RGA Study: The connection between mental health disorders and all-cause mortality

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In recent years, mental health has received increasing attention in the media, prompting the insurance industry to make efforts to ensure individuals with mental health conditions have fair access to insurance products at reasonable prices.

Key takeaways

- Using a large dataset of 9.2 million individuals, a new RGA study found that anxiety, depression, and bipolar disorder were all associated with elevated mortality risk, even after adjusting for comorbidities.
- The increased mortality risk associated with those mental health conditions was more pronounced at younger ages.
- Individuals with mental health conditions had higher rates of coexisting diseases/disorders that increase mortality risk, highlighting the need to adjust for comorbidities to isolate the independent effect of the mental health condition.

A 2023 global survey by RGA found that 85% of life and health insurers prioritized mental health as a strategic imperative. Yet more than 80% of survey-takers said underwriting was a contributing factor to their cautious approach to mental health products.

In this context, we conducted a mortality experience study using an RGA-acquired dataset that includes de-identified medical histories and mortality outcomes for 9.2 million individuals. The study aims to provide insights to the industry on the mortality risk associated with three primary mental health conditions: anxiety, depression, and bipolar disorder.

Data

The dataset is derived from medical claim histories within a general health insurance population in the US. These medical claims capture diagnosis and procedure billing

codes following a patient's interaction with healthcare providers, covering the period from 2012 to 2015.

RGA underwriters mapped ICD-10 diagnosis codes to the three mental health conditions – anxiety, depression, and bipolar disorder – each categorized by severity levels (mild, moderate, severe). They also assigned a mortality risk score (1 to 10) based on other ICD-10 codes, with 1 representing the lowest and 10 the highest risk. The maximum risk score for each individual was used as a "comorbidity" index. Mortality outcomes for each individual were linked through a third-party record between January 1, 2016, and December 31, 2017, with 112,218 total deaths recorded. Expected mortality was calculated for each individual based on the 2015 Society of Actuaries Valuation Basic Table (SOA VBT), ultimate mortality table, using aggregate smoking/non-smoker rates.

RGA recognizes the insurance industry's opportunity to drive improvements in mental health inclusion, delivery, and support.

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Mortality experience study using a generalized linear model

Rather than using the traditional actuarial approach, which calculates actual vs. expected (A/E) mortality ratios, we employed a generalized linear model (GLM), a multivariate statistical method. GLM allows for adjustments beyond expected mortality, incorporating variables such as the comorbidity index and interactions between mental health conditions, age, and gender. Another benefit of GLM is the ability to calculate a 95% confidence interval for hazard ratio (HR).

Findings

Prevalence of mental health disorders

Mental health conditions were more prevalent in females than males (Fig 1). However, the gender difference disappeared when considering the most severe cases (Fig 2). There was no age-related difference in either the overall prevalence or severity.

Coexisting higher mortality risk disorders

Individuals with mental health conditions had higher comorbidity scores than those without, suggesting that elevated mortality in mental health patients is influenced by coexisting conditions (Fig 3). This indicates the need for multivariate comorbidity adjustments to isolate the independent mortality impact of mental health conditions

Elevated mortality risk

Using the GLM model, all three mental health conditions were associated with higher mortality risks, expressed as hazard ratios (HR). A HR greater than 1 indicates an increased mortality risk, and non-overlapping 95% confidence intervals with 1 confirm statistical significance. After adjusting for comorbidities, the hazard ratios were reduced but remained significant (Fig 4).

Please note that the hazard ratios are meant to illustrate the impact of mental health conditions on mortality. They should not be directly translated into underwriting ratings, as mental health conditions in life insurance underwriting are defined clinically rather than by ICD codes. Additionally, significant differences exist between the insurance population and the general population that are not addressed in this study.

Severity and mortality risk

Mortality risk increased with the severity of each mental health condition, although the severity definitions in the study, based on ICD-10 codes, lacked clinical granularity (Fig 5).

Stronger impact at younger ages

Subgroup analysis revealed that mental health conditions had a stronger mortality impact on younger individuals, with the effect being statistically significant. Mortality risk was slightly higher in males than females, though not all results reached statistical significance.

Conclusions

The primary strength of this study is its large sample size, with over 100,000 recorded deaths, allowing for high sensitivity in detecting associations between mental health conditions and mortality in the general population, even when broken down by age and gender.

However, the study has two key limitations: (1) The classification of mental health condition severity lacks clinical precision and does not correspond to actual clinical severity assessments. As such, the findings on severity and mortality in Figure 5 indicate a positive association in direction but should not be interpreted as quantifying mortality risk based on clinically defined severity. (2) The co-morbidity index is not specific to particular conditions, limiting its ability to assess interactions between mental health and individual co-morbidities.

This mortality study is part of RGA's comprehensive review of mental health disease risk. The empirical evidence from this study, along with findings from medical literature and RGA's underwriting expertise, helps shape RGA's underwriting philosophy and guidelines on mental health risk.

Fig 1. Prevalence of Three Mental Health Conditions by Gender

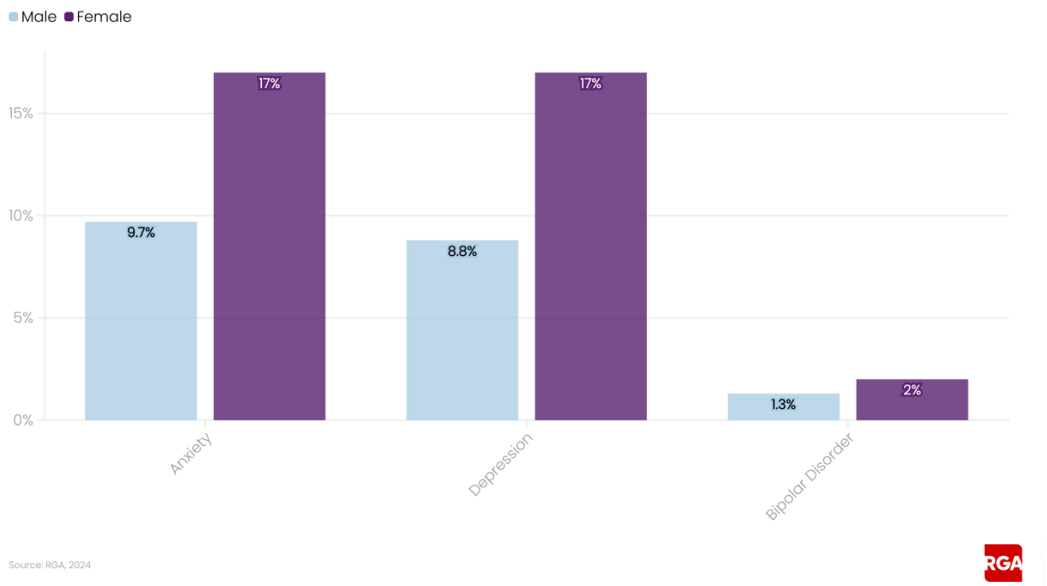


Fig 2. Prevalence of Severe Mental Health Conditions by Gender

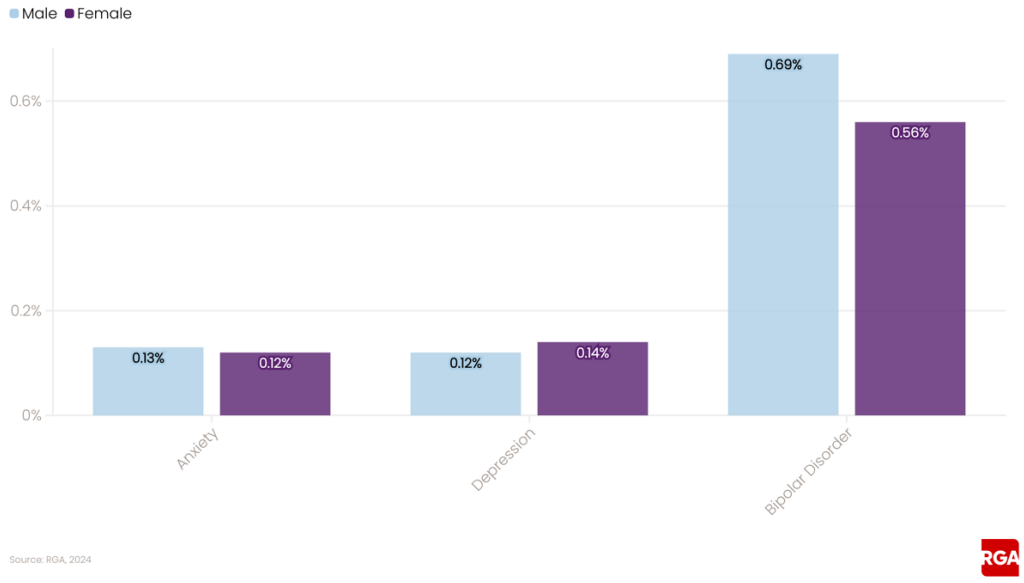


Fig 3. Higher Comorbidity Score Among Individual with Mental Health Conditions than Those Without

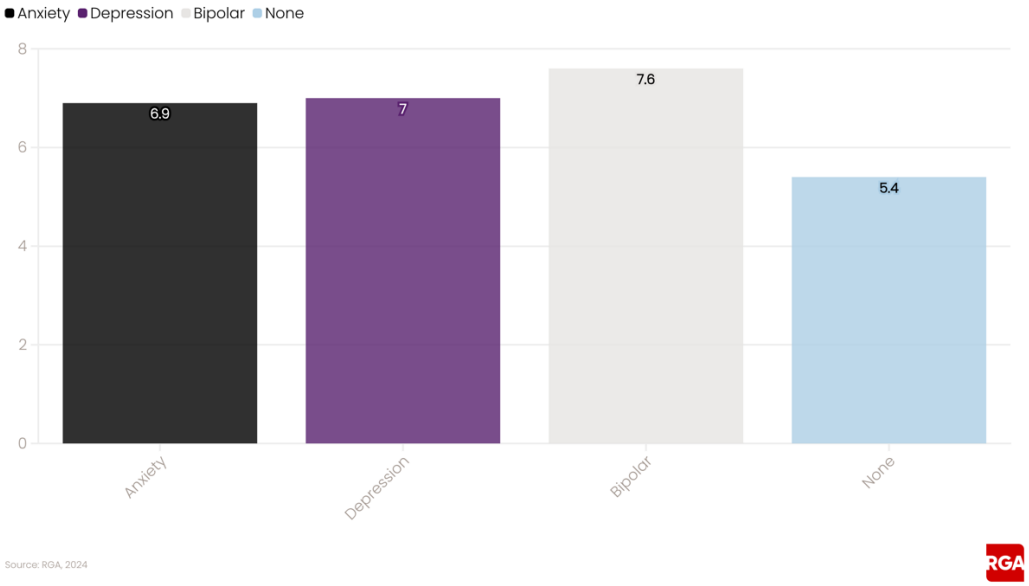


Fig 4. Hazard Ratios (95% Confidence Interval) of Three Mental Health Conditions in GLLM Model, With & Without Comorbidity Adjustment

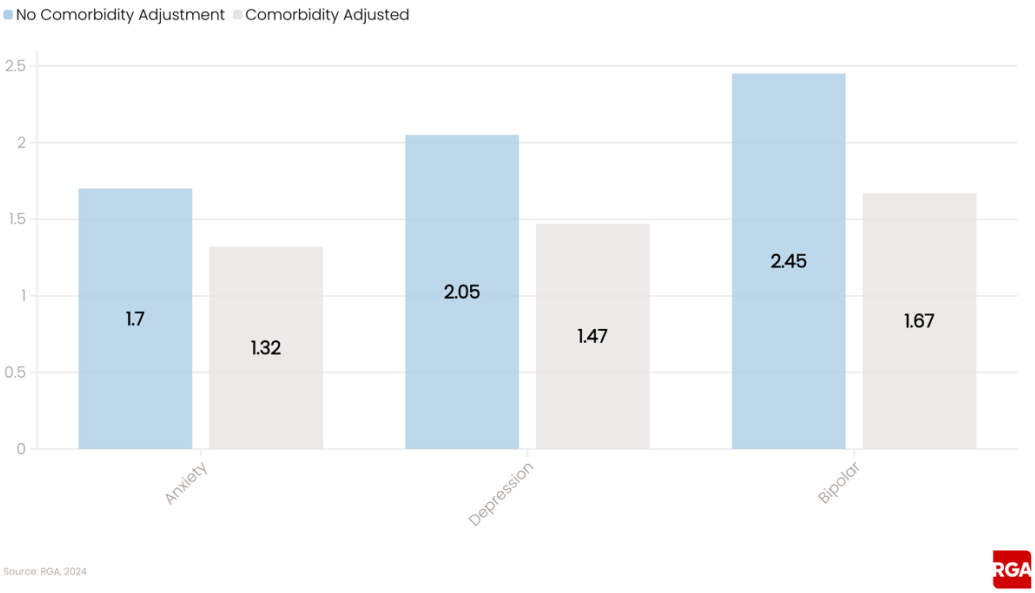


Fig 5. Hazard Ratios by Severity

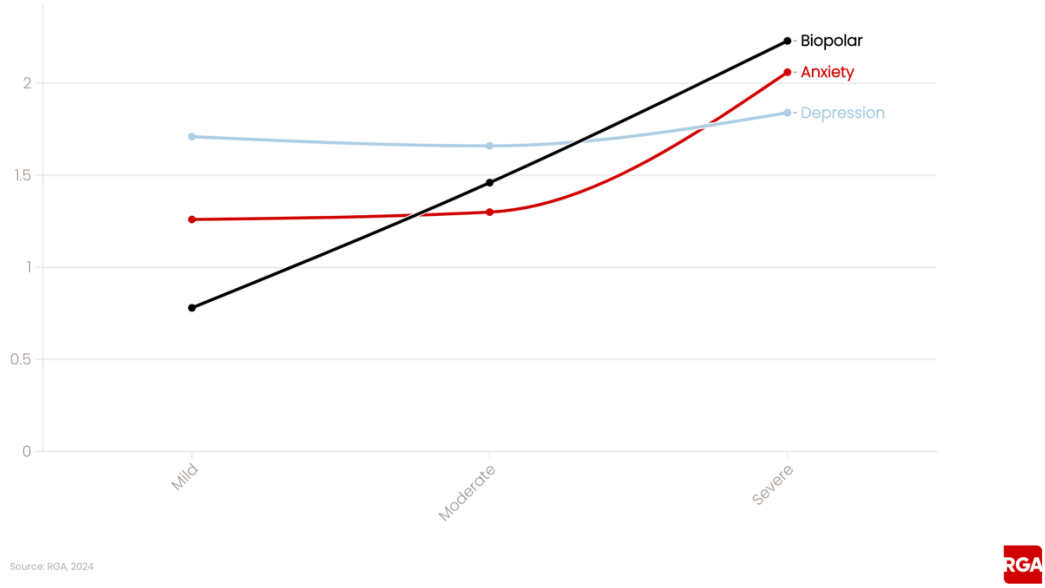
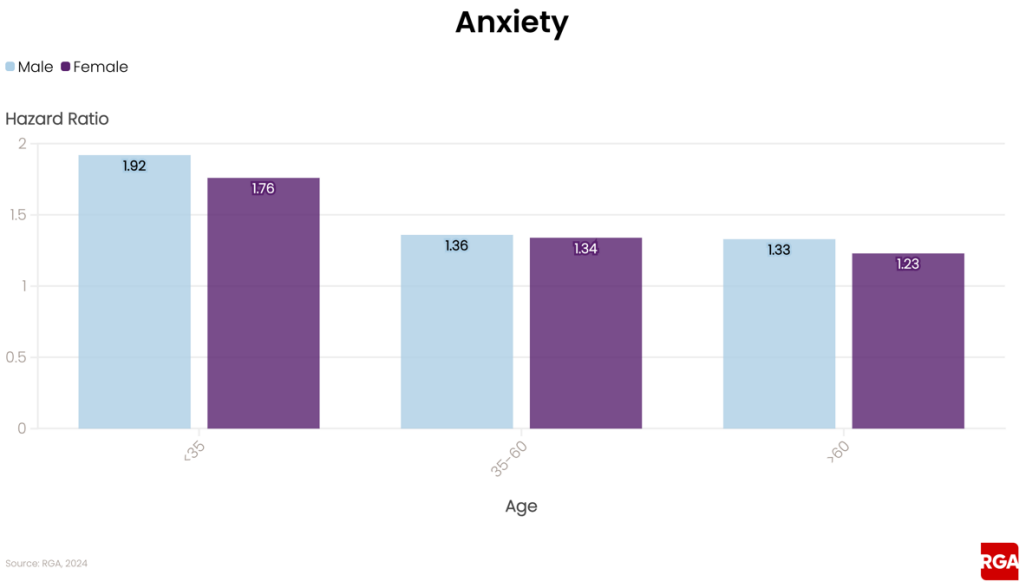
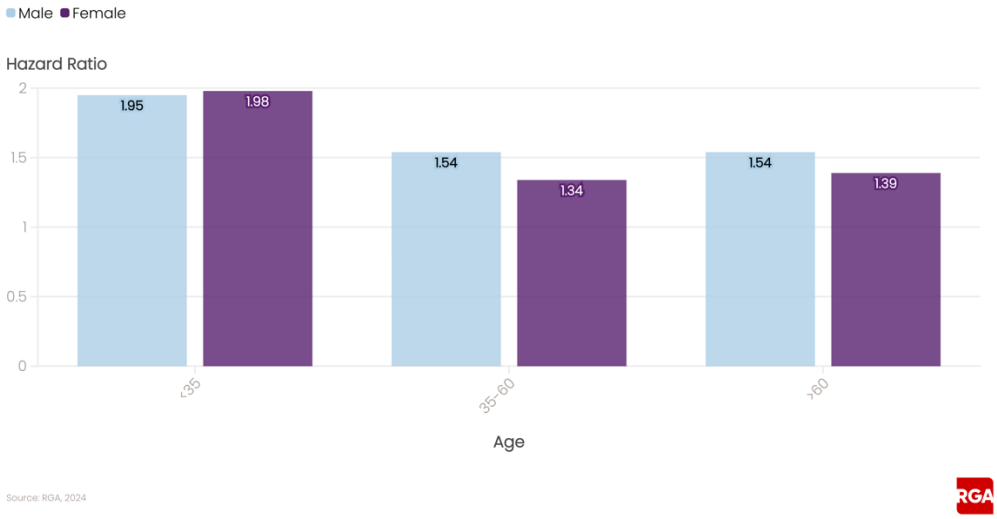


Fig 6. Hazard Ratios by Age and Sex of the Three Conditions

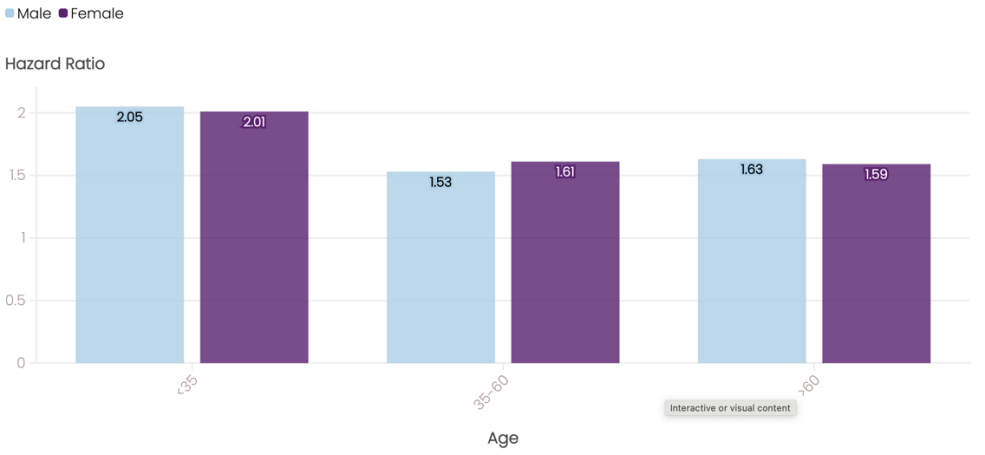


Depression



Source: RGA, 2024

Bipolar



Source: RGA, 2024

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