

Mental Health Diagnoses and Services Utilization Vary by Wage Level

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Mental health disorders place a substantial burden on the workplace and health care system. In the United States, 19% of adults had a mental illness in 2018.¹ Depression is common among employees and poses challenges in the workplace.²⁻⁴ Employees with mood disorders often lose workdays^{3,5} and productivity,^{4,6} and mental illness is associated with physical health challenges and disability.⁴ Multiple studies have linked low income levels with greater mental health challenges.⁷⁻¹¹

Although treatment can improve outcomes for employees with mental health disorders,^{6,12} many do not receive treatment.^{4,6,13} In a national survey, American adults seeking mental health services reported that cost, stigma, and difficulty getting an appointment were barriers to seeking care.¹⁴ Difficulties with access are more acute at lower income levels and are linked to disparities in obtaining health care services. In one study, the proportion of employees receiving any medical service increased with wage level, although emergency department (ED) visits and hospitalizations were more frequent among lower-wage earners.¹⁵

Despite evidence that income levels affect both mental health status and health care utilization, the relationship between wage status and mental health service utilization has not been characterized in large-scale data analyses of commercially insured populations. Comprehensive evidence from such studies may provide a basis for policy and practice changes to reduce disparities in access to mental health services.

The objective of this study was to assess health care utilization and cost patterns for mental health diagnoses according to wage category among employees with employer-provided health insurance.

METHODS

Additional details of the study methodology are provided in the [eAppendix Methods](#) (eAppendix available at [ajmc.com](#)). Takeda Pharmaceuticals U.S.A., Inc, and Lundbeck LLC funded the study and participated in study design and interpretation.

ABSTRACT

OBJECTIVES: The relationship between employee wage status and mental health care utilization has not been characterized in large-scale analyses. This study assessed health care utilization and cost patterns for mental health diagnoses according to wage category among employees with health insurance.

STUDY DESIGN: This was an observational, retrospective cohort study for the year 2017 among 2,386,844 adult full-time employees (254,851 with mental health disorders; subgroup of 125,247 with depression) enrolled in self-insured plans in the IBM Watson Health MarketScan research database.

METHODS: Participants were stratified into annual wage categories: \$34,000 or less; more than \$34,000 to \$45,000; more than \$45,000 to \$69,000; more than \$69,000 to \$103,000; and more than \$103,000. Health care utilization and costs were analyzed via regression analyses.

RESULTS: Prevalence of diagnosed mental health disorders was 10.7% (9.3% in the lowest-wage category); prevalence of depression was 5.2% (4.2% in the lowest-wage category). Severity of mental health, and specifically depression episodes, was greater in lower-wage categories. All-cause utilization of health care services was higher in patients with mental health diagnoses vs the total population. Among patients with mental health diagnoses, specifically depression, utilization was highest in the lowest- vs highest-wage category for hospital admissions, emergency department visits, and prescription drug supply (all $P < .0001$). All-cause health care costs were higher in the lowest- vs highest-wage category among patients with mental health diagnoses (\$11,183 vs \$10,519; $P < .0001$), specifically depression (\$12,206 vs \$11,272; $P < .0001$).

CONCLUSIONS: Lower mental health condition prevalence and greater use of high-intensity health care resources highlight the need to more effectively identify and manage mental health conditions among lower-wage workers.

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TAKEAWAY POINTS

- ▶ The relationship between wage level and health care utilization among employees with mental health disorders (specifically depression) has not been previously characterized in large-scale studies.
- ▶ In this analysis of insurance records for 2,386,844 adult employees, including 254,851 with mental health disorders, severity of mental health episodes was greater in the lowest- vs highest-wage categories, with prevalence lower among lower-wage employees.
- ▶ Hospital admissions, emergency department visits, overall costs, and discontinuation from antidepressant therapy were also higher in the lower-wage categories.
- ▶ Greater disease severity and higher use of health care resources highlight the need to better manage mental health disorders among lower-income employees.

Study Design

This was an observational retrospective cohort study using data from January 1, 2017, to December 31, 2017 (study period). Informed consent was not required because deidentified information from a claims database was used. The analysis included active employees in the United States who were continuously enrolled in self-insured, employer-sponsored health plans in the IBM Watson Health MarketScan research database.

Participant Groups and Wage Categories

Included individuals were employed benefits enrollees 18 years or older with employer-provided wage information during the study period.

Three participant groups were defined: (1) the total population: all participants; (2) patients with mental health diagnoses: participants who had an *International Classification of Diseases, Tenth Revision (ICD-10)* code for a psychiatric or substance use disorder and met IBM Watson Health's Medical Episode Grouper¹⁶ criteria (Mental Health Conditions in eAppendix Methods); and (3) a subgroup of patients with depression: those patients from the prior group with a principal diagnosis of depression. The Medical Episode Grouper was used to identify patients meeting eligibility criteria for the respective mental health conditions (eAppendix Methods).¹⁶ Examples of Medical Episode Grouper use in other research include estimation of annual attributable medical cost analysis of substance use disorder in US hospitals with diagnoses by *ICD-10, Clinical Modification (ICD-10-CM)* code¹⁷ and assessment of changes in health care services during the initial phase of the COVID-19 pandemic using the IBM Watson Health procedure categories.¹⁸ In prior research, the Medical Episode Grouper was also used to assign disease severity to each episode based solely on *ICD-9-CM* diagnosis codes for condition-related complications (eAppendix Methods).¹⁹ The following wage categories were defined based on each participant's annual wage in US\$ at the midpoint of 2017: \$34,000 or less; more than \$34,000 to \$45,000; more than \$45,000 to \$69,000; more than \$69,000 to \$103,000; and more than \$103,000. The wage categories were intended to create quartiles, with the lowest-wage quartile split into 2 wage categories (\leq \$34,000 and $>$ \$34,000-\$45,000) for more detailed analysis.

Study End Points

End points are reported for the total population, patients with mental health diagnoses, and the subgroup of patients with depression. Demographic information was captured as described in the eAppendix Methods.

Prevalence of diagnosed mental health disorders was calculated as the proportion of participants meeting IBM Watson Health's Medical Episode Grouper criteria for a mental health condition as a percentage of the total study population. Severity of a mental health episode was analyzed based on the

highest disease severity (from 1.0 to 4.0) recorded for that episode (eAppendix Methods).

Mental health-specific utilization and costs were calculated for services with a principal diagnosis of mental health according to *ICD-10* codes. Health care utilization was analyzed for the following outcomes: hospital admissions, length of hospital stays, outpatient services, ED visits, and supply of a prescription drug (eAppendix Methods). Costs were reported based on the amount allowed (paid from all sources: total costs and costs for inpatient, outpatient, ED, and prescription drug services) and total net payment per patient.

The number of patients prescribed mental health-specific medications was recorded for the following drug types: antidepressants, antipsychotics, anxiolytics, substance use disorder medications, stimulants, and other mental health-specific medications (eAppendix Methods), and medication use is reported. Adherence and discontinuation are reported for antidepressants only. Adherence was analyzed as the percentage of patients with the proportion of days covered (PDC) at least 80% (eAppendix Methods). Discontinuation was analyzed based on the proportion of patients with a gap of at least 90 days in medication supply.²⁰ Provider status was coded as either in network or out of network.

Statistical Analysis

All analyses were performed by IBM Watson using WPS version 4.1.2 (World Programming). Regression models were used to examine the adjusted relationship between key outcomes and wage categories, controlling for demographic and clinical variables (Statistical Analysis section within eAppendix Methods).

RESULTS

Study Disposition and Participant Demographics

A total of 2,386,844 adults were included in the analysis and formed the total population (eAppendix Table 1). Of these, 254,851 (10.7%) were patients with mental health diagnoses. Among patients with mental health diagnoses, 125,247 (5.2% of the total population) experienced depression (subgroup of patients with depression). The mean (SD) age of participants was 44.5 (11.3) years and was

higher in higher-wage categories. Overall, 58% of participants were men; most patients with mental health diagnoses, and specifically depression, were women (eAppendix Table 1). Overall, the mean annualized wage was \$86,079; this ranged from \$24,606 in the lowest-wage category (< \$34,000) to \$166,868 in the highest-wage category (> \$103,000) (eAppendix Table 1).

About half of participants (49%) were enrolled in a preferred provider organization. Fewer than half (39%) of participants had employee-only coverage; most had coverage that included family members.

Prevalence and Severity of Mental Health Disorders

Analysis revealed that 10.7% of the total population had mental health disorders and 5.2% of the total population had depression. Prevalence of diagnosed mental health disorders, and specifically depression, was highest in the mid-wage categories (Figure 1 [A]).

The adjusted mean severity of depression episodes ranged from 1.46 to 1.63 (on a scale from 1.0 to 4.0) across wage categories (Figure 1 [B]). Depression severity was inversely related to wage, with greater severity in the lower-wage categories. A similar but less pronounced pattern was observed for all mental health episodes (Figure 1 [B]).

Utilization of Health Care Services

All-cause utilization of health care services was greater among patients with mental health diagnoses than in the total population (eAppendix Table 2). Among patients with mental health diagnoses, and specifically depression, all-cause hospital admissions, ED visits, and drug supply were higher in lower-wage categories than in the highest-wage category. This pattern was similar for mental health–specific health care services (eAppendix Table 2). In addition, the proportion of all hospital admissions that were mental health related was numerically greater in the lower-wage than in the higher-wage categories.

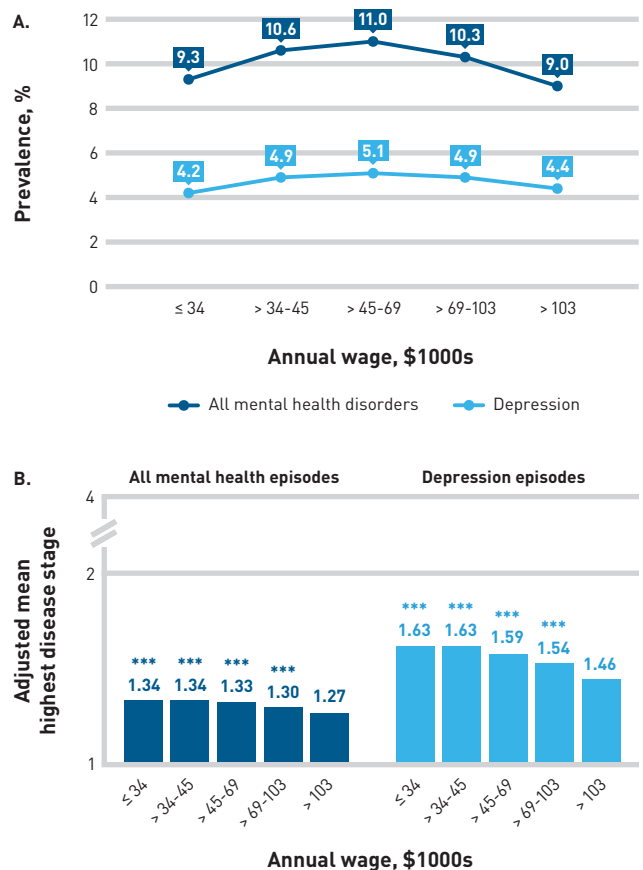
Among patients with mental health diagnoses, the adjusted mean rate of mental health–specific hospital admissions per 1000 in the lowest-wage category (32.5) was twice the rate in the highest-wage category (16.1) (eAppendix Table 2). This discrepancy was even greater in the subgroup of patients with depression, for whom those in the lowest-wage category were almost 2.5-fold more likely to have mental health–specific hospitalizations than those in the highest-wage category. Among patients with depression, the rate of all-cause ED visits in the lowest-wage category was also twice as high as in the highest-wage category.

Rates of all-cause outpatient service utilization among patients with mental health diagnoses and patients with depression showed no consistent pattern in relation to wage, with rates appearing greatest in the lowest- and highest-wage categories (eAppendix Table 2).

Adjusted Cost of Care

The total cost of care was higher for individuals with mental health conditions than for the total population (Figure 2 [A] and eAppendix Table 3); costs were even higher for patients with depression. In

FIGURE 1. (A) Prevalence and (B) Adjusted Mean Severity of Mental Health Disorders by Mental Health Disorder and Wage Category^a



*** $P < .0001$ vs annual wages more than \$103,000.

^aPrevalence is based on the number of participants meeting Medical Episode Group criteria for the respective mental health disorders as a proportion of the total population, with results adjusted for demographic and other variables. Severity is based on the highest disease severity (from 1.0 to 4.0) recorded for that episode.

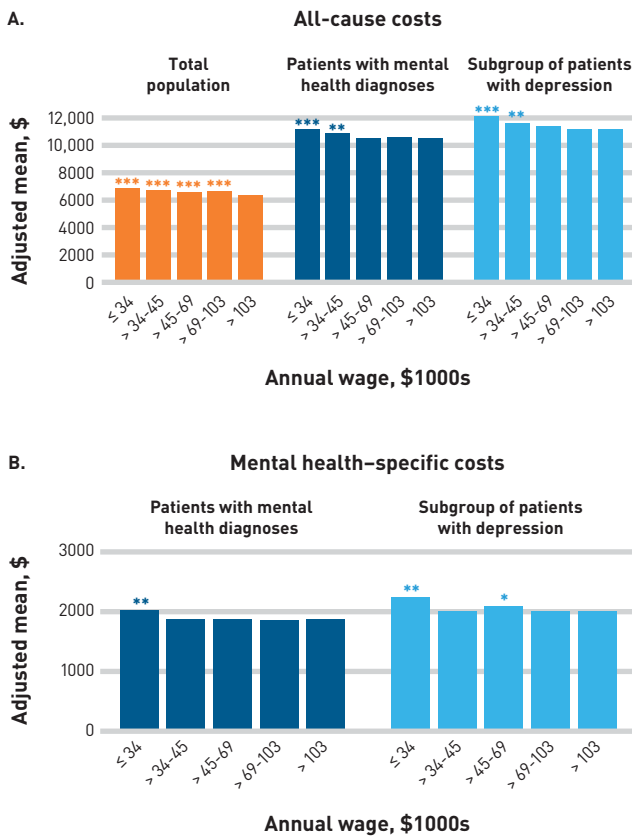
the total population, all-cause costs declined in association with increasing wages (Figure 2 [A]). A similar pattern occurred for inpatient costs and net payments (eAppendix Table 3). Among patients with mental health diagnoses, and specifically depression, mental health–specific costs were highest in the lowest-wage category (Figure 2 [B] and eAppendix Table 3).

Medication Use

In each analysis group, antidepressants were the most prescribed class of mental health–specific medications, followed by anxiolytics and stimulants (eAppendix Table 4). Among patients with depression, 61.5% received antidepressants during the study period.

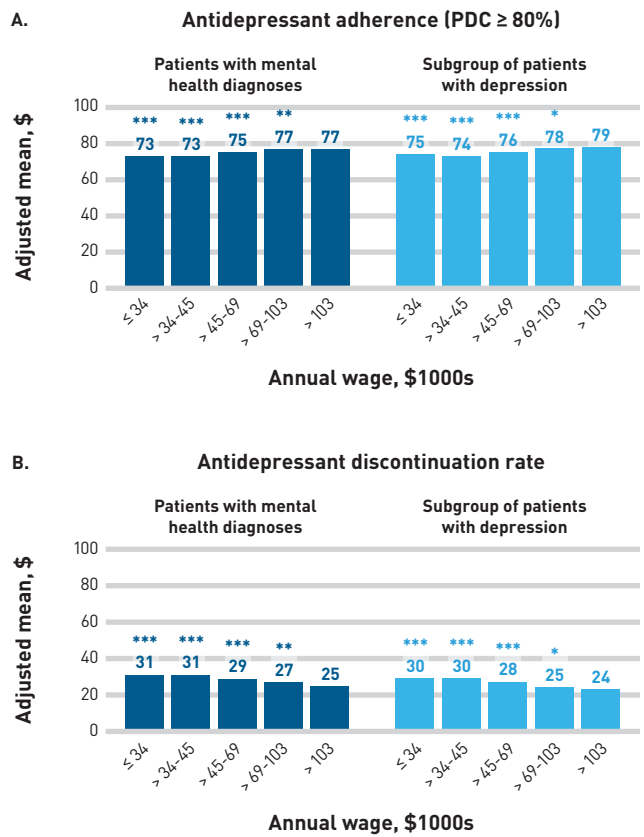
Among those with mental health diagnoses, the proportion of patients adherent (based on PDC \geq 80%) to antidepressant therapy was lower (Figure 3 [A]) and the 90-day discontinuation rate was higher (Figure 3 [B]) in the 2 lower-wage quartiles (eAppendix Table 5).

FIGURE 2. Adjusted Mean Cost of (A) All-Cause and (B) Mental Health-Specific Care by Mental Health Disorder and Wage Category^a



^a*P* < .05 vs annual wages more than \$103,000; ^{**}*P* < .01; ^{***}*P* < .0001.
^aCosts are based on allowed amount per patient.

FIGURE 3. Adjusted Mean Proportion of Patients (A) Adhering to and (B) Discontinuing From Antidepressant Therapy by Wage Category^a



^a*P* < .05 vs annual wages more than \$103,000; ^{**}*P* < .01; ^{***}*P* < .0001.
PDC, proportion of days covered.
^aAdherence is based on proportion of patients with PDC at least 80%. Discontinuation rate is based on proportion of patients discontinuing therapy, where discontinuation is defined as a gap of at least 90 days in medication.

Use of Out-of-Network Mental Health Services

Use of out-of-network mental health services was highest in the highest-wage category and lowest in the middle-wage categories (\$34,000-\$69,000) (eAppendix Table 6).

DISCUSSION

Prevalence and Severity of Mental Health Disorders

In this study of more than 2 million employees with employer-sponsored health insurance and meeting Medical Episode Grouper criteria for diagnosis, 10.7% of participants were found to have mental health conditions in 2017, including 5.2% of the study population with depression. Following adjustment for demographic and other variables, the proportion of patients with mental health disorders as a percentage of the total population ranged from 9% to 11% across wage categories. For depression, these proportions were 4.2% to 5.1%. Mean severity of depression episodes ranged from

1.46 to 1.63 across wage categories, with higher severity observed in lower-wage groups.

In comparison with available prevalence data in the general population,¹ prevalence of diagnosed mental health disorders based on insurance claims in this study was substantially lower than expected. Individuals may use employee assistance programs (EAPs), pay cash for services, or use other sources of support not captured in claims data. Individuals may also experience cost or access barriers,^{4,6,13} preventing use of services that would be documented in claims data. Stigma^{14,21} (public or personal) concerns also prompt individuals to avoid seeking care. In addition, this analysis was based on diagnosis of mental health disorders in the context of episodes of care, which may underestimate prevalence. Use of the Medical Episode Grouper may effectively reduce the overall prevalence rates because of its more restrictive methodology.

In this analysis, the highest prevalence of diagnosed mental health disorders was observed in the middle-wage categories, with the

lowest prevalence rates in the lowest- and highest-wage categories. In contrast, in a previous analysis, prevalence of depression was greatest at the lowest income level and declined at each higher income level, although this association was not significant among older adults (≥ 55 years).⁸ We also found that patients with mental health diagnoses in the lower-wage categories had more severe mental health episodes and more hospital admissions, and this was particularly true for patients with depression.

The lower apparent prevalence observed in our data for the lowest-wage category may be due to individuals with milder cases not seeking care. This is also apparent by an increased severity of the disease among lower-wage individuals, raising the possibility that care is being sought by patients with the most severe manifestations of depression. In our study population, insurance deductible as a percentage of wage was much higher in the lowest-wage category (12%) than in higher-wage categories (1%-3%), highlighting the cost pressure against seeking medical care among lower-wage earners. In our sample, patients with mental health diagnoses in the highest-wage category were much more likely to use out-of-network providers, presumably reflecting their willingness and ability to seek and pay for these services. Interestingly, there was also an apparent higher rate of out-of-network use in the lowest-wage category than in the middle-wage categories, which may reflect the greater disease severity and need for prompt treatment observed in this group or exposure to out-of-network providers during in-network hospital admissions.^{22,23}

Health Care Costs and Utilization

In this study, costs of care were higher for patients with mental health diagnoses than for the total population, consistent with earlier studies.⁴ All-cause and mental health–specific health care costs were higher for participants in the lowest-wage quartile compared with the highest-wage quartile. Among patients with mental health diagnoses, rates of hospital admissions and ED visits were also higher in the lower-wage categories. After adjustment for demographic variables, the rate of mental health–specific hospital admissions in the lowest-wage category was twice as high as in the highest-wage category, and this discrepancy was even greater among patients with depression. Further, the proportion of mental health–related hospital admissions was greater among lower-income than higher-income workers. These findings suggest that management of mental health conditions in this lower-income population may be suboptimal. It is possible that lower-wage workers delay seeking care until their symptoms are severe enough to warrant inpatient care; however, the relative similarity of outpatient services utilization observed across wage categories suggests that access differences may not have been significant.

These utilization findings are consistent with an earlier study by Sherman and colleagues, which found higher rates of hospital admissions and ED visits among lower-wage earners.¹⁵ These researchers speculated that low-wage-earning adults may exhibit a more reactive approach to health care, either by necessity or choice.¹⁵ Furthermore, low-wage-earning adults may also face difficulties in

taking time off to schedule appointments because of workplace conditions less conducive to employees having daytime personal appointments, uncertain work schedules, and unavailability of appointments outside regular business hours.²⁴ The tendency of the lower-wage earners to obtain care in high-intensity settings appears to drive the overall higher cost of care.

There is a need to systematically evaluate employee benefit design considerations and communication approaches to improve mental health service use and effectiveness. Sensitivity to patient privacy has limited the analysis of mental health claims and EAP data to more fully characterize this issue. Even as mental health benefits are offered, utilization of these benefits is not systematically tracked for impact. There is a need to capture clinical outcomes to assess treatment effectiveness; however, data from insurance claims alone are insufficient. Also, self-reported disease may be much more prevalent than claims data indicate,²⁵ as our unexpectedly low prevalence numbers appear to demonstrate.^{10,11}

Policy Implications

Employers' awareness of the significance of mental health concerns appears to underestimate the importance of the problem.^{4,6,13} Despite implementation of the 2008 Mental Health Parity and Addiction Equity Act, our data indicate that disparities in access to and use of mental health services remain, particularly for lower-income individuals.

Further, our analysis again demonstrates that health care costs for patients with mental health disorders are higher than those in the overall population. Therefore, employers have strong incentives to ensure that all employees, including those with mental health issues, have equitable access to health care. Greater remuneration for mental health care providers can increase the number of in-network providers. Integration of mental health services with primary care is another option to increase access to and utilization of mental health services.²⁶ Technology-based care delivery methods²⁷ and innovative content should also be explored.

Study Limitations and Strengths

This study has several limitations. The analysis was limited to employees with wage information who were continuously enrolled in self-insured plans in the IBM Watson Health MarketScan Research Database during 2017, which does not constitute a population-based sample and does not include lower-wage-earning workers who rely on public health insurance. Because the analysis was based on insurance claims, employees with mental health symptoms who did not seek care or receive a formal diagnosis were not identified. Our data also do not include employees paying out of pocket for mental health services outside the delivery system. Patients with mental health conditions were identified using the Medical Episode Grouper,¹⁶ which may undercount the number of patients relative to use of the corresponding ICD-10 codes as inclusion criteria. EAP data were not included in this analysis, making it difficult to know the extent to which individuals with mental health concerns received care via this benefit offering.

Use of claims data–based analysis also precludes our understanding of specific barriers to using mental health services. Consequently, we are unable to determine the relative importance of access, cost, stigma, cultural beliefs, or other factors in the observed mental health services utilization patterns. Our analysis did not incorporate other social determinants of health data beyond wage status that could further inform data interpretation and recommendations. Our analysis was also unable to identify employees who had poor access to mental health services. Additionally, we cannot determine whether low wages caused the observed patterns of mental health disorders and health care utilization, or whether lack of mental health care and resulting exacerbation of mental health disorders may have resulted in lower earning potential.

We did not include health savings account or health care reimbursement arrangement balances in our analysis, which may have influenced individuals' willingness to use mental health services. Because of our large sample size, differences between groups sometimes achieved statistical significance even when they were numerically small.

Strengths of the study design include the large size and national distribution of the population included in the analysis, increasing the likelihood that these results are generalizable to other commercially insured populations.

CONCLUSIONS

Based on our findings, lower-wage-earning workers have a greater severity of mental health disorders and more frequent ED visits and rates of hospitalization. Medication adherence and discontinuation data are also consistent with suboptimal management. Increased and more proactive use of ambulatory mental health services may help to lessen the need for high-intensity services.

Many factors likely contribute to the observed findings, including out-of-pocket cost considerations and barriers to care; additional research can help to better characterize these concerns. Our findings have particular relevance in relation to the COVID-19 pandemic, which has led to an increase in mental health disorders.^{10,11} Employers should critically review the design of their company's mental health benefits to ensure that affordable and accessible treatment is available for all enrollees. ■

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Authorship Information: Concept and design (BWS, DFL, MK, SP, MT); acquisition of data (BWS); analysis and interpretation of data (BWS, DFL, MK, LC, SP, MT);

drafting of the manuscript (BWS, LC, MT); critical revision of the manuscript for important intellectual content (BWS, DFL, MK, LC, SP, MT); statistical analysis (BWS, SP, MT); obtaining funding (BWS, MT); administrative, technical, or logistic support (BWS, MK); and supervision (BWS, DFL).

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1 **Online-Only Supplemental Appendix**

2 Sherman B, et al. Mental Health Diagnoses and Services Utilization Vary by Wage Level
3 *The American Journal of Managed Care*

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17 **eAppendix Table 5. Adherence to and Discontinuation From Antidepressant Therapy by**

18 **Mental Health Disorder and Wage Category**..... 31

19 **eAppendix Table 6. Mental Health Allowed Out-of-Network Costs by Wage Category (%)**

20 32

21

22

23 **eAppendix Methods**

24 **Data Source**

25 The analysis included active employees continuously enrolled in self-insured plans in the IBM
26 Watson Health MarketScan® Research Database. January 1, 2017, was defined as the index date
27 for all patients. The dataset includes demographic information (age, sex, geographic location,
28 wages), health plan enrollment details, and medical and pharmacy claims details. The database
29 also includes information on enrollment, outpatient and inpatient services, hospital admissions,
30 and prescription drug usage.

31
32 **Episode Grouper**

33 Principal diagnosis was determined based on claims data and Medical Episode Grouper Inclusion
34 Logic, which employs specialized processing rules to help ensure that unique episodes of care
35 are appropriately categorized. Episodes were constructed by identifying claims for a patient that
36 met criteria for a particular condition, then organizing these claims into periods of treatment, or
37 episodes.¹ Episode groupers systematically assign each of a patient’s medical claims to a
38 particular episode, further defining healthcare services to multiple distinct healthcare episodes.
39 Episode-based cost-of-illness analysis considers all the treatments and conditions a patient
40 experiences during a particular period of time.² In this study, individuals may have had more
41 than one diagnosis contributing to different episodes of care; related claims for each diagnosis
42 were then included in the respective diagnostic categories within the analysis.

43
44 **Explanatory and Outcome Variables**

45 Definitions of explanatory variables and outcome variables are shown below:

46
47 **Explanatory Variables**

Variable	Definition
Age and sex dummy variables	Employee age measured mid-year <ul style="list-style-type: none">• Female, 18–30 years• Female, 31–40 years• Female, 41–50 years• Female, 51–64 years• Male, 18–30 years• Male, 31–40 years• Male, 41–50 years• Male, 51–64 years (reference)
Geographic region	US census region of the ZIP code of employee residence <ul style="list-style-type: none">• Northeast (reference)• North Central• South• West
Charlson Comorbidity Index (CCI)	CCI values from 0–11 (within the sample) ³

Salaried indicator	Employee is compensated on a salaried basis <ul style="list-style-type: none"> • 1 = salaried • 0 = hourly
Insurance plan type ^a	Type of health benefits plan: <ul style="list-style-type: none"> • Health maintenance organization • Preferred provider organization • Consumer-directed health plan • Other • Missing
Wage categories	Based on annualized employee wages at the mean monthly wage rate <ul style="list-style-type: none"> • ≤\$34,000 • >\$34,000–\$45,000 • >\$45,000–\$69,000 • >\$69,000–\$103,000 • ≥\$103,001 (reference)
Median household income	Groupings of median household income from the American Community Survey based on median income in the ZIP code of residence <ul style="list-style-type: none"> • ≤\$62,000 • \$62,001–\$82,000 • \$82,001–\$105,000 • >\$105,000
Coverage tier	Contract coverage tier selected by the employee <ul style="list-style-type: none"> • Employee only (reference) • Employee + spouse • Employee + child • Employee + children • Family (employee + 2 or more)
Deductible as a percentage of wages	Annual deductible amount as a percentage of annual wages

^aThe plan type was determined at the beginning of the year using the initial plan type value.

48
49
50
51

Outcome Variables

Variable	Definition
Medical claims	≥1 inpatient or outpatient medical claim
Prescription drug claims	≥1 filled outpatient prescription drug claim
Admissions	An inpatient confinement with ≥1 overnight stay. Admissions were analyzed as number per 1000 patients
Total allowed amount per patient	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as

	coordination of benefits) for employees with nonzero (>\$0) allowed amount
Inpatient care spending	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as coordination of benefits) for inpatient admissions including emergency department visits resulting in an inpatient admission for all employees with nonzero (>\$0) allowed amount
Outpatient care spending	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as coordination of benefits) for outpatient service excluding emergency department visits resulting in an inpatient admission for all employees with nonzero (>\$0) allowed amount
Prescription drug spending	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as coordination of benefits) for prescription drug claims for all employees with nonzero (>\$0) allowed amount
Inpatient admissions length of stay	The mean number of days associated with an inpatient admission
Emergency department visits	Emergency department visits including those with and without an inpatient admission. Emergency department visits were analyzed as number per 1000 patients
Outpatient services	The mean service count (number of clinician visits) per patient for medical visits incurred in the outpatient setting. Outpatient visits do not include an overnight stay at a healthcare facility
Supply of prescription drug	Sum of the number of days supplied from outpatient pharmacy claims
Patients % of total population	Percentage of the total MarketScan population meeting IBM Watson Health's Medical Episode Grouper criteria limited to employers with wage data
Patients with an outpatient visit to a mental health provider	Employees with a visit defined by a procedure code (see current procedural terminology [CPT] codes below) for a mental health encounter
Mean number of visits to a mental health provider per patient	The mean number of outpatient visits to a mental health provider defined by procedure codes (see CPT codes below)
Mental health allowed amount per patient	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as coordination of benefits) limited to medical claims and prescription drug claims related to a mental health condition for employees with nonzero (>\$0) allowed amount
Mental health inpatient allowed amount per patient	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as coordination of benefits) limited to inpatient medical claims

	for a mental health condition for employees with nonzero (>\$0) allowed amount
Mental health outpatient allowed amount per patient	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as coordination of benefits) limited to outpatient medical claims for a mental health condition for employees with nonzero (>\$0) allowed amount
Mental health prescription drug allowed amount per patient	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as coordination of benefits) limited to pharmacy claims for a mental health condition for employees with nonzero (>\$0) allowed amount. For the list of included therapeutics, see Mental-Health Therapeutic Classes and Generic Drug Names below
Total net payment per patient	Health plan payments to all providers of care from all sources excluding employee out-of-pocket and third-party amounts for employees with nonzero (>\$0) net payment
Mental health net payment per patient	Health plan payments to all providers of care from all sources for a mental health condition excluding employee out-of-pocket and third-party amounts for employees with nonzero (>\$0) net payment
Inpatient care spending per patient	Inpatient allowed amount for employees with nonzero (>\$0) allowed amount
Outpatient care spending per patient	Outpatient allowed amount for employees with nonzero (>\$0) allowed amount
Prescription drug allowed amount	Amount paid to all providers of care from all sources (health plan, employee out-of-pocket, third parties, such as coordination of benefits) for outpatient prescription drugs
Prescription drug allowed amount per patient	Prescription drug allowed amount for employees with nonzero (>\$0) allowed amount
Prescription days' supply	The mean days' supply per patient across all prescription drug types
Proportion of days covered (PDC)	The number of days with availability of antidepressant medication based on fill dates and days' supply. The PDC threshold is the level above which the medication has a reasonable likelihood of achieving the most clinical benefit. ⁴ Adjustments were made for stockpiling, and outcome was reported on a "percentage of days" basis. Total days were the first fill date until the end of the study period. PDC was reported for the following drug classes: antidepressants, antipsychotics, anxiolytics, substance use disorder medications, stimulants, other mental health medications. For the list of included therapeutics, see Mental-Health Therapeutic Classes and Generic Drug Names below

Discontinuation rate	The number of patients with evidence of stopping medication for ≥ 90 days during the time frame, out of all patients taking that respective medication. This was calculated for antidepressants, antipsychotics, anxiolytics, substance use disorder medications, stimulants, and all other mental health medications. For the list of included therapeutics, see Mental-Health Therapeutic Classes and Generic Drug Names below																				
Disease severity	<p>Disease severity staging is the condition classification system that forms the basis of the proprietary Medical Episode Grouper (IBM Watson), which classifies conditions with a series of severity levels based on the pathophysiologic manifestations of the disease. Severity ranges from 1.0 to 4.0, with higher numbers indicating greater condition severity. The severity codes are based on ICD-10 condition-specific complication codes and have been derived by clinician experts for more than 500 specific diagnoses, including mental health. Depression severity codes^a are included below, with the first digit representing the measure of severity—the greater the number, the more severe the condition.</p> <table border="1" data-bbox="623 888 1105 1749"> <tr> <td data-bbox="623 888 789 1035">1.01</td> <td data-bbox="789 888 1105 1035">Adjustment disorder with depressed mood (lost interest in usual activities)</td> </tr> <tr> <td data-bbox="623 1035 789 1182">1.02</td> <td data-bbox="789 1035 1105 1182">Depression with loss of interest or pleasure in usual activities</td> </tr> <tr> <td data-bbox="623 1182 789 1255">1.03</td> <td data-bbox="789 1182 1105 1255">Depression with substance abuse</td> </tr> <tr> <td data-bbox="623 1255 789 1297">2.01</td> <td data-bbox="789 1255 1105 1297">Major depression</td> </tr> <tr> <td data-bbox="623 1297 789 1371">2.02</td> <td data-bbox="789 1297 1105 1371">Depression with psychotic features</td> </tr> <tr> <td data-bbox="623 1371 789 1444">3.01</td> <td data-bbox="789 1371 1105 1444">Depression with suicide attempt</td> </tr> <tr> <td data-bbox="623 1444 789 1518">3.02</td> <td data-bbox="789 1444 1105 1518">Depression with respiratory failure</td> </tr> <tr> <td data-bbox="623 1518 789 1591">3.03</td> <td data-bbox="789 1518 1105 1591">Depression with intracranial injury</td> </tr> <tr> <td data-bbox="623 1591 789 1665">3.04</td> <td data-bbox="789 1591 1105 1665">Depression with coma</td> </tr> <tr> <td data-bbox="623 1665 789 1749">3.05</td> <td data-bbox="789 1665 1105 1749">Depression with shock</td> </tr> </table>	1.01	Adjustment disorder with depressed mood (lost interest in usual activities)	1.02	Depression with loss of interest or pleasure in usual activities	1.03	Depression with substance abuse	2.01	Major depression	2.02	Depression with psychotic features	3.01	Depression with suicide attempt	3.02	Depression with respiratory failure	3.03	Depression with intracranial injury	3.04	Depression with coma	3.05	Depression with shock
1.01	Adjustment disorder with depressed mood (lost interest in usual activities)																				
1.02	Depression with loss of interest or pleasure in usual activities																				
1.03	Depression with substance abuse																				
2.01	Major depression																				
2.02	Depression with psychotic features																				
3.01	Depression with suicide attempt																				
3.02	Depression with respiratory failure																				
3.03	Depression with intracranial injury																				
3.04	Depression with coma																				
3.05	Depression with shock																				
Out-of-network services	Proportion of healthcare costs paid at a rate not contracted by the health plan at the plan-discounted rate																				

^aSource: Methodology published by IBM Corporation, Watson Health, Medical Episode Grouper, Cambridge, MA, USA.

54

CPT Codes for Psychotherapy Visits

CPT code		
90804	90847	90865
90806	90849	90867
90814	90853	90868
90815	0364T	90869
90832	0365T	90870
90833	0366T	90875
90834	0367T	90876
90836	0368T	90880
90837	0369T	96152
90838	0370T	96153
90839	0371T	96154
90840	0372T	96155
90845	90785	
90846	90863	

55

56 CPT, current procedural terminology.

57

58 Mental Health Conditions

59 Patients with mental health conditions were identified based on IBM Watson Health’s Medical
60 Episode Grouper, which links inpatient, outpatient, and drug experiences into clinically relevant
61 episodes of care. Episodes are opened by a physician visit or hospital admission for a given
62 condition. The methodology employs a clean period to close an episode. A clean period is the
63 specific period of time an episode remains open in the absence of a new claim. If the patient does
64 not have a medical claim for the given condition during this time, the episode ends. The
65 following ICD-10 codes were used for diagnoses in this analysis:

66

- 67 • F10-F19 Mental and behavioral disorders due to psychoactive substance use
- 68 • F20-F29 Schizophrenia, schizotypal, delusional, and other non-mood psychotic
69 disorders
- 70 • F30-F39 Mood [affective] disorders
- 71 • F40-F48 Anxiety, dissociative, stress-related, somatoform, and other nonpsychotic
72 mental disorders
- 73 • F50-F59 Behavioral syndromes associated with physiological disturbances and
74 physical factors
- 75 • F60-F69 Disorders of adult personality and behavior
- 76 • F90-F98 Behavioral and emotional disorders with onset usually occurring in
77 childhood and adolescence
- 78 • F99 Unspecified mental disorder

79

80 Mental health diagnoses were as follows:

- 81 • Antisocial personality disorder
- 82 • Generalized anxiety disorder
- 83 • Autism
- 84 • Bipolar disorder, major depressive episode
- 85 • Bipolar disorder, manic episode
- 86 • Depression
- 87 • Eating disorders, anorexia nervosa
- 88 • Eating disorders, bulimia nervosa
- 89 • Obsessive-compulsive disorder
- 90 • Other mental health disorders
- 91 • Schizophrenia
- 92 • Drug abuse, dependence, intoxication: alcohol
- 93 • Drug abuse, dependence, overdose: amphetamine
- 94 • Drug abuse, dependence, overdose: barbiturate
- 95 • Drug abuse, dependence, overdose: cannabis
- 96 • Drug abuse, dependence, overdose: cocaine
- 97 • Drug abuse, dependence, overdose: hallucinogen
- 98 • Drug abuse, dependence, overdose: opioid
- 99 • Drug abuse, dependence, overdose: other
- 100 • Other psychoses

101

102 **Mental-Health Therapeutic Classes**

103 Classes of mental health–specific medications included:

- 104 • Psychotherapeutics
- 105 • Antidepressants
- 106 • Psychotherapeutic tranquilizers and antipsychotics
- 107 • Amphetamine-type stimulants
- 108 • Nonamphetamine-type stimulants
- 109 • Barbiturates
- 110 • Benzodiazepines
- 111 • Anxiolytic/sedative/hypnotic, not elsewhere classifiable (NEC)
- 112 • Antimanic agents, NEC
- 113 • Substance use drugs defined as therapeutic detail class of methadone, buprenorphine,
- 114 naltrexone, acamprosate, disulfiram, or topiramate

115

116

117 **Mental-Health Therapeutics: Generic Drug Names**

Category

Psychotherapeutic,
Antidepressant

Generic name

Amantadine HCl
Amitriptyline HCl
Amitriptyline HCl; Cream, Multi-ingredient
Amitriptyline HCl; Medical Food
Amitriptyline HCl/Chlordiazepoxide
Amitriptyline HCl/Perphenazine
Amoxapine
Bupropion HCl
Bupropion hydrobromide
Bupropion HCl; Medical Food
Chlorprothixene
Citalopram hydrobromide
Clomipramine HCl
Desipramine HCl
Desvenlafaxine
Desvenlafaxine succinate
Doxepin HCl
Duloxetine HCl
Duloxetine HCl; Lidocaine/Menthol
Escitalopram oxalate
Fluoxetine HCl
Fluoxetine HCl; Medical Food
Fluvoxamine maleate
Imipramine HCl
Imipramine pamoate
Isocarboxazid
Levomilnacipran HCl
Maprotiline HCl
Mirtazapine
Nefazodone HCl
Nortriptyline HCl
Paroxetine HCl
Paroxetine mesylate
Phenelzine sulfate
Protriptyline HCl
Selegiline
Selegiline HCl
Sertraline HCl
Tranlycypromine sulfate
Trazodone HCl
Trazodone HCl; Medical Food
Trimipramine maleate
Venlafaxine HCl

Vilazodone HCl
Vortioxetine hydrobromide

Psychotherapeutic,
Tranquilizer/Antipsychotic

Acetophenazine maleate
Aripiprazole
Aripiprazole lauroxil
Asenapine
Brexipiprazole
Cariprazine
Chlorpromazine
Chlorpromazine HCl
Chlorprothixene
Clozapine
Droperidol
Fluphenazine decanoate
Fluphenazine enanthate
Fluphenazine HCl
Haloperidol
Haloperidol decanoate
Haloperidol lactate
Iloperidone
Loxapine
Loxapine HCl
Loxapine succinate
Lurasidone HCl
Mesoridazine besylate
Molindone HCl
Olanzapine
Olanzapine pamoate
Paliperidone
Paliperidone palmitate
Pentaerythritol/Phenobarbital
Perphenazine
Pimavanserin
Pimozide
Piperacetazine
Prochlorperazine
Prochlorperazine edisylate
Prochlorperazine maleate
Promazine HCl
Quetiapine fumarate
Risperidone
Thioridazine
Thioridazine HCl
Thiothixene
Thiothixene HCl
Trifluoperazine HCl

	Triflupromazine HCl
	Ziprasidone HCl
	Ziprasidone mesylate
Stimulant, Amphetamine Type	Amphetamine
	Amphetamine Resin Complex/Dextroamphetamine Resin
	Amphetamine Salt Combination
	Amphetamine sulfate
	Amphetamine/Dextroamphetamine
	Armodafinil
	Benzphetamine HCl
	Dexfenfluramine HCl
	Dexmethylphenidate HCl
	Dextroamphetamine sulfate
	Diethylpropion HCl
	Fenfluramine HCl
	Levmetamfetamine
	Lisdexamfetamine dimesylate
	Mazindol
	Methamphetamine HCl
	Methylphenidate
	Methylphenidate HCl
	Modafinil
	Phendimetrazine tartrate
	Phenmetrazine HCl
	Phentermine HCl
	Phentermine HCl/Topiramate
	Phentermine Resin
Stimulant, Nonamphetamine	Ammonia
	Ammonia/Ethanol
	Caffeine
	Caffeine citrate
	Caffeine/Citric acid
	Caffeine/Potassium salicylate/Salicylamide
	Caffeine/Sodium benzoate
	Cola
	Cola Extract
	Doxapram HCl
	Nikethamide
	Pemoline
ASH, Barbiturate	Amobarbital
	Amobarbital sodium
	Amobarbital sodium/Secobarbital sodium
	Aprobarbital
	Barbital/Hyoscyamine/Passiflora/Valerian

Belladonna Alkaloids and Analgesics
Butabarbital/Phenobarbital/Secobarbital
Butabarbital sodium
Ethanol/Phenobarbital
Mephobarbital
Metharbital
Pentobarbital
Pentobarbital sodium
Phenobarbital
Phenobarbital sodium
Pyrilamine/Pentobarbital
Secobarbital sodium
Talbutal

ASH, Benzodiazepine

Alprazolam
Alprazolam; Medical Food
Chlordiazepoxide
Chlordiazepoxide HCl
Clorazepate dipotassium
Dextrose/Lorazepam
Dextrose/Midazolam HCl
Diazepam
Diazepam; Lubricant
Diazepam; Medical Food
Estazolam
Flurazepam HCl
Halazepam
Lorazepam
Lorazepam/Sodium chloride
Midazolam HCl
Midazolam HCl/Sodium chloride
Oxazepam
Prazepam
Quazepam
Temazepam
Triazolam

ASH, NEC

Acepromazine maleate
Acetylcarbromal
Acetylcarbromal/Acetaminophen
Aspirin/Meprobamate
Benactyzine/Meprobamate
Buspirone HCl
Chloral hydrate
Chlormezanone
Doxepin HCl
Eszopiclone

	Ethchlorvynol
	Ethinamate
	Glutethimide
	Hydroxyzine HCl
	Hydroxyzine pamoate
	Meprobamate
	Meprobamate/PETN
	Meprobamate-Ethoheptazine-ASA
	Meprobamate/Tridihexethyl
	Methyprylon
	Paraldehyde
	Propiomazine HCl
	Ramelteon
	Suvorexant
	Tasimelteon
	Three Bromides
	Zaleplon
	Zolpidem tartrate
	Zolpidem tartrate; Medical Food
Antimanic Agent, NEC	Carbamazepine
	Lithium
	Lithium carbonate
	Lithium citrate
	Lithium orotate
Analgesic/Antipyretic, Opiate Partial Agonist	Acetaminophen/Pentazocine HCl
	Aspirin/Pentazocine HCl
	Buprenorphine
	Buprenorphine HCl
	Buprenorphine/Naloxone
	Butorphanol tartrate
	Dezocine
	Nalbuphine HCl
	Nalbuphine HCl/Sodium chloride
	Naloxone HCl/Pentazocine HCl
	Pentazocine lactate

118

119 ASA, acetylsalicylic acid; ASH, anxiolytic/sedative/hypnotic; HCl; hydrochloride; NEC, not
120 elsewhere classifiable; PETN, pentaerythritol tetranitrate.

121

122 **Statistical Analysis**

123 Principal diagnosis was determined based on claims data and Medical Episode Grouper Inclusion

124 Logic, which employs specialized processing rules to identify and categorize unique episodes of

125 care by diagnosis.¹ Once an individual was diagnosed with a relevant condition meeting Medical

126 Episode Grouper Inclusion Logic, related claims for that diagnosis (including mental health–

127 specific medications) for the entire year were then included in the analysis. In this study,

128 individuals may have had more than one diagnosis contributing to different episodes of care,
129 each of which was then included in the analysis.

130
131 Descriptive analyses were performed on demographic and clinical characteristics. Frequencies
132 and percentages are reported for categorical variables and mean and SD for continuous variables.
133 Regression models were used to examine the adjusted relationship between key outcomes and
134 wage categories, controlling for demographic and clinical variables. Control variables included
135 age group and sex combination, region, CCI, salaried indicator, median household income group,
136 insurance plan type, coverage tier, and deductible as a percentage of wage groups. Outcome
137 measures in each wage category were compared with outcomes in the highest wage category
138 (>\$103,000). We estimated models of the form

$$y = f(\alpha_0 + \alpha_{1j}wage_j + X\beta + \varepsilon)$$

141 Where:

- 142 • y is an outcome;
- 143 • $wage_j$ are indicator variables for wage categories; and
- 144 • $X\beta$ are characteristics including age/sex categories, salaried status, union indicator,
145 coverage tier, comorbidities, geographic region, number of psychiatric conditions,
146 deductible spend as percentage of wage.

147
148 Different types of regression analyses were performed based on the nature of the outcome
149 variables. Cost and utilization outcomes were modeled using Poisson distribution and log link;
150 binary outcomes (patient counts, service indicators, and discontinuation rates) were modeled
151 using binomial distribution and log link; and proportion of days covered (PDC) metrics were
152 modeled using a normal distribution. Adjusted means were based on estimates using average
153 covariate values for the total population. Regression results are reported in natural units and
154 include the corresponding confidence intervals.

155
156 The assumptions we made when using a linear model for zero-bounded continuous outcomes
157 were:

- 158 • For continuous regressors: over the range of the observed data, an increase in X is
159 associated with an approximately constant increase in Y , irrespective of the baseline Y
160 and X values of the observations, and
- 161 • For categorical regressors: over the range of the observed data, the differences in Y with
162 which contrasting levels of the categorical variable G are associated is (approximately)
163 constant, irrespective of the baseline Y and G (and X) values of the observations.

164
165 **Post-estimation:** For the adjusted value estimates, we used the overall mean covariate values to
166 generate the y -hat for every wage group; therefore, the differences in y -hats tested are due to
167 variation in the wage group indicators, and not the covariate values. The confidence intervals for
168 the regression-adjusted means were computed using SAS's default approach to estimating
169 confidence intervals, as described here (for example):

170 [https://support.sas.com/documentation/cdl/en/statug/63962/HTML/default/viewer.htm#statug_ge
nmod_sect045.htm](https://support.sas.com/documentation/cdl/en/statug/63962/HTML/default/viewer.htm#statug_ge
171 nmod_sect045.htm). In the linear case, this approach estimates the average partial effect and

172 partial effect at the average (PEA), and in the nonlinear/logistic case, this approach estimates the
173 PEA.

174

175 **Correction for Multiple Comparisons:** In the descriptive and multivariate analyses, we
176 compared each of the 4 lower wage categories to the >\$130K wage category. Comparisons
177 within a level were based on $\alpha = 0.0125$ (the Bonferroni correction for multiple comparisons, a
178 conservative approach).

179

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eAppendix Table 1. Participant Demographics by Mental Health Disorder and Wage Category

	Total population						Patients with mental health diagnoses					
Wage category (\$1000s, annually)	≤34	>34–45	>45–69	>69–103	>103	Total	≤34	>34–45	>45–69	>69–103	>103	Total
N	267,662	279,184	623,765	608,533	607,700	2,386,844	26,154	32,101	74,757	66,488	55,351	254,851
Proportion of participants, %	11.2	11.7	26.1	25.5	25.5	100	10.3	12.6	29.3	26.1	21.7	100
Age, years, mean (SD)	41.6 (12.4)	41.5 (11.9)	43.0 (11.7)	45.1 (11)	48.0 (9.2)	44.5 (11.3)	39.7 (11.9)	39.4 (11.2)	41.2 (11.1)	43.7 (10.5)	46.7 (9.1)	42.7 (10.9)
Sex, %												
Female	58	51	47	38	31	42	69	64	59	50	43	55
Male	42	49	53	62	69	58	31	36	41	50	57	45
Region, %												
Northeast	9	12	15	21	27	18	10	11	16	26	32	21
North Central	32	33	30	23	19	26	36	38	34	23	18	29
South	45	43	42	36	30	38	42	39	37	31	27	34
West	14	12	13	19	25	18	13	11	12	19	24	16
Charlson Comorbidity Index, mean (SD)	0.49 (0.92)	0.47 (0.92)	0.45 (0.91)	0.42 (0.90)	0.37 (0.86)	0.43 (0.90)	0.40 (1.06)	0.36 (0.98)	0.36 (0.99)	0.36 (1.00)	0.34 (0.99)	0.36 (1.00)
Salaried, %	16	17	31	50	77	44	19	18	33	51	75	44
Annualized wage, \$, mean (SD)	24,606 (8342)	39,801 (3150)	56,434 (6889)	84,060 (9392)	166,868 (209,088)	86,079 (117,223)	24,781 (8577)	39,866 (3117)	56,396 (6923)	83,765 (9358)	164,284 (149,353)	81,642 (84,341)

Median annual household income, \$1000s, ^a %												
≤62	62	63	57	43	30	48	61	61	53	39	29	46
>62–82	27	29	33	38	38	34	29	32	36	41	39	37
>82–105	8	7	9	16	25	14	8	6	9	16	24	13
>105	2	1	2	3	7	4	2	1	2	4	8	4
Insurance plan type, %												
CDHP	30	31	24	26	34	29	26	24	19	22	31	24
HMO	14	10	10	9	6	9	16	11	12	11	7	11
PPO	47	45	48	52	52	49	50	47	48	52	53	50
Other	9	14	18	13	7	12	8	17	20	14	10	15
Missing	1	1	1	0	0	1	1	1	0	0	0	0
Coverage tier, %												
Employee only	61	50	42	36	24	39	61	52	44	39	29	42
Employee + spouse	9	11	12	14	14	12	8	9	10	10	11	10
Employee + child	5	5	4	3	3	3	5	5	4	4	4	4
Employee + children	8	9	7	7	7	7	8	9	7	8	9	8
Family	13	20	27	36	47	32	12	21	27	34	43	30
Missing	5	5	10	5	5	6	5	4	9	4	4	6

Individual deductible, \$, mean (SD)	1336 (962)	1369 (1080)	1262 (1115)	1376 (1219)	1528 (1243)	1384 (1160)	1235 (880)	1199 (1017)	1103 (1032)	1230 (1144)	1338 (1175)	1218 (1082)
Deductible as a % of wage, mean (SD)	0.12 (0.50)	0.03 (0.03)	0.02 (0.02)	0.02 (0.01)	0.01 (0.01)	0.03 (0.18)	0.10 (0.42)	0.03 (0.03)	0.02 (0.02)	0.01 (0.01)	0.01 (0.01)	0.03 (0.15)

eTable 1, Continued

	Subgroup of patients with depression					
Wage category (\$1000s, annually)	≤34	>34–45	>45–69	>69–103	>103	Total
N	11,799	14,876	36,391	33,121	29,060	125,247
Proportion of participants, %	9.4	11.9	29.1	26.4	23.2	100
Age, years, mean (SD)	40.2 (11.9)	40.1 (11.3)	42.0 (10.9)	44.6 (10.2)	47.3 (8.9)	43.5 (10.8)
Sex, %						
Female	72	70	65	56	47	59
Male	28	30	35	44	53	41
Region, %						
Northeast	10	11	17	27	32	21
North Central	38	40	36	25	18	30
South	39	38	35	28	24	31
West	14	11	12	21	25	18

Charlson Comorbidity Index, mean (SD)	0.42 (1.12)	0.39 (1.03)	0.39 (1.01)	0.38 (1.04)	0.36 (1.02)	0.38 (1.03)
Salaried, %	22	19	33	51	76	45
Annualized wage, \$, mean (SD)	24,483 (8850)	39,913 (3097)	56,638 (6965)	83,816 (9405)	163,627 (142,442)	83,633 (83,706)
Median annual household income, \$1000s, ^a %						
≤62	59	60	51	37	27	44
>62–82	30	33	37	42	40	38
>82–105	9	6	9	17	24	14
>105	3	1	2	4	9	4
Insurance plan type, %						
CDHP	25	23	17	21	30	22
HMO	17	11	12	12	7	11
PPO	49	48	48	52	52	50
Other	8	17	22	16	11	16
Missing	1	1	0	0	0	0
Coverage tier, %						
Employee only	61	52	43	39	29	41
Employee + spouse	8	8	9	10	11	10

Employee + child	6	5	4	4	4	4
Employee + children	8	9	7	8	10	8
Family	13	21	28	35	42	31
Missing	5	4	9	4	4	6
Individual deductible, \$, mean (SD)	1203 (874)	1161 (1012)	1035 (994)	1164 (1101)	1296 (1166)	1167 (1062)
Deductible as a % of wage, mean (SD)	0.10 (0.39)	0.03 (0.03)	0.02 (0.02)	0.01 (0.01)	0.01 (0.01)	0.03 (0.13)

^aBased on 3-digit ZIP code.

Data shown are unadjusted.

CDHP, consumer-directed health plan; HMO, health maintenance organization; PPO, preferred provider organization.

eAppendix Table 2. Utilization of All-Cause and Mental Health Services by Mental Health Disorder and Wage Category

	Total population					Patients with mental health diagnoses				
Wage category (\$1000s, annually)	≤34	>34–45	>45–69	>69–103	>103	≤34	>34–45	>45–69	>69–103	>103
N	267,662	279,184	623,765	608,533	607,700	26,154	32,101	74,757	66,488	55,351
All-cause utilization										
Admissions per 1000, n										
Adjusted mean	42.5	40.6	38	36.7	30.8	110.8	105.7	92.1	82.6	69.5
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	<.0001	<.0001	–
Length of hospital stay, days										
Adjusted mean	3.42	3.49	3.43	3.32	3.13	4.28	4.54	4.46	4.32	4.07
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	.1099	.0001	.0001	.0078	–
Outpatient services, mean service count										
Adjusted mean	24.4	25.3	25.7	26.7	26.1	49.0	47.6	47.1	48.7	49.2
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	.5738	<.0001	<.0001	.0856	–
Emergency department visits per 1000, n										
Adjusted mean	671.8	559.4	465.2	416.1	365.5	1369.1	1073.3	879.6	797.7	702.1
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	<.0001	<.0001	–
Drug supply, days										

Adjusted mean	355	382	393	392	348	743	736	741	736	672
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	<.0001	<.0001	–
Mental health–specific utilization										
Admissions per 1000, n										
Adjusted mean	3.1	3.2	3	2.3	1.6	32.5	28.1	25	20.7	16.1
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	<.0001	<.0001	–
Proportion of all admissions that were mental health related, %										
Adjusted mean	7.4	7.8	7.8	6.4	5.2	29.4	26.6	27.2	25.0	23.2
Length of hospital stay, days										
Adjusted mean	7.67	8.00	8.07	8.25	7.74	7.67	8.01	8.07	8.25	7.75
<i>P</i> value	.8747	.5117	.3337	.1230	–	.8477	.5226	.3456	.1299	–
Outpatient services, mean service count										
Adjusted mean	0.86	0.96	0.99	0.98	0.88	9.59	9.28	9.27	9.58	9.92
<i>P</i> value	.0027	<.0001	<.0001	<.0001	–	.0039	<.0001	<.0001	<.0001	–
Emergency department visits per 1000, n										
Adjusted mean	10	8.8	7.2	5.9	5.5	100.3	78.2	60.8	53	57.1
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	.0016	.0002	–

Prescription drug supply, days										
Adjusted mean	53	58	62	61	50	274	268	274	275	247
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	<.0001	<.0001	–

eTable 2 Continued

	Subgroup of patients with depression				
Wage category (\$1000s, annually)	≤34	>34–45	>45–69	>69–103	>103
N	11,799	14,876	36,391	33,121	29,060
All-cause utilization					
Admissions per 1000, n					
Adjusted mean	120.8	113.6	101.3	88.1	72.5
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–
Length of hospital stay, days					
Adjusted mean	4.16	4.39	4.21	4.12	3.83
<i>P</i> value	.0500	.0003	.0027	.0152	–
Outpatient services, mean service count					
Adjusted mean	54.1	52.3	52.7	54.1	54.0
<i>P</i> value	.8855	.0014	.0027	.7607	–

Emergency department visits per 1000, n					
Adjusted mean	1293.8	1049.7	847	751	635.2
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–
Prescription drug supply, days					
Adjusted mean	776	762	776	757	689
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–
Mental health-specific utilization					
Admissions per 1000, n					
Adjusted mean	39	31.2	28.9	23.3	15.9
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–
Proportion of all admissions that were mental health related, %					
Adjusted mean	32.3	27.5	28.5	26.4	21.9
Length of hospital stay, days					
Adjusted mean	6.55	6.99	7.12	7.28	6.86
<i>P</i> value	.5373	.7965	.5346	.3026	–
Outpatient services, mean service count					
Adjusted mean	11.39	11.22	11.67	12.10	12.31
<i>P</i> value	<.0001	<.0001	<.0001	.0643	–

Emergency department visits per 1000, n					
Adjusted mean	70.2	67.3	46.4	36.2	39.8
<i>P</i> value	<.0001	<.0001	<.0001	.0014	–
Prescription drug supply, days					
Adjusted mean	293	282	287	284	249
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–

P values vs employees with annual wages >\$103,000. *P* values were not calculated for proportion of all admissions that were mental health related.

eAppendix Table 3. Adjusted Costs of All-Cause and Mental Health Care by Mental Health Disorder and Wage Category

Wage category (\$1000s, annually)	Total population					Patients with mental health diagnoses				
	<34	>34-45	>45-69	>69-103	>103	<34	>34-45	>45-69	>69-103	>103
N	267,662	279,184	623,765	608,533	607,700	26,154	32,101	74,757	66,488	55,351
All-cause costs										
Total, \$										
Adjusted mean (CI)	6851 (6805- 6898)	6735 (6693- 6778)	6614 (6588- 6642)	6653 (6626- 6679)	6365 (6335- 6395)	11,183 (10,989- 11,379)	10,879 (10,717- 11,044)	10,539 (10,437- 10,641)	10,578 (10,472- 10,685)	10,519 (10,388- 10,651)
Difference, %	8	6	4	5	-	6	3	0	1	-
P value	<.0001	<.0001	<.0001	<.0001	-	<.0001	.0015	.8193	.4582	-
Inpatient, \$										
Adjusted mean (CI)	1346 (1331- 1362)	1285 (1271- 1298)	1185 (1176- 1193)	1159 (1151- 1168)	1012 (1003- 1020)	2181 (2114- 2250)	2358 (2297- 2420)	2,060 (2,024- 2098)	1903 (1867- 1940)	1751 (1708- 1794)
Difference, %	33	27	17	15	-	25	35	18	9	-
P value	<.0001	<.0001	<.0001	<.0001	-	<.0001	<.0001	<.0001	<.0001	-
Outpatient, \$										
Adjusted mean (CI)	3882 (3856- 3908)	3794 (3771- 3818)	3,762 (3747- 3778)	3846 (3831- 3861)	3842 (3824- 3859)	6523 (6413- 6634)	6137 (6047- 6228)	6072 (6014- 6129)	6259 (6199- 6321)	6482 (6405- 6560)
Difference, %	1	-1	-2	0	-	1	-5	-6	-3	-
P value	.0194	.0029	<.0001	.7039	-	.5833	<.0001	<.0001	<.0001	-
Drugs, \$										
Adjusted mean (CI)	1516 (1501- 1530)	1567 (1554- 1581)	1591 (1583- 1600)	1569 (1561- 1578)	1450 (1441- 1459)	2,375 (2317- 2433)	2257 (2211- 2305)	2309 (2279- 2339)	2315 (2285- 2346)	2213 (2177- 2250)
Difference, %	5	8	10	8	-	7	2	4	5	-
P value	<.0001	<.0001	<.0001	<.0001	-	<.0001	.1742	.0001	<.0001	-
Net payment, \$										
Adjusted mean (CI)	5765 (5723- 5808)	5684 (5646- 5723)	5576 (5551- 5600)	5571 (5548- 5595)	5276 (5250- 5303)	9436 (9258- 9618)	9297 (9147- 9450)	8989 (8895- 9084)	8981 (8884- 9080)	8854 (8735- 8976)
Difference, %	9	8	6	6	-	7	5	2	1	-
P value	<.0001	<.0001	<.0001	<.0001	-	<.0001	<.0001	.0945	.0838	-
Mental health-specific costs										
Total, \$										

Adjusted mean (CI)	217 (214–219)	229 (227–231)	241 (240–243)	230 (228–231)	202 (200–204)	2018 (1974–2063)	1867 (1832–1902)	1879 (1857–1901)	1864 (1841–1887)	1872 (1844–1901)
Difference, %	7	13	20	14	–	8	0	0	0	–
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	.8230	.7211	.6274	–
Inpatient, \$										
Adjusted mean (CI)	30 (30–31)	30 (30–31)	34 (33–34)	30 (29–30)	23 (23–23)	312 (301–325)	274 (265–283)	290 (284–297)	262 (256–268)	230 (222–237)
Difference, %	33	32	47	29	–	36	19	26	14	–
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	<.0001	<.0001	–
Outpatient, \$										
Adjusted mean (CI)	103 (101–104)	110 (109–111)	113 (112–113)	108 (108–109)	103 (103–104)	1134 (1110–1159)	1063 (1043–1082)	1051 (1039–1063)	1061 (1049–1074)	1164 (1147–1181)
Difference, %	–1	6	9	5	–	–3	–9	–10	–9	–
<i>P</i> value	.4065	<.0001	<.0001	<.0001	–	.0753	<.0001	<.0001	<.0001	–
Drugs, \$										
Adjusted mean (CI)	75 (75–76)	80 (79–81)	85 (85–86)	82 (82–83)	67 (66–67)	507 (494–520)	476 (466–487)	474 (468–481)	480 (473–487)	419 (411–427)
Difference, %	13	20	28	23	–	21	14	13	15	–
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	<.0001	<.0001	–
Net payment, \$										
Adjusted mean (CI)	158 (156–160)	166 (165–168)	175 (174–176)	164 (163–165)	140 (139–141)	1526 (1489–1565)	1411 (1381–1441)	1420 (1401–1438)	1373 (1354–1392)	1340 (1317–1363)
Difference, %	13	19	25	17	–	14	5	6	2	–
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–	<.0001	.0005	<.0001	.0200	–

eAppendix Table 3 Continued

Wage category (\$1000s, annually) N	Subgroup of patients with depression				
	≤34 11,799	>34–45 14,876	>45–69 36,391	>69–103 33,121	>103 29,060
All-cause costs					
Total, \$					
Adjusted mean (CI)	12,206 (11,901–12,519)	11,733 (11,482–11,989)	11,497 (11,342–11,654)	11,269 (11,112–11,427)	11,272 (11,082–11,466)
Difference, %	8	4	2	0	–
<i>P</i> value	<.0001	.0075	.0864	.9759	–
Inpatient, \$					
Adjusted mean (CI)	2406 (2299–2518)	2599 (2503–2698)	2221 (2166–2279)	2016 (1963–2072)	1774 (1714–1835)
Difference, %	36	47	25	14	–
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–
Outpatient, \$					
Adjusted mean (CI)	7159 (6987–7335)	6609 (6472–6750)	6715 (6627–6803)	6775 (6685–6866)	7107 (6994–7221)
Difference, %	1	–7	–6	–5	–
<i>P</i> value	.6497	<.0001	<.0001	<.0001	–
Drugs, \$					
Adjusted mean (CI)	2498 (2409–2590)	2364 (2292–2438)	2445 (2399–2491)	2371 (2326–2417)	2320 (2267–2374)
Difference, %	8	2	5	2	–
<i>P</i> value	.0017	.3692	.0007	.1175	–
Net payment, \$					
Adjusted mean (CI)	10,363 (10,080–10,654)	10,129 (9896–10,368)	9883 (9739–10,030)	9604 (9459–9750)	9543 (9369–9721)
Difference, %	9	6	4	1	–
<i>P</i> value	<.0001	.0002	.0049	.5791	–
Mental health-specific costs					
Total, \$					
Adjusted mean (CI)	2265 (2197–2336)	2032 (1979–2086)	2113 (2080–2147)	2034 (2001–2068)	2025 (1985–2066)
Difference, %	12	0	4	0	–
<i>P</i> value	<.0001	.8444	.0017	.7121	–
Inpatient, \$					

Adjusted mean (CI)	387 (367–408)	290 (276–304)	308 (299–317)	245 (237–254)	175 (166–183)
Difference, %	122	66	76	41	–
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–
Outpatient, \$					
Adjusted mean (CI)	1319 (1280–1359)	1254 (1223–1286)	1304 (1285–1324)	1294 (1275–1314)	1410 (1385–1436)
Difference, %	–6	–11	–8	–8	–
<i>P</i> value	.0006	<.0001	<.0001	<.0001	–
Drugs, \$					
Adjusted mean (CI)	471 (453–490)	429 (414–443)	439 (430–448)	438 (429–447)	385 (375–396)
Difference, %	22	11	14	14	–
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–
Net payment, \$					
Adjusted mean (CI)	1739 (1681–1800)	1564 (1519–1610)	1625 (1597–1653)	1505 (1478–1533)	1445 (1413–1478)
Difference, %	20	8	12	4	–
<i>P</i> value	<.0001	<.0001	<.0001	.0035	–

^aAllowed amount per patient. Difference, % depicts adjusted mean difference from employees with annual wages >\$103,000 expressed as a percentage. *P* values versus employees with annual wages >\$103,000.

eAppendix Table 4. Medication Use for Mental Health–Specific Causes by Wage Category (Proportion of Patients Using Each Medication Type, %)

Wage category (\$1000s, annually)	Total population						Patients with mental health diagnoses					
	≤34	>34–45	>45–69	>69–103	>103	Total	≤34	>34–45	>45–69	>69–103	>103	Total
N	267,662	279,184	623,765	608,533	607,700	2,386,844	26,154	32,101	74,757	66,488	55,351	254,851
Antidepressant	14.8	16.2	16.2	14.6	11.5	14.4	61.2	59.9	57.2	54.4	49.2	55.5
Antipsychotic	1.2	1.2	1.1	0.9	0.6	0.9	9.4	8.2	7.1	6.3	4.6	6.7
Anxiolytic	4.5	4.7	5.0	4.8	5.0	4.9	18.0	17.2	16.1	15.0	14.8	15.9
SUD medication	0.3	0.3	0.3	0.2	0.1	0.2	1.4	1.5	1.4	1.1	0.5	1.1
Stimulant	2.3	2.7	3.4	3.2	2.3	2.9	14.0	14.6	17.0	16.7	14.3	15.7
Other MH medication	20.0	21.6	21.6	20.4	17.2	20.0	40.8	40.9	40.1	38.9	35.7	39.0

eAppendix Table 4 Continued

Wage category (\$1000s, annually)	Subgroup of patients with depression					
	≤34	>34–45	>45–69	>69–103	>103	Total
N	11,799	14,876	36,391	33,121	29,060	125,247
Antidepressant	69.9	68.4	64.4	60.2	52.6	61.5
Antipsychotic	9.9	8.9	8.0	6.9	4.8	7.3
Anxiolytic	18.5	17.4	16.4	15.0	14.0	15.8
SUD medication	0.8	0.8	0.9	0.6	0.3	0.7
Stimulant	9.3	9.5	10.9	10.6	9.1	10.1
Other MH medication	39.2	39.4	39.2	37.2	33.1	37.3

MH, mental health; SUD, substance use disorder.

eAppendix Table 5. Adherence to and Discontinuation From Antidepressant Therapy by Mental Health Disorder and Wage Category

Wage category (\$1000s, annually)	Total population					Patients with mental health diagnoses				
	≤34	>34–45	>45–69	>69–103	>103	≤34	>34–45	>45–69	>69–103	>103
N	267,662	279,184	623,765	608,533	607,700	26,154	32,101	74,757	66,488	55,351
PDC outcomes										
Adjusted mean (CI)	72 (71–72)	72 (72–73)	74 (74–74)	76 (76–77)	77 (77–77)	73 (73–73)	73 (73–74)	75 (74–75)	77 (76–77)	77 (77–78)
Difference, %	–5.3	–4.8	–2.8	–0.7	–	–4.3	–4.2	–2.7	–0.7	–
P value	<.0001	<.0001	<.0001	<.0001	–	<.0001	<.0001	<.0001	.0036	–
Discontinuation ^a rate, %										
Adjusted mean (CI)	33 (32–33)	32 (32–33)	30 (29–30)	27 (26–27)	26 (25–26)	31 (30–32)	31 (30–32)	29 (29–30)	27 (26–27)	25 (25–26)
Difference, %	6.8	6.2	3.9	0.9	–	6.0	5.7	3.8	1.1	–
P value	<.0001	<.0001	<.0001	.0003	–	<.0001	<.0001	<.0001	.0059	–

eAppendix Table 5, Continued

Wage category (\$1000s, annually)	Subgroup of patients with depression				
	≤34	>34–45	>45–69	>69–103	>103
N	11,799	14,876	36,391	33,121	29,060
PDC outcomes					
Adjusted mean (CI)	75 (74–75)	74 (74–75)	76 (76–76)	78 (78–78)	79 (78–79)
Difference, %	–4.0	–4.5	–2.8	–0.6	–
P value	<.0001	<.0001	<.0001	.0292	–
Discontinuation ^a rate, %					
Adjusted mean (CI)	30 (28–31)	30 (29–31)	28 (27–29)	25 (24–26)	24 (23–25)
Difference, %	5.8	6.2	4.0	1.2	–
P value	<.0001	<.0001	<.0001	.0266	–

^aDiscontinuation is defined as ≥90-day gap in medication during study time frame. Difference, % depicts adjusted mean difference from employees with annual wages >\$103,000 expressed as a percentage. P values versus employees with annual wages >\$103,000.

PDC, proportion of days covered.

eAppendix Table 6. Mental Health Allowed Out-of-Network Costs by Wage Category (%)

Wage category (\$1000s, annually)	≤34	>34–45	>45–69	>69–103	>103
Patients with mental health diagnoses					
Raw value	18	14	19	19	29
Adjusted mean (CI)	22 (19–24)	18 (16–21)	20 (19–22)	19 (17–20)	28 (26–29)
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–
Subgroup of patients with depression					
Raw value	18	11	17	19	31
Adjusted mean (CI)	22 (19–25)	16 (13–19)	19 (17–21)	18 (16–20)	29 (27–31)
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	–

P values versus employees with annual wages >\$103,000.

STROBE Statement—Checklist of items that should be included in reports of *cohort studies*

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1, 2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	4-5
		(b) For matched studies, give matching criteria and number of exposed and unexposed	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6 and eMethods
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	eMethods
Bias	9	Describe any efforts to address potential sources of bias	eMethods
Study size	10	Explain how the study size was arrived at	N/A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	eMethods
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6-7 and eMethods
		(b) Describe any methods used to examine subgroups and interactions	eMethods
		(c) Explain how missing data were addressed	Missing data are reported in tables where applicable
		(d) If applicable, explain how loss to follow-up was addressed	N/A
		(e) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	4-6
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	4-6 and eMethods

		(b) Indicate number of participants with missing data for each variable of interest	eMethods
		(c) Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Report numbers of outcome events or summary measures over time	eMethods
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Unadjusted-eMethods (eTable 1) Adjusted – all other results Confounders – eMethods eMethods N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14 (Conclusions)
Generalisability	21	Discuss the generalisability (external validity) of the study results	14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at <http://www.strobe-statement.org>.

Mental Health Diagnoses and Services Utilization Vary by Wage Level

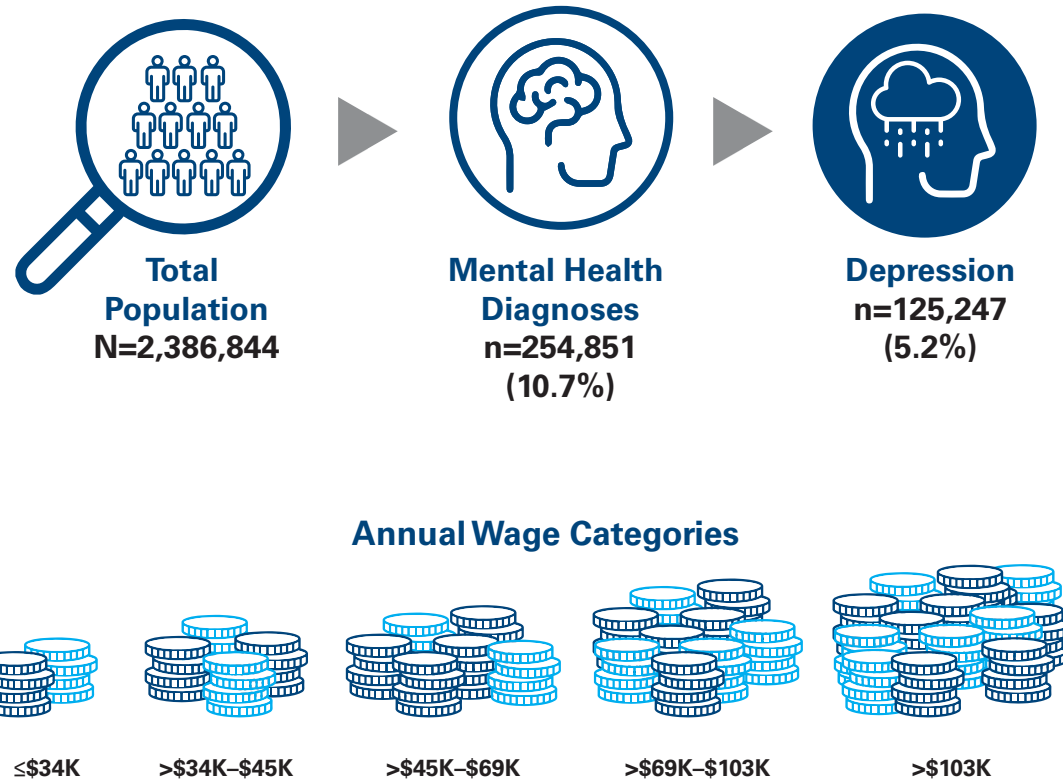


Objective

To assess healthcare utilization and cost patterns for mental health diagnoses according to wage category among employees with health insurance

Study Population

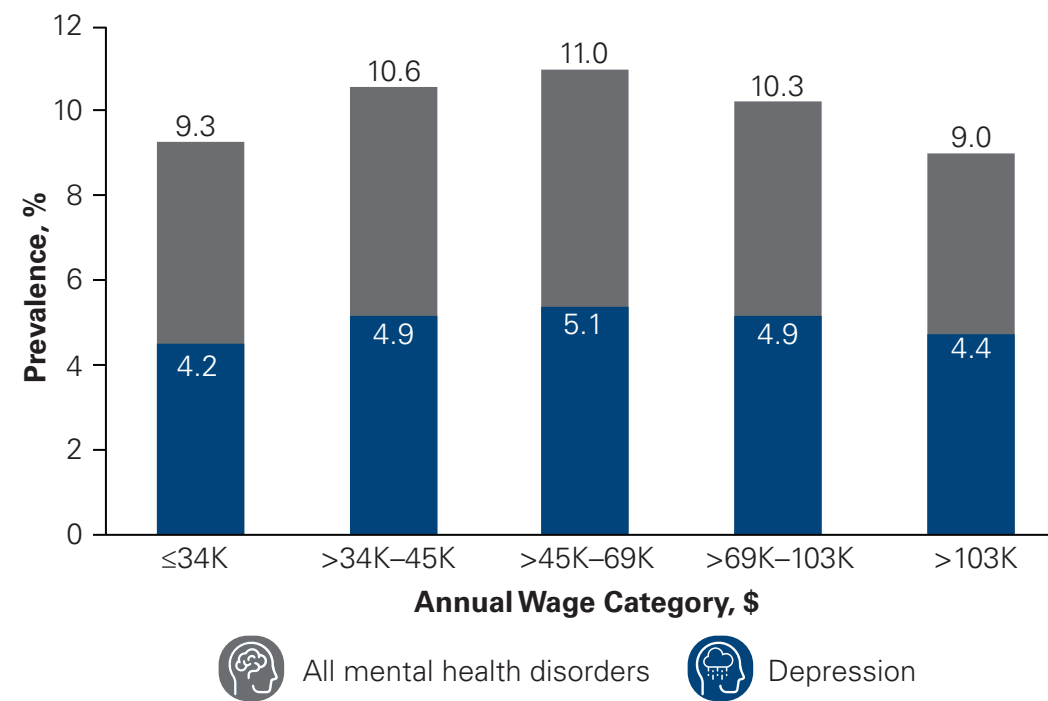
Observational, retrospective study using data from 2017 among adult full-time employees enrolled in self-insured plans in the IBM Watson Health MarketScan® research database



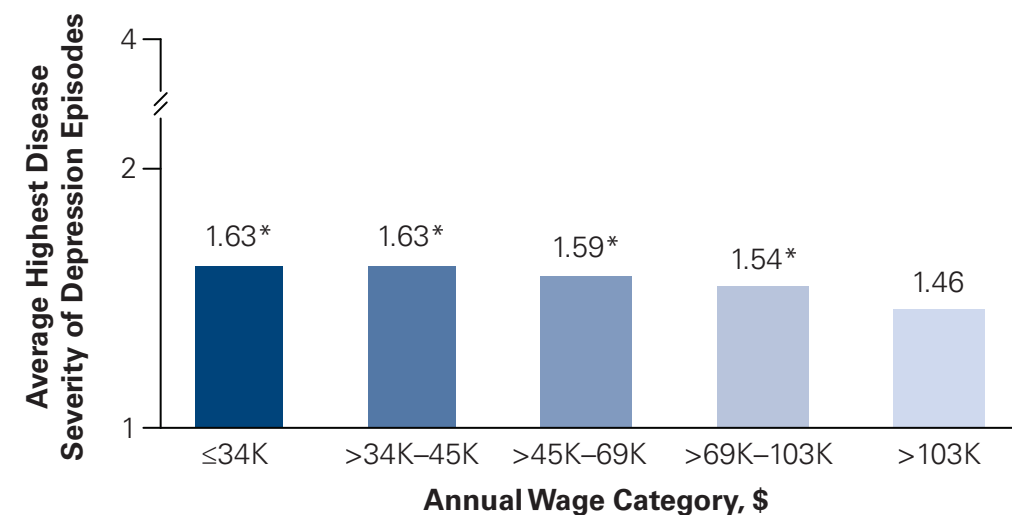
Key Findings

Prevalence and Severity

Prevalence of diagnosed mental health disorders and depression were highest in the mid-wage categories



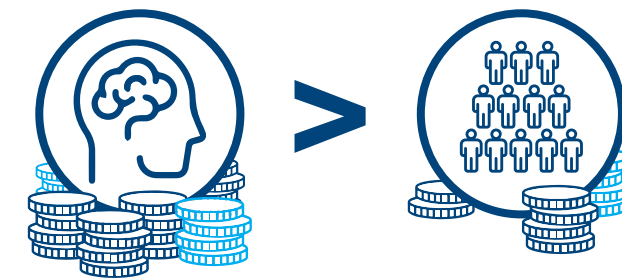
Depression severity was greater in the lower-wage categories (on a scale of 1-4)



*P<.0001 compared to the highest-wage category.

Utilization of Healthcare Services and Costs

All-cause utilization of healthcare services and total cost of care were greater among patients with mental health diagnoses than in the total population



Among patients with depression, utilization was significantly higher in the lowest- versus highest-wage category for hospital admissions, emergency department visits, and prescription drug supply (all $P < 0.0001$)



Summary: Workers in lower-wage categories have a lower prevalence of depression but have more frequent emergency department visits and rates of hospitalization, consistent with suboptimal management. Employers should critically review the design of their company's mental health benefits to ensure affordable and accessible treatment is available for all enrollees.