

Supplementary Online Content

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eTable 1. *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) and ICD-10-CM Codes Used to Define Psychiatric Disorders*

eTable 2. *Associations Between Any Psychiatric Disorder and Breakthrough SARS-CoV-2 Infections Among Fully Vaccinated VA Patients at Least 30 Days Postvaccination (n = 241,705), in the Full Sample and Age-Stratified*

eTable 3. *Associations Between Psychiatric Disorders and Breakthrough SARS-CoV-2 Infections Among Fully Vaccinated VA Patients Excluding Those With Booster Vaccination (n = 257,171), in the Full Sample and Age-Stratified*

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) and ICD-10-CM Codes Used to Define Psychiatric Disorders

Psychiatric Disorder	ICD-9-CM	ICD-10-CM Codes
Posttraumatic Stress Disorder	309.81 Posttraumatic Stress Disorder	F43.1 Posttraumatic Stress Disorder
Major Depressive Disorder	293.83 Mood disorder in conditions classified elsewhere 296.20-296.25 Major depressive affective disorder, single episode 296.30-296.35 Major depressive affective disorder, recurrent episode 296.82 Atypical depressive disorder 300.4 Dysthymic disorder 311 Depressive disorder, not elsewhere classified	F32.0-4 Major depressive disorder, single episode F33.0-3 Major depressive disorder, recurrent F33.8 Other recurrent depressive disorders F33.9 Major depressive disorder, recurrent, unspecified F34.1 Dysthymic disorder F34.81 Disruptive mood dysregulation disorder F34.89 Other specified persistent mood disorders F34.9 Persistent mood [affective] disorder, unspecified F39 Unspecified mood [affective] disorder
Anxiety Disorder	300.00 Anxiety state, unspecified 300.01 Panic disorder without agoraphobia 300.02 Generalized anxiety disorder 300.09 Other anxiety states 300.20 Phobia, unspecified 300.21 Agoraphobia with panic disorder 300.22 Agoraphobia without mention of panic attacks 300.23 Social phobia 300.29 Other isolated or specific phobias 300.30 Obsessive-compulsive disorders 300.70 Hypochondriasis 300.81 Somatization disorder 300.82 Undifferentiated somatoform disorder 300.89 Other somatoform disorders	F40.00 Agoraphobia, unspecified F40.01 Agoraphobia with panic disorder F40.02 Agoraphobia without panic disorder F40.10 Social phobia, unspecified F40.11 Social phobia, generalized F40.210 Arachnophobia F40.218 Other animal type phobia F40.220 Fear of thunderstorms F40.228 Other natural environment type phobia F40.230 Fear of blood F40.231 Fear of injections and transfusions F40.232 Fear of other medical care F40.233 Fear of injury F40.240 Claustrophobia F40.241 Acrophobia F40.242 Fear of bridges F40.243 Fear of flying F40.248 Other situational type phobia F40.290 Androphobia F40.291 Gynephobia F40.298 Other specified phobia F40.8 Other phobic anxiety disorders F40.9 Phobic anxiety disorder, unspecified F41.0 Panic disorder without agoraphobia F41.1 Generalized anxiety disorder F41.3 Other mixed anxiety disorders F41.8 Other specified anxiety disorders F41.9 Anxiety disorder, unspecified F42.2 Mixed obsessional thoughts and acts F42.3 Hoarding disorder

		<p>F42.4 Excoriation (skin-picking) disorder</p> <p>F42.8 Other obsessive-compulsive disorder</p> <p>F42.9 Obsessive-compulsive disorder, unspecified</p> <p>F45.0 Somatization disorder</p> <p>F45.1 Undifferentiated somatoform disorder</p> <p>F45.20 Hypochondriacal disorder, unspecified</p> <p>F45.21 Hypochondriasis</p> <p>F45.22 Body dysmorphic disorder</p> <p>F45.29 Other hypochondriacal disorders</p> <p>F45.8 Other somatoform disorders</p> <p>F45.9 Somatoform disorder, unspecified</p> <p>F63.3 Trichotillomania</p>
Substance Use Disorder	<p>304.00-02 Opioid type dependence</p> <p>304.10-12 Sedative, hypnotic or anxiolytic dependence</p> <p>304.20-22 Cocaine dependence</p> <p>304.30-32 Cannabis dependence</p> <p>304.40-42 Amphetamine and other psychostimulant dependence</p> <p>304.50-52 Hallucinogen dependence</p> <p>304.60-62 Other specified drug dependence</p> <p>304.70-72 Combinations of opioid type drug with any other drug dependence</p> <p>304.80-82 Combinations of drug dependence excluding opioid type drug</p> <p>304.90-92 Unspecified drug dependence</p> <p>305.20-22 Cannabis abuse</p> <p>305.30-32 Hallucinogen abuse</p> <p>305.40-42 Sedative, hypnotic or anxiolytic abuse</p> <p>305.50-52 Opioid abuse</p> <p>305.60-62 Cocaine abuse</p> <p>305.70-72 Amphetamine or related acting sympathomimetic abuse</p> <p>305.80-82 Antidepressant type abuse</p> <p>305.90-02 Other, mixed, or unspecified drug abuse</p>	<p>F11.1 Opioid abuse</p> <p>F11.2 Opioid dependence (excluding F11.21 Opioid dependence, in remission)</p> <p>F12.1 Cannabis abuse</p> <p>F12.2 Cannabis dependence (excluding F12.21 Cannabis dependence, in remission)</p> <p>F13.1 Sedative, hypnotic or anxiolytic abuse</p> <p>F13.2 Sedative, hypnotic or anxiolytic dependence (excluding F13.21 Sedative, hypnotic or anxiolytic dependence, in remission)</p> <p>F14.1 Cocaine abuse</p> <p>F14.2 Cocaine dependence (excluding F14.21 Cocaine dependence, in remission)</p> <p>F15.1 Other stimulant abuse</p> <p>F15.2 Other stimulant dependence (excluding F15.21 Other stimulant dependence, in remission)</p> <p>F16.1 Hallucinogen abuse</p> <p>F16.2 Hallucinogen dependence (excluding F16.21 Hallucinogen dependence, in remission)</p> <p>F18.1 Inhalant abuse</p> <p>F18.2 Inhalant dependence (excluding F18.21 Inhalant dependence, in remission)</p> <p>F19.1 Other psychoactive substance abuse</p> <p>F19.2 Other psychoactive substance dependence (excluding F19.21 Other psychoactive substance dependence, in remission)</p>
Alcohol Use Disorder	<p>303.00-02 Acute alcoholic intoxication in alcoholism</p> <p>303.90-92 Other and unspecified alcohol dependence</p> <p>305.00-02 Alcohol abuse</p>	<p>F10.1 Alcohol abuse</p> <p>F10.2 Alcohol dependence (excluding F10.21 Alcohol dependence, in remission)</p>
Bipolar Disorder	<p>296.00-05 Bipolar I disorder, single manic episode</p>	<p>F30 Manic episode (excluding F30.4 Manic episode in full remission)</p>

	<p>296.10-15 Manic affective disorder, recurrent episode</p> <p>296.40-45 Bipolar I disorder, most recent episode (or current) manic</p> <p>296.50-55 Bipolar I disorder, most recent episode (or current) depressed</p> <p>296.60-65 Bipolar I disorder, most recent episode (or current) mixed</p> <p>296.70 Bipolar I disorder, most recent episode (or current) unspecified</p> <p>296.80 Bipolar disorder, unspecified</p> <p>296-81 Atypical manic disorder</p> <p>296.89 Other bipolar disorders</p> <p>301.13 Cyclothymic disorder</p>	<p>F31 Bipolar disorder (excluding F31.7 Bipolar disorder, currently in remission)</p> <p>F34 Cyclothymic disorder</p>
Psychotic Disorder	<p>295.00-04 Simple type schizophrenia</p> <p>295.10-14 Disorganized type schizophrenia</p> <p>295.20-24 Catatonic type schizophrenia</p> <p>295.30-34 Paranoid type schizophrenia</p> <p>295.40-44 Schizophreniform disorder</p> <p>295.50-54 Latent schizophrenia</p> <p>295.60-64 Schizophrenic disorders, residual type</p> <p>295.70-74 Schizoaffective disorder</p> <p>295.80-84 Other specified types of schizophrenia</p> <p>295.90-94 Unspecified schizophrenia</p> <p>297.00 Paranoid state, simple</p> <p>297.10 Delusional disorder</p> <p>297.20 Paraphrenia</p> <p>297.30 Shared psychotic disorder</p> <p>297.80 Other specified paranoid states</p> <p>297.90 Unspecified paranoid state</p> <p>298.00 Depressive type psychosis</p> <p>298.10 Excitatory type psychosis</p> <p>298.20 Reactive confusion</p> <p>298.30 Acute paranoid reaction</p> <p>298.40 Psychogenic paranoid psychosis</p> <p>298.80 Other and unspecified reactive psychosis</p> <p>298.90 Unspecified psychosis</p>	<p>F20.0 Paranoid schizophrenia</p> <p>F20.1 Disorganized schizophrenia</p> <p>F20.2 Catatonic schizophrenia</p> <p>F20.3 Undifferentiated schizophrenia</p> <p>F20.5 Residual schizophrenia</p> <p>F20.81 Schizophreniform disorder</p> <p>F20.89 Other schizophrenia</p> <p>F20.9 Schizophrenia, unspecified</p> <p>F21 Schizotypal disorder</p> <p>F22 Delusional disorders</p> <p>F23 Brief psychotic disorder</p> <p>F24 Shared psychotic disorder</p> <p>F25.0 Schizoaffective disorder, bipolar type</p> <p>F25.1 Schizoaffective disorder, depressive type</p> <p>F25.8 Other schizoaffective disorders</p> <p>F25.9 Schizoaffective disorder, unspecified</p> <p>F28 Other psych disorder not due to a substance or known physiological condition</p> <p>F29 Unspecified psychosis not due to a substance or known physiological condition</p>
Eating Disorder	<p>307.10 Anorexia nervosa</p> <p>307.50 Eating disorder, unspecified</p> <p>307.51 Bulimia nervosa</p>	<p>F50.00-02 Anorexia nervosa</p> <p>F50.2 Bulimia nervosa</p> <p>F50.81 Binge eating disorder</p> <p>F50.89 Other specified eating disorder</p> <p>F50.9 Eating disorder, unspecified</p>
Attention-Deficit Hyperactivity Disorder	<p>314.00 Attention deficit disorder without mention of hyperactivity</p> <p>314.01 Attention deficit disorder with hyperactivity</p>	<p>F90 Attention-deficit hyperactivity disorder</p>
Dissociative Disorder	<p>300.11 Conversion disorder</p> <p>300.12 Dissociative amnesia</p> <p>300.13 Dissociative fugue</p> <p>300.14 Dissociative identity disorder</p> <p>300.15 Dissociative disorder or reaction, unspecified</p>	<p>F44.0 Dissociative amnesia</p> <p>F44.1 Dissociative fugue</p> <p>F44.2 Dissociative stupor</p> <p>F44.4 Conversion disorder with motor symptom or deficit</p>

	<p>300.16 Factitious disorder with predominantly psychological signs and symptoms</p> <p>300.19 Other and unspecified factitious illness</p> <p>300.60 Depersonalization disorder</p>	<p>F44.5 Conversion disorder with seizures or convulsions</p> <p>F44.6 Conversion disorder with sensory symptom or deficit</p> <p>F44.7 Conversion disorder with mixed symptom presentation</p> <p>F44.81 Dissociative identity disorder</p> <p>F44.89 Other dissociative and conversion disorders</p> <p>F44.9 Dissociative and conversion disorder, unspecified</p> <p>F48.1 Depersonalization-derealization syndrome</p>
Adjustment Disorder	<p>308.00 Predominant disturbance of emotions</p> <p>308.20 Predominant psychomotor disturbance</p> <p>308.30 Other acute reactions to stress</p> <p>308.40 Mixed disorders as reaction to stress</p> <p>308.90 Unspecified acute reaction to stress</p> <p>309.00 Adjustment disorder with depressed mood</p> <p>309.10 Prolonged depressive reaction</p> <p>309.21 Separation anxiety disorder</p> <p>309.22 Emancipation disorder of adolescence and early adult life</p> <p>309.23 Specific academic or work inhibition</p> <p>309.24 Adjustment disorder with anxiety</p> <p>309.28 Adjustment disorder with mixed anxiety and depressed mood</p> <p>309.29 Other adjustment reactions with predominant disturbance of other emotions</p> <p>309.30 Adjustment disorder with disturbance of conduct</p> <p>309.40 Adjustment disorder with mixed disturbance of emotions and conduct</p>	<p>F43.2 Adjustment disorder</p> <p>F43.8 Other reactions to severe stress</p> <p>F43.9 Reaction to severe stress, unspecified</p>

eTable 2. Associations Between Any Psychiatric Disorder and Breakthrough SARS-CoV-2 Infections Among Fully Vaccinated VA Patients at Least 30 Days Postvaccination (n = 241,705), in the Full Sample and Age-Stratified

	Model 1		Model 2	
	RR (95% CI)	p-value	RR (95% CI)	p-value
<i>Full Sample</i>				
Any Psychiatric Disorder	1.07 (1.05-1.09)	<.0001	1.03 (1.01-1.05)	<.0001
<i>Age <65 (n=89,436)</i>				
Any Psychiatric Disorder	1.04 (1.00-1.07)	0.024	1.00 (0.97-1.04)	0.76
<i>Age ≥65 (n=152,144)</i>				
Any Psychiatric Disorder	1.10 (1.08-1.13)	<.0001	1.05 (1.03-1.08)	<.0001

CI=confidence intervals. RR=relative risk. SARS-CoV-2=severe acute respiratory syndrome coronavirus 2. VA=U.S. Department of Veterans Affairs. Reference group for each model is No Psychiatric Disorders.

Model 1: age, age squared, sex, race, ethnicity, vaccine type, time since vaccination, and vaccine type*time since vaccination.

Model 2: Model 1 plus obese status, diabetes, cardiovascular disease including hypertension, obstructive sleep apnea, chronic obstructive pulmonary disease, cancer, chronic kidney disease, liver disease, HIV, and smoking.

eTable 3. Associations Between Psychiatric Disorders and Breakthrough SARS-CoV-2 Infections Among Fully Vaccinated VA Patients Excluding Those With Booster Vaccination (n = 257,171), in the Full Sample and Age-Stratified

	Model 1		Model 2	
	<i>RR (95% CI)</i>	<i>p-value</i>	<i>RR (95% CI)</i>	<i>p-value</i>
<i>Full Sample</i>				
Any Psychiatric Disorder	1.07 (1.05-1.09)	<.0001	1.03 (1.01-1.05)	0.002
<i>Age <65 (n=96,406)</i>				
Any Psychiatric Disorder	1.03 (1.00-1.06)	0.045	1.00 (0.97-1.04)	0.93
<i>Age ≥65 (n=165,765)</i>				
Any Psychiatric Disorder	1.10 (1.07-1.13)	<.0001	1.05 (1.03-1.08)	<.0001

CI=confidence intervals. RR=relative risk. SARS-CoV-2=severe acute respiratory syndrome coronavirus 2. VA=U.S. Department of Veterans Affairs. Reference group for each model is No Psychiatric Disorders.
 Model 1: age, age squared, sex, race, ethnicity, vaccine type, time since vaccination, and vaccine type*time since vaccination.
 Model 2: Model 1 plus obese status, diabetes, cardiovascular disease including hypertension, obstructive sleep apnea, chronic obstructive pulmonary disease, cancer, chronic kidney disease, liver disease, HIV, and smoking.