

Measuring and Characterizing Psychiatric Multimorbidity Among Individuals with Mental Illness

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Abstract

Objective

Psychiatric multimorbidity, defined as the co-occurrence of two or more psychiatric diagnoses, is increasingly recognized as a marker of clinical complexity. While prior research has examined psychiatric comorbidity in selected populations or via structured diagnostic interviews, less is known about the rates of psychiatric multimorbidity as documented in administrative claims. To address this gap, this study characterizes psychiatric multimorbidity within a statewide insured population.

Methods

We conducted a cross-sectional analysis of the Massachusetts All-Payer Claims Database (2016–2018) including adults aged 21–64 years with at least one psychiatric diagnosis and insured by Medicaid or commercial insurance. Psychiatric disorders were identified using ICD-10-CM codes grouped into diagnostic categories, with complete code listings provided in supplementary material. Multimorbidity was defined as ≥ 2 distinct psychiatric diagnoses. Logistic regression models were used to examine associations of psychiatric multimorbidity with patient characteristics.

Results

The sample included 2,409,794 person-year observations representing 653,413 unique people with mental health disorders. 68.8% of the population had only one mental health disorder, 17.4% had two mental health disorders, and 13.8% had three or more mental health disorders. In multivariable analyses, females had higher odds of psychiatric multimorbidity compared to males (adjusted Odds Ratio (aOR) = 1.23, 95% CI = 1.22,1.24), and those with any medical comorbidity had higher odds of psychiatric multimorbidity compared to people without a medical comorbidity (aOR = 1.37, 95% CI = 1.36,1.38). Medicaid enrollees had higher odds of psychiatric multimorbidity compared to those with commercial insurance (aOR = 1.25, 95% CI = 1.24,1.25). Those with serious mental illness had nearly nine times the odds of having psychiatric multimorbidity (aOR = 8.92, 95% CI = 8.84,8.99) compared to people without serious mental illness.

Conclusions

This study extends prior population-based and specialty-care research by examining psychiatric multimorbidity in a statewide insured population spanning both public and private payers. In this sample, one in three individuals with a mental illness diagnosis had psychiatric multimorbidity. Findings underscore the complexity of psychiatric presentations in clinical care, highlight greater multimorbidity among Medicaid enrollees, and point to the need for integrated and patient-centered treatment approaches.

Introduction

Psychiatric disorders are prevalent, costly, and a leading cause of disability, making them a major public health concern (Kessler & Wang, 2008). In the United States (US), nearly half of all adults experience a psychiatric disorder during their lifetime (Kessler & Wang, 2008), and approximately one in five meet criteria for a psychiatric disorder in a

given year. Among those with a psychiatric disorder, 5.6% experience a serious mental illness (SMI), a subset characterized by substantial functional impairment (Kessler et al., 2005; SAMHSA, 2023) and elevated risks of premature mortality (Chesney et al., 2014; Walker, McGee, et al., 2015). Population-based surveys, such as the National Survey on Drug Use and Health (NSDUH) and the National Comorbidity Survey Replication (NCS-R), estimate that nearly half of adults with a psychiatric disorder have more than one diagnosis (Bhalla & Rosenheck, 2018; Kessler et al., 2005; Kessler & Wang, 2008), and one-quarter have three or more (Kessler et al., 2005).

The concept of psychiatric *comorbidity* has a longstanding history in psychiatric nosology. Early formulations distinguished *true comorbidity* (independent co-occurring conditions), *artifactual comorbidity* (diagnostic overlap from shared symptoms), and *spurious comorbidity* (associations generated by measurement artifacts) (Nordgaard et al., 2023; Doherty & Kartalova-O'Doherty, 2010). Over successive editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM), hierarchical restrictions limiting the assignment of multiple diagnoses have been reduced, with DSM-5 (2013) allowing broader recognition of co-occurring conditions (American Psychiatric Association, 2013). Building on this foundation, the concept of *multimorbidity*—defined as the presence of two or more disorders without privileging a primary condition—has been increasingly adopted in psychiatry as a framework to capture the complexity of patients' clinical presentations (Boyd & Fortin, 2010; Feinstein, 1970; Kessler et al., 2005; Langan et al., 2013; North et al., 2016).

Despite this conceptual evolution, research on psychiatric multimorbidity remains limited. Existing studies have primarily relied on either population-based surveys using self-reported or interview-based diagnoses (Kessler et al., 2005; Kessler & Wang, 2008) or small clinical research samples (Bhalla & Rosenheck, 2018; Bhalla et al., 2018; Fortin et al., 2005; Hefner & Rosenheck, 2019; Kessler et al., 2005). Most have emphasized psychiatric comorbidity restricted to two disorders or have examined narrowly defined populations, including single age cohorts such as older adults (Angst et al., 2002; Byers et al., 2010), individuals engaged in psychiatric specialty care (Bhalla & Rosenheck, 2018; Pincus et al., 2004), persons with SMI (Bhalla et al., 2021; Bhalla & Rosenheck, 2018; Carvalho et al., 2014; The Academy of Medical Sciences, 2015) veterans receiving care through the Veterans Health Administration (VA) (Hefner & Rosenheck, 2019), or samples defined by an index disorder such as posttraumatic stress disorder (PTSD) (Andrews et al., 2001; Cassell et al., 2018; Caughey & Roughead, 2011; Kessler et al., 2017; Kessler et al., 2011; Newman et al., 1998; Rhodes & Fung, 2004; Sinnige et al., 2013; Trivedi et al., 2015; Wang et al., 2005). Prior research has relied largely on self-report surveys or narrowly defined clinical samples, limiting generalizability. Administrative claims data offer a complementary lens, capturing diagnostic patterns across diverse care settings and payers.

Although psychiatric multimorbidity has been documented in population-based surveys and selected clinical subgroups, less is known about its prevalence and correlates as captured in real-world administrative claims across diverse healthcare settings. Survey studies rely on structured interviews and include untreated conditions, while specialty samples often focus on high-severity populations such as veterans or individuals with serious mental illness. As a result, estimates may not reflect the diagnostic complexity encountered within routine care delivery. Claims data offer a complementary lens by capturing diagnosed and treated conditions within healthcare systems. Leveraging a statewide all-payer claims database, the present study characterizes psychiatric multimorbidity within a broad insured adult population in Massachusetts. Specifically, we estimated the prevalence of psychiatric multimorbidity and examined demographic and clinical correlates. We hypothesized that individuals with serious mental illness would have higher rates of psychiatric multimorbidity compared to those without SMI, and that Medicaid beneficiaries would demonstrate greater psychiatric multimorbidity relative to those with commercial insurance coverage.

Methods

Data Source

We analyzed data from the Massachusetts All Payer Claims Database (APCD, version 8), for the years 2016 through 2018. The APCD is maintained by the Massachusetts Center for Health Information and Analysis (CHIA) (CHIA, 2013), and contains medical, pharmacy, and eligibility files submitted by public and private payers. This includes all MassHealth (Medicaid) beneficiaries, including both fee-for-service and managed care enrollees, and the majority of commercially insured residents of Massachusetts. However, reporting by self-insured employer plans is voluntary, and therefore this population is underrepresented. This limitation is especially relevant for generalizability to the broader commercially insured population, and it is acknowledged in both the analytic plan and interpretation of results. The study was reviewed and approved by the Human Research Protection Office (HRPO), which waived informed consent based on the use of secondary data.

Study Population

The study population consisted of adults aged 21–64 years with at least one psychiatric diagnosis documented in the APCD during the study period. Psychiatric diagnoses were defined using ICD-10-CM codes (described below). We limited the sample to adults, as treatment protocols and utilization patterns for mental health disorders can be different for those under the age of 21. We also restricted the cohort to individuals with ≥ 7 months of continuous insurance eligibility per calendar year to minimize incomplete follow-up and ensure sufficient observation time to detect psychiatric diagnoses. Because requiring ≥ 7 months of eligibility could introduce exposure heterogeneity (i.e., some individuals were observed longer than others), two strategies were employed: (1) Regression adjustment – Months of eligibility were included as a covariate in all multivariable models, and (2) Sensitivity analysis – We restricted the sample to those with ≥ 12 months continuous eligibility, reducing heterogeneity but narrowing the sample. Findings were consistent across these specifications, suggesting robustness to alternative exposure definitions.

Psychiatric Diagnoses

Psychiatric diagnoses were identified using ICD-10-CM codes as specified in the Healthcare Effectiveness Data and Information Set (HEDIS) quality measures for mental illness treatment (see Table 1 in Online Resource 1 for a list of included ICD-10 codes) (MVP Health Care; Forum NQ, n.d.; Forum NQ, 2019). To focus specifically on psychiatric disorders, we excluded: intellectual disabilities (F70–F79), mental disorders due to known physiological conditions (F01–F09), and substance use disorders (F10–F19). The exclusion of SUDs is notable because, in the Massachusetts APCD, claims with a principal or secondary SUD diagnosis are redacted for privacy protection. As a result, psychiatric–SUD comorbidity could not be examined. Given the high prevalence of co-occurring SUDs among individuals with psychiatric disorders, this exclusion likely results in conservative estimates of multimorbidity.

Definition of Multimorbidity and Serious Mental Illness (SMI)

The primary outcome was psychiatric multimorbidity, defined as the presence of two or more distinct psychiatric diagnoses documented in a calendar year. Distinct diagnoses were counted if they were recorded under separate ICD-10 categories, even if they were within the same DSM-5 class (e.g., panic disorder and generalized anxiety disorder within F41 were treated as distinct). Serious Mental Illness (SMI) was defined following prior claims-based

approaches as the presence of schizophrenia spectrum disorders, bipolar disorder, delusional disorder, or psychotic disorder not otherwise specified. Diagnoses classified as SMI were included in the multimorbidity count; thus, individuals with multiple SMI diagnoses, or SMI plus one or more additional psychiatric conditions, were classified as multimorbid. We acknowledge that this claims-based definition differs from functional impairment-based definitions (e.g., the NSDUH approach, which incorporates measures of role limitation). Accordingly, our operationalization should be interpreted as a proxy rather than a direct measure of SMI severity.

Sample Eligibility

We limited to individuals with at least one claim in any setting in a calendar year with a principal or secondary ICD-10 diagnosis of a psychiatric disorder. Patients were excluded if they were: 1) less than 21 or greater than 64 years of age; 2) had missing or negative age; 3) had missing sex; 4) were not a Massachusetts resident; 5) primary insurance coverage type was missing; 6) insurance coverage was categorized as 'other'; 7) or if they had less than seven months of continuous eligibility in any insurance in each calendar year. We excluded individuals with missing data for included measures and covariates. We grouped individuals with missing 5-digit ZIP codes—potentially indicating homelessness or unstable housing—into a “missing” category and retained these individuals in our analytic sample. See the Online Resource 2 for the analytic sample of exclusions.

Study Measures and Definitions

Our primary outcome measure was psychiatric multimorbidity, defined as a binary indicator of whether a patient had claims that included two or more principal or secondary psychiatric diagnoses (as defined above) during a single calendar year. More than one psychiatric diagnosis per diagnostic category was included as providers can make multiple DSM-5 diagnoses per diagnostic category (e.g., generalized anxiety disorder and panic disorder were counted as two distinct diagnoses even though they are included in the same anxiety disorder diagnostic category within DSM-5). We computed the sum of all psychiatric diagnoses per patient per year, indicator variables for the presence of each mental health diagnosis (1 if present /0 if absent), and an indicator variable for the presence of severe mental illness. SMI was defined based on prior literature as a diagnosis of schizophrenia, affective disorders (including major depressive disorder, but excluding single-episode depression), delusional disorder, bipolar disorder, and/or psychotic disorder not otherwise specified (Abram et al., 2003; Morrissey et al., 2006; Robertson et al., 2018). To assess medical comorbidities, we included a binary variable for presence of any medical condition included in the Elixhauser comorbidity index (Agency for Healthcare Research and Quality [AHRQ], 2021; Quan et al., 2005; van Walraven et al., 2009). We included patient demographics of age, sex, county of residence, and health insurance type (i.e., commercial versus Medicaid).

Statistical Analysis

We first summarized sample characteristics using descriptive statistics. Group differences between individuals with and without psychiatric multimorbidity were assessed using chi-square tests of independence for categorical variables and independent-samples t-tests for continuous variables. To further characterize diagnostic burden, we examined the distribution of the number of psychiatric diagnoses per individual using descriptive statistics.

To estimate associations between patient characteristics and psychiatric multimorbidity, we fit multivariable logistic regression models, reporting adjusted odds ratios (aORs) with 95% confidence intervals (CIs). All models controlled for the demographic and clinical covariates described above. Robust standard errors were clustered at the patient level to adjust for serial correlation arising from repeated person-years per individual.

Two sensitivity analyses were conducted. First, to evaluate whether findings were sensitive to the operational definition of multimorbidity, we redefined multimorbidity by counting only one psychiatric diagnosis per DSM-5 diagnostic category. Second, to assess the influence of repeated observations, we restricted the sample to 2018 only, thereby eliminating multiple person-years per individual. All data management and statistical analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC). Statistical significance was evaluated using two-sided tests with $\alpha = 0.05$.

Results

The analytic sample included 2,409,794 person-year observations for 999,091 unique individuals with at least one psychiatric disorder (see the Online Resource 2 for the analytic sample flow diagram and Table 1 for sample characteristics). Among this population, 63.6% were female, the mean age was 43.0 years (SD = 12.8), 69.1% were insured through Medicaid, and 54.3% had at least one medical comorbidity. The three most prevalent medical conditions were uncomplicated hypertension, chronic pulmonary disease, and obesity. Overall, 31.2% of patients met criteria for psychiatric multimorbidity (≥ 2 diagnoses), and 19.6% had SMI.

Table 1 Population Characteristics of Person-Year Observations with Psychiatric Multimorbidity

Characteristic	Overall (N=2,409,794)		No Psychiatric Multimorbidity: (N=1,658,396)	Psychiatric Multimorbidity: Yes (N=751,398)	P- value
	n	%	%/Mean	%/Mean	
Psychiatric Disorders					
1 psychiatric disorder	1,658,661	68.83	68.83		
> 1 psychiatric diagnosis					
2 diagnoses	418,316	17.36		17.36	
3 diagnoses	189,544	7.87		7.87	
4 diagnoses	82,601	3.43		3.43	
5 diagnoses	34,255	1.42		1.42	
6 or more diagnoses	26,682	1.09		1.09	
Sex					*
Male (ref)	876,880	36.39	37.71	33.47	
Female	1,532,914	63.61	62.29	66.53	
Age, Mean (SD)					*
21-29 (ref)	513,701	21.32	20.69	22.71	
30-39	541,935	22.49	21.9	23.78	
40-49	508,395	21.10	21.10	21.10	
50-59	588,361	24.42	25.35	23.13	
60-64	257,402	10.68	11.31	9.30	
Insurance type					*
Commercial (ref)	745,668	30.94	27.56	38.71	
Medicaid	1,664,111	69.06	61.59	72.44	
SMI Status					*
No (ref)	1,937,594	80.4	94.29	49.76	
Yes	472,200	19.6	5.71	50.24	
Medical Comorbidity					*
No (ref)	1,100,414	45.72	48.85	38.64	
Yes	1,309,380	54.31	51.15	61.36	
Top 7 Prevalent Psychiatric Diagnoses					
Generalized anxiety disorder (F41)	944,652	39.21	24.21	72.28	

<i>Major depressive disorder (F32)</i>	489,125	20.32	7.89	47.67
<i>Reaction to severe stress, adjustment disorders (F43)</i>	395,195	16.42	8.64	33.52
<i>Recurrent major depressive disorder (F33)</i>	339,526	14.09	3.98	36.41
<i>Attention-deficit hyperactivity disorders (F90)</i>	195,442	8.11	3.72	17.79
<i>Bipolar disorder (F31)</i>	124,912	5.18	2.66	13.24
<i>Persistent mood affective disorders (F34)</i>	104,178	4.32	2.88	10.21

Note: *= p <.0001

Among those with a single psychiatric diagnosis (68.8%), the most frequent diagnoses included generalized anxiety disorder (42.0%), reaction to severe stress and adjustment disorders (15.0%), major depressive disorder (13.7%), recurrent major depressive disorder (6.9%), attention deficit/hyperactivity disorder (6.5%), bipolar disorder (5.1%), and persistent mood affective disorders (4.3%).

Among patients with psychiatric multimorbidity (≥ 2), 44.3% had three or more psychiatric disorders, with the maximum number of diagnoses per patient reaching ten (see Fig. 1 for the distribution of psychiatric disorders among the sample). Those with psychiatric multimorbidity were more likely to be female, younger, more likely to have Medicaid coverage, more likely to have SMI, and more likely to have at least one medical comorbidity (see Table 1). The most frequent combinations of co-occurring pairs or triplets of psychiatric disorders can be found in Table 2. The most prevalent combinations of disorders generally included combinations of the following disorders: 1) generalized anxiety disorder; 2) attention deficit/hyperactivity disorder; 3) major depressive disorder; 4) recurrent major depressive disorder; 5) reaction to severe stress, adjustment disorders; 6) dysthymic disorder; and 7) bipolar disorder.

Table 2
Combinations of Psychiatric Disorders Among Patients with Multimorbidity

Panel A: Pairs	
Diagnoses	%
Generalized anxiety disorder and major depressive disorder (F32 + F41)	22%
Reaction to severe stress, adjustment disorders and generalized anxiety disorder (F43 + F41)	12%
Generalized anxiety disorder and recurrent major depressive disorder (F33 + F41)	10%
Attention deficit hyperactivity disorders and generalized anxiety disorder (F41 + F90)	6%
Major depressive disorder and recurrent major depressive disorder (F32 + F33)	5%
Reaction to severe stress, adjustment disorders and major depressive disorder (F32 + F43)	4%
Recurrent major depressive disorder and reaction to severe stress, adjustment disorders (F33 + F43)	3%
All other pairs 1% or lower	38%
Person-period observations	418,316
Panel B: Triplets	
Diagnoses	%
Generalized anxiety disorder, major depressive disorder, and recurrent depressive disorder (F41 + F32+F33)	14%
Generalized anxiety disorder, reaction to severe stress, adjustment disorders, and major depressive disorder (F41 + F43+F32)	10%
Generalized anxiety disorder, reaction to severe stress, adjustment disorders, and recurrent major depressive disorder (F41 + F43+F33)	6%
Attention deficit hyperactivity disorders, generalized anxiety disorder, and major depressive disorder (F90 + F41+F32)	4%
Major depressive disorder, recurrent major depressive disorder, and reaction to severe stress, adjustment disorders (F32 + F33+F43)	3%
Dysthymic disorder, major depressive disorder, and generalized anxiety disorder (F34 + F32+F41)	2%
Bipolar disorder, generalized anxiety disorder, and major depressive disorder (F41 + F32+F31)	2%
All other triplets: 2% or lower	58%
Person-period observations	189,544

Results from the multivariable analyses are presented in Table 3. Compared to men, women had higher odds of psychiatric multimorbidity (aOR, 1.23 [95% CI, 1.22–1.24]). Compared to individuals aged 21–29, those aged 30–39 (aOR, 0.93 [95% CI, 0.92–0.94]), 40–49 (aOR, 0.81 [95% CI, 0.80–0.82]), 50–59 (aOR, 0.71 [95% CI, 0.70–0.72]), and 60–64 (aOR, 0.62 [95% CI, 0.61–0.63]) all had lower odds of having psychiatric multimorbidity. Individuals with a medical comorbidity had higher odds of psychiatric multimorbidity as compared to those without medical comorbidity (aOR, 1.37 [95% CI, 1.36–1.38]). Those with SMI had nearly nine times the odds of psychiatric multimorbidity relative to those without SMI (aOR, 8.92 [95% CI, 8.84–8.99]). Finally, Medicaid enrollees had higher odds of psychiatric multimorbidity than those with commercial health insurance (aOR, 1.25 [95% CI, 1.24–1.26]).

Table 3
Multivariable Logistic Regression Predicting Psychiatric Multimorbidity

Sex (ref=male)	aOR	95% CI	p-value
<i>Female</i>	1.23	1.22–1.24	< .0001
Age (ref = 21–29 years)			
<i>30–39</i>	0.93	0.92–0.94	< .0001
<i>40–49</i>	0.81	0.80–0.82	0.0008
<i>50–59</i>	0.71	0.70–0.72	< .0001
<i>60–64</i>	0.62	0.61–0.63	< .0001
Insurance type (ref=commercial)			
<i>Medicaid</i>	1.25	1.24–1.26	< .0001
SMI Status (ref = no)			
<i>Yes</i>	8.92	8.84–8.99	< .0001
Medical Comorbidity (ref = no)			
<i>Yes</i>	1.37	1.36–1.38	< .0001
*Adjusted for calendar year, and fixed effects for county of residence were included			

Table 4
Sensitivity Analysis - Multivariable Logistic Regression Predicting Psychiatric
Multimorbidity (restricted to 2018 only)

	aOR	95% CI	p-value
Sex (ref=male)			
<i>Female</i>	1.23	1.21–1.25	< .0001
Age (ref = 21–29 years)			
<i>30–39</i>	0.91	0.89–0.92	< .0001
<i>40–49</i>	0.79	0.78–0.81	0.0008
<i>50–59</i>	0.70	0.69–0.71	< .0001
<i>60–64</i>	0.61	0.59–0.62	< .0001
Insurance type (ref=commercial)			
<i>Medicaid</i>	1.21	1.19–1.23	< .0001
SMI Status (ref = no)			
<i>Yes</i>	8.60	8.48–8.72	< .0001
Medical Comorbidity (ref = no)			
<i>Yes</i>	1.38	1.36–1.39	< .0001
*Adjusted for calendar year, and fixed effects for county of residence were included			

In the first sensitivity analysis, psychiatric multimorbidity was redefined as two or more distinct diagnoses counted once per DSM-5 diagnostic category within a calendar year. Using this definition, 25.9% of the sample met criteria for psychiatric multimorbidity—5.3 percentage points lower than the primary definition (31.2%). Importantly, the direction and magnitude of associations with patient characteristics remained consistent with those from the main model.

In the second sensitivity analysis, the sample was restricted to calendar year 2018 to remove repeated person-year observations. In this restricted dataset, 32.9% of individuals had psychiatric multimorbidity, a rate similar to the main analysis. The correlates of psychiatric multimorbidity in this restricted sample mirrored those found in the full sample (see Table 4). Together, these findings demonstrate that the prevalence and correlates of psychiatric multimorbidity were robust across alternate definitions and time restrictions, indicating that the observed associations are not sensitive to variation in the operationalization or time frame of measurement.

Discussion

Individuals with psychiatric multimorbidity often present with complex and multifaceted needs that exceed those of individuals with fewer diagnoses. Therefore, identifying and characterizing psychiatric multimorbidity is critical to informing identification, treatment, and policy efforts surrounding this growing public health challenge. Findings from this statewide clinical sample demonstrate that among individuals with at least one psychiatric diagnosis, approximately one in three experienced psychiatric multimorbidity, and roughly one in seven had three or more distinct psychiatric disorders. These findings indicate that SMI, female sex, presence of a medical comorbidity, and Medicaid enrollment were independently associated with increased odds of psychiatric multimorbidity.

Although the existing literature on psychiatric multimorbidity remains limited, the rate of psychiatric multimorbidity observed in this study is lower than rates observed in population-based surveys such as the National Comorbidity Survey and the National Comorbidity Survey Replication (Kessler et al., 2005; Kessler & Wang, 2008). This difference likely reflects methodological and definitional factors rather than true population differences. By leveraging an all-payer claims database, this study extends prior survey-based and specialty-care research by characterizing multimorbidity among individuals receiving treatment across diverse healthcare settings. Although the prevalence observed here is somewhat lower than national survey estimates, our findings reflect diagnosed and treated conditions within real-world care delivery systems. Notably, the present study did not include substance-related and addictive disorders due to redaction of SUD claims in the Massachusetts APCD, whereas national surveys include these disorders in their estimates of psychiatric comorbidity. Given that approximately 9% of individuals with psychiatric disorders in the National Comorbidity Surveys also had a SUD—and that national rates of SUD have increased since those data were collected—the prevalence of psychiatric multimorbidity in our analysis likely represents a conservative estimate. Nonetheless, the rate of SMI identified in our study (19.6%) closely aligns with those reported in both the original and replication National Comorbidity Surveys (22.6%) (Kessler et al., 2005; Kessler & Wang, 2008), suggesting that our sample reflects comparable severity distributions of psychiatric illness among insured populations.

Our findings that females exhibited higher odds of psychiatric multimorbidity than males are consistent with prior epidemiological and clinical research. Females are more likely to engage in mental health treatment and to receive psychiatric diagnoses (Liddon et al., 2018; Pattyn et al., 2015; Doherty & Kartalova-O'Doherty, 2010), and they also experience a higher lifetime prevalence of depression, anxiety, and trauma-related disorders compared to males (Dalsgaard et al., 2020; Fawcett et al., 2020; Naser et al., 2020; Phillips et al., 2023). These diagnostic patterns mirror the most common psychiatric disorders identified in our study—generalized anxiety disorder, major depressive disorder, and adjustment disorders—suggesting that gender differences in symptom expression, help-seeking, and diagnostic attribution may contribute to observed patterns of multimorbidity. The elevated prevalence of psychiatric multimorbidity among Medicaid enrollees compared to commercially insured individuals also aligns with prior evidence that psychiatric disorders are more common and more often treated among Medicaid beneficiaries (SAMHSA, 2010; Rowan et al., 2013; Walker, Cummings, et al., 2015). Medicaid is the nation's single largest payer for behavioral health care, and individuals enrolled in Medicaid are disproportionately affected by socioeconomic stressors, trauma exposure, and medical comorbidity, all of which can contribute to the clustering of multiple psychiatric disorders.

In comparing our findings to other clinical populations, rates of psychiatric multimorbidity in this study were slightly lower than those reported among veterans (Bhalla & Rosenheck, 2018; Bhalla et al., 2018; Hefner & Rosenheck, 2019). This difference may be attributable to the greater illness severity and trauma exposure within veteran populations, as many prior studies have focused on veterans with posttraumatic stress disorder, schizophrenia, or other serious mental illnesses. Importantly, by examining both Medicaid and commercially insured adults across a range of service settings, the present study extends this literature by providing a broader population-based perspective on psychiatric multimorbidity within a general clinical population, rather than focusing solely on high-severity or specialized subgroups.

The results from our sensitivity analyses provide additional confidence in the robustness of our findings. During the study design phase, multiple definitions of psychiatric multimorbidity were considered, given the absence of standardized criteria across the literature. Our primary approach—counting distinct psychiatric diagnoses documented during a given observation year—aligns with contemporary diagnostic conventions allowing for multiple co-occurring DSM-5 disorders. The sensitivity analysis, which restricted classification to one diagnosis per DSM-5

diagnostic category, yielded a slightly lower rate (25.9% vs. 31.2%) but did not materially alter the pattern or strength of associations with patient characteristics. Similarly, restricting the analysis to 2018 to eliminate repeated person-years per individual produced results nearly identical to the main analysis. These consistent findings suggest that the operationalization of psychiatric multimorbidity in this study is stable and reproducible across reasonable definitional and temporal variations.

The high prevalence of psychiatric multimorbidity observed in this study has important implications for healthcare delivery systems. Most treatment guidelines, reimbursement structures, and quality metrics remain diagnosis-specific, despite the reality that a substantial proportion of patients present with multiple concurrent conditions. These findings suggest that psychiatric multimorbidity may be the norm rather than the exception in routine care, particularly among individuals with SMI and Medicaid coverage. Healthcare systems may therefore need to consider screening, care coordination, and service models that better account for cross-diagnostic complexity.

Despite these findings, several limitations should be acknowledged. First, the study was conducted within a single state, which may limit national generalizability. However, Massachusetts represents one of the most comprehensively insured states in the U.S., and inclusion of both Medicaid and commercially insured populations enhances external validity relative to studies limited to single-payer systems or narrowly defined clinical cohorts. Second, administrative claims data inherently depend on diagnostic coding practices, which may be influenced by provider expertise, billing constraints, or varying levels of diagnostic specificity (Schneeweiss & Avorn, 2005). Although such limitations may introduce misclassification, the use of standardized ICD-10-CM diagnostic codes mitigates systematic bias to some extent. Third, we were unable to examine important sociodemographic and contextual variables—such as race and ethnicity, sexual orientation, housing instability, and employment status—that may further explain disparities in psychiatric multimorbidity. Additionally, because SUD claims were redacted from the APCD, our findings underestimate the true scope of behavioral health multimorbidity. Fourth, the APCD underrepresents self-insured commercial plans due to voluntary reporting exemptions following *Gobeille v. Liberty Mutual Insurance Co.*, (Curfman, 2017) and excludes uninsured and Medicare-only populations, limiting the completeness of statewide coverage. As working age adults insured by traditional Medicare are not included in APCD, we additionally excluded those with Medicare Advantage (Geissler et al., 2023). These sample restrictions limit full representativeness of the statewide adult population. Despite these constraints, this study leverages one of the most comprehensive state-level datasets available, encompassing a large, heterogeneous sample across diverse healthcare delivery systems.

In summary, this statewide analysis demonstrates that psychiatric multimorbidity is common among insured adults with a mental health diagnosis, affecting approximately one in three person-years. At the population level, these findings highlight the substantial burden of diagnostic complexity within publicly and privately insured healthcare systems. At the clinical level, they underscore the importance of assessment and care models that acknowledge the interrelated and dynamic nature of co-occurring psychiatric conditions. Providers, policymakers, and healthcare systems should consider screening and assessment procedures that explicitly account for psychiatric multimorbidity, alongside care coordination mechanisms that facilitate holistic and sustained management across diagnostic boundaries. Future research should build upon these findings by examining the longitudinal course of psychiatric multimorbidity, the temporal sequencing of disorder onset, and the impact of multimorbidity on healthcare utilization, outcomes, and expenditures. Such work will be essential for advancing precision in the identification and treatment of complex psychiatric conditions and for developing evidence-based strategies to improve population mental health.

Declarations

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Author Contribution

P.S. wrote the main manuscript and prepared figure 1, tables 1-4, and the supplementary materials. All authors reviewed the manuscript.

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Data Availability

The data that support the findings is from the Massachusetts Center for Health Information and Analysis (CHIA), but restrictions apply to the availability of these data, which were used under a data use agreement and so are not publicly available.

References

1. Abram, K. M., Teplin, L. A., & McClelland, G. M. (2003). Comorbidity of severe psychiatric disorders and substance use disorders among women in jail. *American Journal Of Psychiatry*, 160(5), 1007–1010. <https://doi.org/10.1176/appi.ajp.160.5.1007>
2. Agency for Healthcare Research and Quality (2021, October). *Elixhauser Comorbidity Software Refined for ICD-10-CM (v2022.1)*. Healthcare Cost and Utilization Project (HCUP). https://hcupus.ahrq.gov/toolssoftware/comorbidityicd10/comorbidity_icd10.jsp
3. American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). <https://psychiatryonline.org/doi/book/10.1176/appi.books.9780890425596>
4. Andrews, G., Henderson, S., & Hall, W. (2001). Prevalence, comorbidity, disability and service utilisation. Overview of the Australian National Mental Health Survey. *British Journal Of Psychiatry*, 178, 145–153. <https://doi.org/10.1192/bjp.178.2.145>
5. Angst, J., Sellaro, R., & Merikangas, R., K (2002). Multimorbidity of psychiatric disorders as an indicator of clinical severity. *Eur Arch Psychiatry Clin Neurosci*, 252(4), 147–154. <https://doi.org/10.1007/s00406-002-0357-6>
6. Bhalla, I. P., Deegan, D., Stefanovics, E. A., & Rosenheck, R. A. (2021). Psychiatric Multimorbidity in a Specialized Program for Severely Mentally Ill Veterans. *Psychiatric Quarterly*, 92(2), 489–499. <https://doi.org/10.1007/s11126-020-09826-2>
7. Bhalla, I. P., & Rosenheck, R. A. (2018). A Change in Perspective: From Dual Diagnosis to Multimorbidity. *Psychiatric Services (Washington, D. C.)*, 69(1), 112–116. <https://doi.org/10.1176/appi.ps.201700194>
8. Bhalla, I. P., Stefanovics, E. A., & Rosenheck, R. A. (2018). Mental health multimorbidity and poor quality of life in patients with schizophrenia. *Schizophrenia Research*, 201, 39–45. <https://doi.org/10.1016/j.schres.2018.04.035>

9. Boyd, C. M., & Fortin, M. (2010). Future of Multimorbidity Research: How Should Understanding of Multimorbidity Inform Health System Design? *Public Health Reviews*, 32(2), 451–474. <https://doi.org/10.1007/BF03391611>
10. Byers, A. L., Yaffe, K., Covinsky, K. E., Friedman, M. B., & Bruce, M. L. (2010). High occurrence of mood and anxiety disorders among older adults: The National Comorbidity Survey Replication. *Archives Of General Psychiatry*, 67(5), 489–496. <https://doi.org/10.1001/archgenpsychiatry.2010.35>
11. Carvalho, A. F., McIntyre, R. S., Dimelis, D., Gonda, X., Berk, M., Nunes-Neto, P. R., Cha, D. S., Hyphantis, T. N., Angst, J., & Fountoulakis, K. N. (2014). Predominant polarity as a course specifier for bipolar disorder: a systematic review. *Journal Of Affective Disorders*, 163, 56–64. <https://doi.org/10.1016/j.jad.2014.03.035>
12. Cassell, A., Edwards, D., Harshfield, A., Rhodes, K., Brimicombe, J., Payne, R., & Griffin, S. (2018). The epidemiology of multimorbidity in primary care: a retrospective cohort study. *British Journal Of General Practice*, 68(669), e245–e251. <https://doi.org/10.3399/bjgp18X695465>
13. Caughey, G. E., & Roughead, E. E. (2011). Multimorbidity research challenges: where to go from here? *J Comorb*, 1, 8–10. <https://doi.org/10.15256/joc.2011.1.9>
14. Center for Health Information and Analysis (CHIA) (2013). *All-payer claims database introduction, 2013*. Boston, MA,. Retrieved February 22, 2022 from
15. Chesney, E., Goodwin, G. M., & Fazel, S. (2014). Risks of all-cause and suicide mortality in mental disorders: a meta-review. *World Psychiatry*, 13(2), 153–160. <https://doi.org/10.1002/wps.20128>
16. Curfman, G. D. (2017). *All-payer claims databases after Gobeille*. *Health Affairs Forefront*. <https://www.healthaffairs.org/content/forefront/all-payer-claims-databases-after-em-gobeille-em>
17. Dalsgaard, S., Thorsteinsson, E., Trabjerg, B. B., Schullehner, J., Plana-Ripoll, O., Brikell, I., Wimberley, T., Thygesen, M., Madsen, K. B., Timmerman, A., Schendel, D., McGrath, J. J., Mortensen, P. B., & Pedersen, C. B. (2020). Incidence Rates and Cumulative Incidences of the Full Spectrum of Diagnosed Mental Disorders in Childhood and Adolescence. *JAMA Psychiatry*, 77(2), 155–164. <https://doi.org/10.1001/jamapsychiatry.2019.3523>
18. Doherty, D. T., & Kartalova-O'Doherty, Y. (2010). Gender and self-reported mental health problems: predictors of help seeking from a general practitioner. *The British Journal Of Health Psychology*, 15(Pt 1), 213–228. <https://doi.org/10.1348/135910709x457423>
19. Fawcett, E. J., Power, H., & Fawcett, J. M. (2020). Women Are at Greater Risk of OCD Than Men: A Meta-Analytic Review of OCD Prevalence Worldwide. *Journal Of Clinical Psychiatry*, 81(4). <https://doi.org/10.4088/JCP.19r13085>
20. Feinstein, A. R. (1970). The pre-therapeutic classification of co-morbidity in chronic disease. *J Chronic Dis*, 23(7), 455–468. [https://doi.org/10.1016/0021-9681\(70\)90054-8](https://doi.org/10.1016/0021-9681(70)90054-8)
21. Fortin, M., Bravo, G., Hudon, C., Vanasse, A., & Lapointe, L. (2005). Prevalence of multimorbidity among adults seen in family practice. *Annals Of Family Medicine*, 3(3), 223–228. <https://doi.org/10.1370/afm.272>
22. Forum NQ. (n.d.). *Driving measurable health improvements together*. Retrieved December 5 (2019). from <http://www.qualityforum.org>
23. Forum, N. Q. (2019). *NQF Endorses Behavioral Health Measures*. Retrieved December 5, 2019 from
24. Geissler, K. H., Ericson, K. M., Simon, G. E., Qian, J., & Zeber, J. E. (2023). Differences in Insurance Coverage for Individuals With Schizophrenia After Implementation of the Patient Protection and Affordable Care Act. *JAMA Psychiatry*, 80(3), 278–279. <https://doi.org/10.1001/jamapsychiatry.2022.4628>
25. Hefner, K., & Rosenheck, R. (2019). Multimorbidity among Veterans Diagnosed with PTSD in the Veterans Health Administration Nationally. *Psychiatric Quarterly*, 90(2), 275–291. <https://doi.org/10.1007/s11126-019-09632-5>

26. Kessler, R. C., Aguilar-Gaxiola, S., Alonso, J., Benjet, C., Bromet, E. J., Cardoso, G., Degenhardt, L., de Girolamo, G., Dinolova, R. V., Ferry, F., Florescu, S., Gureje, O., Haro, J. M., Huang, Y., Karam, E. G., Kawakami, N., Lee, S., Lepine, J. P., Levinson, D., & Koenen, K. C. (2017). Trauma and PTSD in the WHO World Mental Health Surveys. *Eur J Psychotraumatol*, 8(sup5), 1353383. <https://doi.org/10.1080/20008198.2017.1353383>
27. Kessler, R. C., Chiu, W. T., Demler, O., Merikangas, K. R., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives Of General Psychiatry*, 62(6), 617–627. <https://doi.org/10.1001/archpsyc.62.6.617>
28. Kessler, R. C., Ormel, J., Petukhova, M., McLaughlin, K. A., Green, J. G., Russo, L. J., Stein, D. J., Zaslavsky, A. M., Aguilar-Gaxiola, S., Alonso, J., Andrade, L., Benjet, C., de Girolamo, G., de Graaf, R., Demyttenaere, K., Fayyad, J., Haro, J. M., Hu, C., Karam, A., & Ustün, T. B. (2011). Development of lifetime comorbidity in the World Health Organization world mental health surveys. *Archives Of General Psychiatry*, 68(1), 90–100. <https://doi.org/10.1001/archgenpsychiatry.2010.180>
29. Kessler, R. C., & Wang, P. S. (2008). The descriptive epidemiology of commonly occurring mental disorders in the United States. *Annual Review Of Public Health*, 29, 115–129. <https://doi.org/10.1146/annurev.publhealth.29.020907.090847>
30. Langan, J., Mercer, S. W., & Smith, D. J. (2013). Multimorbidity and mental health: can psychiatry rise to the challenge? *British Journal Of Psychiatry*, 202, 391–393. <https://doi.org/10.1192/bjp.bp.112.123943>
31. Liddon, L., Kingerlee, R., & Barry, J. A. (2018). Gender differences in preferences for psychological treatment, coping strategies, and triggers to help-seeking. *British Journal Of Clinical Psychology*, 57(1), 42–58. <https://doi.org/10.1111/bjc.12147>
32. Morrissey, J. P., Steadman, H. J., Dalton, K. M., Cuellar, A., Stiles, P., & Cuddeback, G. S. (2006). Medicaid enrollment and mental health service use following release of jail detainees with severe mental illness. *Psychiatric Services (Washington, D. C.)*, 57(6), 809–815. <https://doi.org/10.1176/ps.2006.57.6.809>
33. MVP Health Care. *Behavioral Health Coding Reference Guide for Providers, MVP Health Care*. Retrieved February 22 (2022). from <https://www.mvphealthcare.com/-/media/project/mvp/healthcare/wp-content/mvp-health-care-hedis-behavioral-health-coding-reference-guide-for-providers.pdf>
34. Naser, A. Y., Dahmash, E. Z., Al-Rousan, R., Alwafi, H., Alrawashdeh, H. M., Ghoul, I., Abidine, A., Bokhary, M. A., Al-Hadithi, H. T., Ali, D., Abuthawabeh, R., Abdelwahab, G. M., Alhartani, Y. J., Muhaisen, A., Dagash, H., A., & Alyami, H. S. (2020). Mental health status of the general population, healthcare professionals, and university students during 2019 coronavirus disease outbreak in Jordan: A cross-sectional study. *Brain Behav*, 10(8), e01730. <https://doi.org/10.1002/brb3.1730>
35. Newman, D. L., Moffitt, T. E., Caspi, A., & Silva, P. A. (1998). Comorbid mental disorders: implications for treatment and sample selection. *Journal Of Abnormal Psychology*, 107(2), 305–311. <https://doi.org/10.1037//0021-843x.107.2.305>
36. Nordgaard, J., Nielsen, K. M., Rasmussen, A. R., & Henriksen, M. G. (2023). Psychiatric comorbidity: a concept in need of a theory. *Psychological Medicine*, 53(13), 5902–5908. <https://doi.org/10.1017/s0033291723001605>
37. North, C. S., Brown, E. S., & Pollio, D. E. (2016). Expanded conceptualization of multimorbidity to encompass substance use disorders and other psychiatric illness. *Annals Of Clinical Psychiatry*, 28(3), 182–188.
38. Pattyn, E., Verhaeghe, M., & Bracke, P. (2015). The gender gap in mental health service use. *Social Psychiatry And Psychiatric Epidemiology*, 50(7), 1089–1095. <https://doi.org/10.1007/s00127-015-1038-x>
39. Phillips, S. P., O'Connor, M., & Vafaei, A. (2023). Women suffer but men die: survey data exploring whether this self-reported health paradox is real or an artefact of gender stereotypes. *Bmc Public Health*, 23(1), 94. <https://doi.org/10.1186/s12889-023-15011-4>

40. Pincus, H. A., Tew, J. D., & First, M. B. (2004). Psychiatric comorbidity: is more less? *World Psychiatry*, 3(1), 18–23.
41. Quan, H., Sundararajan, V., Halfon, P., Fong, A., Burnand, B., Luthi, J. C., Saunders, L. D., Beck, C. A., Feasby, T. E., & Ghali, W. A. (2005). Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Medical Care*, 43(11), 1130–1139. <https://doi.org/10.1097/01.mlr.0000182534.19832.83>
42. Rhodes, A. E., & Fung, K. (2004). Self-reported use of mental health services versus administrative records: care to recall? *International Journal Of Methods In Psychiatric Research*, 13(3), 165–175. <https://doi.org/10.1002/mpr.172>
43. Robertson, A. G., Easter, M. M., Lin, H. J., Frisman, L. K., Swanson, J. W., & Swartz, M. S. (2018). Associations between pharmacotherapy for opioid dependence and clinical and criminal justice outcomes among adults with co-occurring serious mental illness. *Journal Of Substance Abuse Treatment*, 86, 17–25. <https://doi.org/10.1016/j.jsat.2017.12.003>
44. Rowan, K., McAlpine, D. D., & Blewett, L. A. (2013). Access and cost barriers to mental health care, by insurance status, 1999–2010. *Health Aff (Millwood)*, 32(10), 1723–1730. <https://doi.org/10.1377/hlthaff.2013.0133>
45. SAMHSA. (2012). Mental health, United States, 2010 [Internet]. Pub no SMA-12-4681. Rockville, MD. Department of Health and Human Services, 2012. <https://www.samhsa.gov/data/2k12/MHUS2010/MHUS-2010.pdf>. Accessed February 22, 2022.
46. SAMHSA (2023). *Results from the 2022 National Survey on Drug Use and Health (NSDUH): Mental Health Findings – National Estimates*.
47. Schneeweiss, S., & Avorn, J. (2005). A review of uses of health care utilization databases for epidemiologic research on therapeutics. *Journal Of Clinical Epidemiology*, 58(4), 323–337. <https://doi.org/10.1016/j.jclinepi.2004.10.012>
48. Sinnige, J., Braspenning, J., Schellevis, F., Stirbu-Wagner, I., Westert, G., & Korevaar, J. (2013). The prevalence of disease clusters in older adults with multiple chronic diseases—a systematic literature review. *PloS one*, 8(11), e79641. <https://doi.org/10.1371/journal.pone.0079641>
49. The Academy of Medical Sciences (2015). *Multiple Morbidities as a Global Health Challenge*. Retrieved January 4, 2022 from <https://acmedsci.ac.uk/file-download/38330-567965102e84a.pdf>
50. Trivedi, R. B., Post, E. P., Sun, H., Pomerantz, A., Saxon, A. J., Piette, J. D., Maynard, C., Arnow, B., Curtis, I., Fihn, S. D., & Nelson, K. (2015). Prevalence, Comorbidity, and Prognosis of Mental Health Among US Veterans. *American Journal Of Public Health*, 105(12), 2564–2569. <https://doi.org/10.2105/ajph.2015.302836>
51. van Walraven, C., Austin, P. C., Jennings, A., Quan, H., & Forster, A. J. (2009). A modification of the Elixhauser comorbidity measures into a point system for hospital death using administrative data. *Medical Care*, 47(6), 626–633. <https://doi.org/10.1097/MLR.0b013e31819432e5>
52. Walker, E. R., Cummings, J. R., Hockenberry, J. M., & Druss, B. G. (2015). Insurance status, use of mental health services, and unmet need for mental health care in the United States. *Psychiatric Services (Washington, D. C.)*, 66(6), 578–584. <https://doi.org/10.1176/appi.ps.201400248>
53. Walker, E. R., McGee, R. E., & Druss, B. G. (2015). Mortality in mental disorders and global disease burden implications: a systematic review and meta-analysis. *JAMA Psychiatry*, 72(4), 334–341. <https://doi.org/10.1001/jamapsychiatry.2014.2502>
54. Wang, P. S., Lane, M., Olfson, M., Pincus, H. A., Wells, K. B., & Kessler, R. C. (2005). Twelve-month use of mental health services in the United States: results from the National Comorbidity Survey Replication. *Archives Of General Psychiatry*, 62(6), 629–640. <https://doi.org/10.1001/archpsyc.62.6.629>

Figures

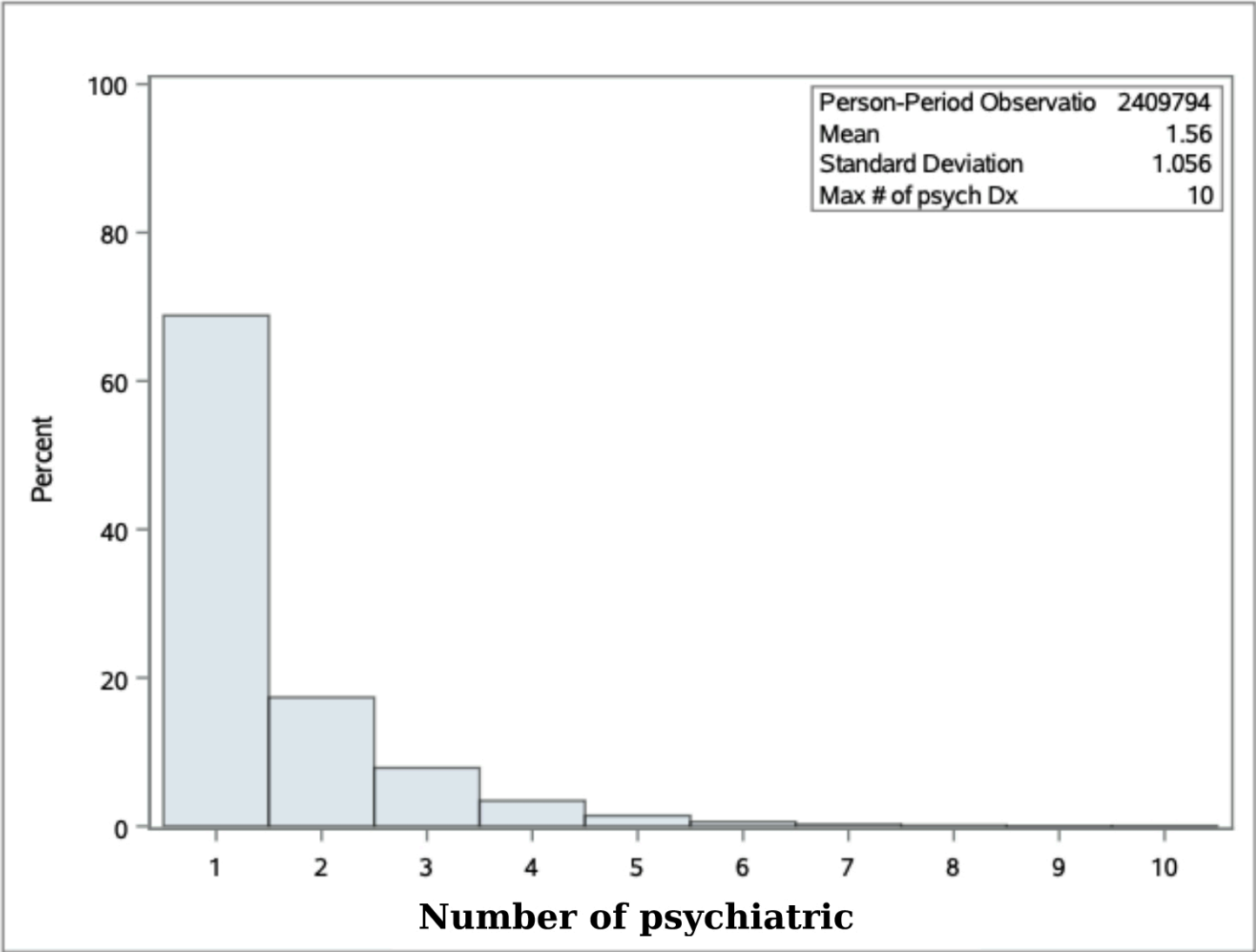


Figure 1
Distribution of Psychiatric Diagnoses

Supplementary Files

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