62	0.009	1.132355	2.374429
MHdep3#BEHsmoker						
Moderate#Past	.6724858	.152784	-1.75	0.081	.430444	1.050629
Moderate#Current	.9459938	.3088275	-0.17	0.865	.498266	1.796037
Severe#Past	.6629638	.1819958	-1.50	0.135	.3866881	1.136629
Severe#Current	1.031504	.3487786	0.09	0.927	.5309975	2.003777
age	1.062297	.0056038	11.46	0.000	1.051349	1.073359
sex	.6280318	.062343	-4.69	0.000	.5167963	.7632096
edu3						
Secondary	.8256692	.0855002	-1.85	0.065	.6737348	1.011867
Third/higher	.701099	.0828703	-3.00	0.003	.5558652	.884279
FRexercise3						
1	.9779646	.1010704	-0.22	0.829	.7983269	1.198024
2	.6002374	.0676473	-4.53	0.000	.4810649	.7489322
FRwaist	1.008736	.003707	2.37	0.018	1.001482	1.016042
BEHcage2	.7895982	.1149902	-1.62	0.105	.5932002	1.05102
ph201_05	1.345637	.2087432	1.91	0.056	.9922601	1.824864
_cons	.0024089	.0014643	-9.92	0.000	.0007301	.0079481

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. svy:logistic smokcondw i.hadsac##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)
```

Survey: Logistic regression

```
Number of strata = 3          Number of obs = 5,024
Number of PSUs  = 621       Population size = 710,730.54
                               Design df     = 618
                               F( 17, 602)    = 18.91
                               Prob > F      = 0.0000
```

smokcondw	Odds Ratio	Linearized Std. Err.	t	P> t	[95% Conf. Interval]	
hadsacat						
Possible	1.317244	.2634739	1.38	0.169	.8893557	1.950998
Probable	1.332097	.3768328	1.01	0.311	.76431	2.321679
BEHsmoker						
Past	1.654075	.1921409	4.33	0.000	1.31669	2.077909
Current	1.69555	.2750631	3.25	0.001	1.232969	2.33168
hadsacat#BEHsmoker						
Possible#Past	.9699241	.2561216	-0.12	0.908	.5774647	1.629109
Possible#Current	1.24606	.4097401	0.67	0.504	.6532663	2.376772
Probable#Past	1.423975	.4938191	1.02	0.309	.7206683	2.813643
Probable#Current	1.057703	.4314164	0.14	0.891	.4747815	2.356316
age	1.062279	.0056919	11.28	0.000	1.05116	1.073516
sex	.6142284	.061035	-4.90	0.000	.5053372	.7465838
edu3						
Secondary	.8078935	.0843724	-2.04	0.042	.6580886	.9917994
Third/higher	.7014106	.0840469	-2.96	0.003	.5543404	.8874996
FRexercise3						
1	.941137	.0998673	-0.57	0.568	.7641025	1.159188
2	.5846041	.0654781	-4.79	0.000	.4691769	.7284288
FRwaist	1.009068	.0038156	2.39	0.017	1.001603	1.016589
BEHcage2	.798744	.1190714	-1.51	0.132	.5960287	1.070405
ph201_05	1.364827	.2128564	1.99	0.047	1.004766	1.853917
_cons	.00286	.0017842	-9.39	0.000	.00084	.0097372

Note: Variances scaled within each stage to handle strata with a single sampling unit.