NOT IF, BUT HOW

Munich RE

Mira Risk Review

Munich Re's Mental Health Calculator

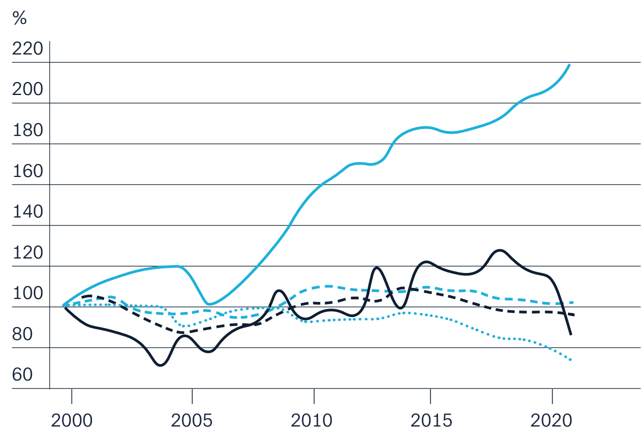
This Risk Review Paper highlights the key features of the new holistic mental health calculator.

Mental health conditions are an increasing challenge globally, but most noticeably in industrialized countries. A long overdue social change has led to greater awareness and destigmatization especially in western countries, which is also reflected in a high burden of disability (DALY – disability adjusted life-years) in these areas [1].

From an insurance perspective, mental diseases are particularly challenging, the rise in incidence is reflected in higher numbers of life insurance applicants disclosing mental diseases as well as increased numbers of claims (Figure 1). In addition to this, most mental health conditions are considered chronic or recurrent and have a high correlation with other health issues, despite good treatment. This shows that complexity in managing mental health conditions is the rule, rather than the exception. How can insurance companies deal with the increasing frequency and complexity, while being fair to the customer and at the same time risk-adequate? Munich Re can now offer a solution – A holistic mental health calculator.

The complexity, which an underwriter faces when assessing mental health conditions cannot be solved by utilising a univariate underwriting approach. Multiple diagnoses comprising mental diseases, risk factors (such as sleep disturbance, lack of concentration or bullying), functional and dependency disorders are by far too complex to accurately assess the individual components independently[2]. Such an approach would often result in the risks being over- or underestimated and consequently would not be fair to the applicant or could negatively impact the portfolio.

Figure 1 – Relative increase of sick leave due to mental disease between the years 2000 and 2021 compared to other disease categories. German public insurance data (Techniker Krankenkasse, 2022)[3]



Why we need a holistic approach to underwriting mental health conditions.

To achieve the most risk-adequate, yet differentiated and fair assessment for the applicant disclosing mental health conditions, we developed a novel approach to underwriting. We have implemented a multivariate and holistic calculator (the Mental Health Calculator – MHC) that ensures that all facts (related to mental health) are taken into account and assessed individually depending on the combination of inputs.

For cases in which the available information is extensive, even the most complex combinations can be evaluated adequately. However, also cases with only limited information, such as a single diagnosis, can be assessed with the Mental Health Calculator (MHC) due to the optionality of the inputs.

To understand the complexity the underwriter faces almost daily in underwriting mental health issues and how our new MHC can provide the best possible support, an example may help:

An applicant applying for disability pension cover (income protection – IP) discloses that they have a history of moderate depression and burnout. Last symptoms of depression occurred several years ago, and they have been treated successfully since then. The burnout occurred prior to the onset of the depression.

(i) Multiple mental diseases? – We consider combinations.
Depression typically presents in a course of waves (recurrent episodes). This means that the applicant may be symptom-free for a very long time between two episodes; but to prevent relapse they are permanently under treatment (medication and/or counselling). In our underwriting guidelines, we therefore consider the symptom-free period as the most important measure, even in presence of medication or counselling, as the risk can be sufficiently mitigated.

Yet, the applicant was also suffering from burnout prior to the diagnosis with depression.

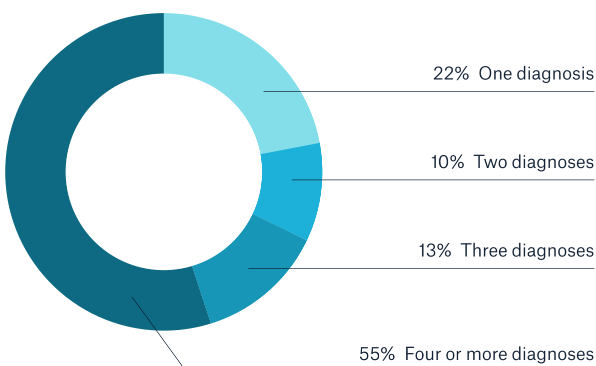
Several longitudinal and cross-sectional studies support the hypothesis that burnout may be a phase in the development of depression[4]. Furthermore, studies show that in this particular combination, no significant difference was detected in the strength of the effect in either direction, meaning that the severity of the individual diagnosis was not increased by the occurrence of the other[5–11].

Based on this information, if the rate for burnout would simply be added to the depression rate, the actual risk would be overestimated and could – in the worst case for the applicant – lead to an unjustified decline of cover.

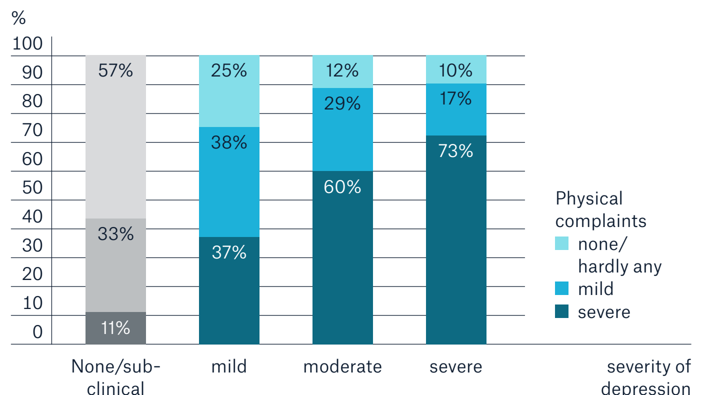
In this example, we see that having two diagnoses in their medical history does not necessarily mean they are independent from each other. However, this applies in both directions; two diagnoses can be part of one disease (e.g. burnout & depression) or two independent diseases could potentiate each other (e.g. anxiety & addiction)[12,13]. Both scenarios need to be considered in a holistic approach to underwriting mental diseases. In total this may account for more than 40% of the cases in which an applicant suffers from more than one mental disease (Figure 2 – left, Figure 3 a).

Figure 2 – Left: Mental health comorbidities in individuals with a 12-month prevalence of mental illness[2]. Right: Individuals diagnosed with a depression are at significantly increased risk for developing physical symptoms compared to a population without depression or only subclinical symptoms (grey coloured bar). Severity of physical complaints correlates with severity of the depression.[14]

Cases with multiple mental health diagnoses



Physical complaints in depression



(ii) Mental health conditions and functional disorders: Combinations that matter.

What if in the same case as before the applicant would now also disclose a functional disorder (e.g. backpain or migraine)? Even with successful antidepressant treatment many patients still suffer from residual somatic symptoms. These residual symptoms should be considered as an additional risk with respect to earlier relapse and higher disability probability due to the potential development of a severe functional disorder (Figure 2 – right). To mitigate these risks appropriately, an additional rating is included to account for the combination of the functional and the additonal somatic disorders[15–20].

However, would it be fair, to always add up the mental rate for the functional disorder, even when those symptoms only occurred prior to the last symptoms of the mental disease? Let's assume the applicant had symptoms of migraine and tinnitus before the last symptoms of said diagnosed depression. In this case the mental rates of the symptoms should be contained in the depression rates, as successful treatment of the depression should consequently prevent further emergence of those functional symptoms. Yet, independent from the mental rates, the somatic rates are still considered as there is an increased risk from the functional disorder alone on somatic function (Figure 3).

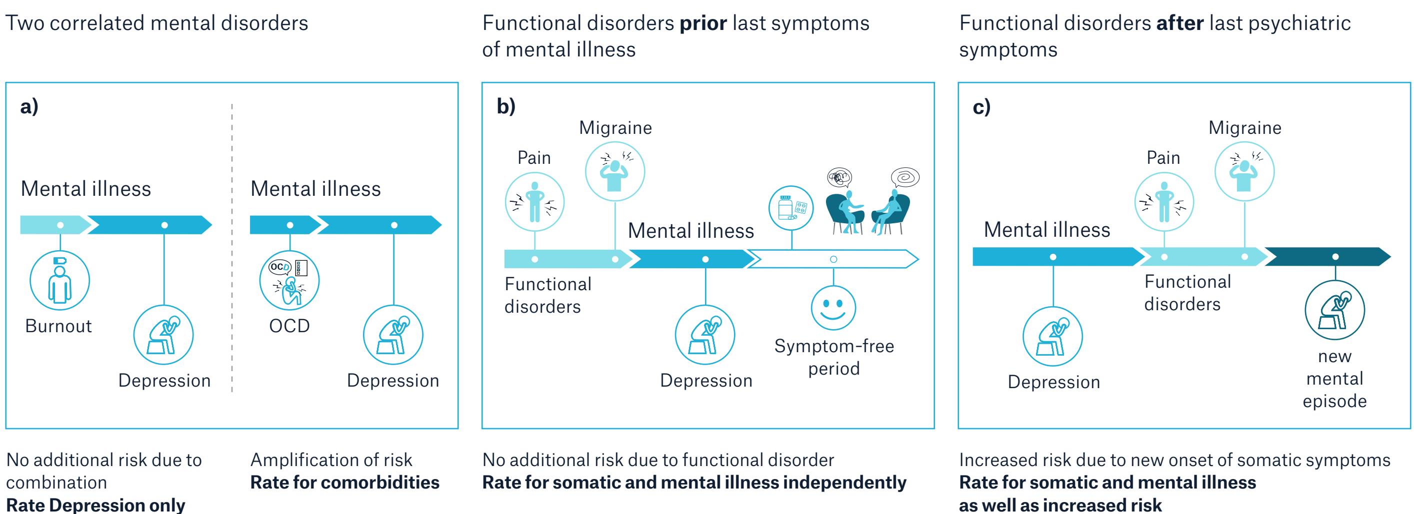
(iii) Mental health conditions and functional disorders: The timing matters.

Let's keep looking at the same case, but now the last somatic symptoms occurred more recently after the last symptoms of the depression (most recent episode, Figure 3). This scenario might indicate that the risk is in fact higher, and the depression might not be adequately treated. In this case the extra mental rate is important to add, as it mitigates the higher risk of a potential recurring episode of the depression as well as the increased probability of a somatically-caused disability[15,16,18].

In these seemingly simple but not uncommon examples we have considered several aspects that are relevant to underwriting: Mental diseases often come hand-in-hand with other diagnoses. They may occur in combination with other mental diseases, but on top of that are often associated with functional disorders as well as additional risk factors, the symptoms of which may occur both before, during and after the last episode of mental symptoms.

And last but not least, dependency disorders play a significant role not only in the development of mental health problems but also in their severity and progression. All of this must be considered in the underwriting process for each individual case.

Figure 3 – Potential scenarios in underwriting mental disease. a) Combinations of mental disease and consequences for underwriting. b) Incidence of functional disorders prior last symptoms of a mental disease (e.g. Depression) does not increase the probability of relapse. c) The occurrence of functional symptoms with unknown physical explanation after the last psychiatric symptoms indicates an increased risk for relapse of the mental health condition.



Prognostic factors? – How can we prevent early claims?

We have shown that we not only need to consider mental health conditions, but also to include functional disorders and risk factors in the equation.

But now, what actually happens to cases where the claimant does not disclose a mental health diagnosis, but the underwriter is confronted with the presence of multiple diagnoses that may indicate an underlying mental health problem? These cases are particularly challenging for the portfolio, as mental health problems that are not identified as such at underwriting stage represent an increased risk that is not taken into account and may even lead to an early claim.

In an internal Munich Re study, we found that of all disability claims due to mental health conditions, up to 30% are early claims (i.e., in the first five years after application). This high percentage of early claims may be due, at least in part, to the failure to recognise mental health problems at the time of application.

To identify potential prognostic factors that may raise a red flag, we conducted an in-depth study based on insurance data to investigate which factors can contribute to an increased risk of developing a mental health condition.

To this end, we have examined the influence of functional disorders and risk factors that have a psychological impact.

Our study focuses on the extent to which these functional disorders and risk factors increase the risk of developing a depression or anxiety disorder within the following years.

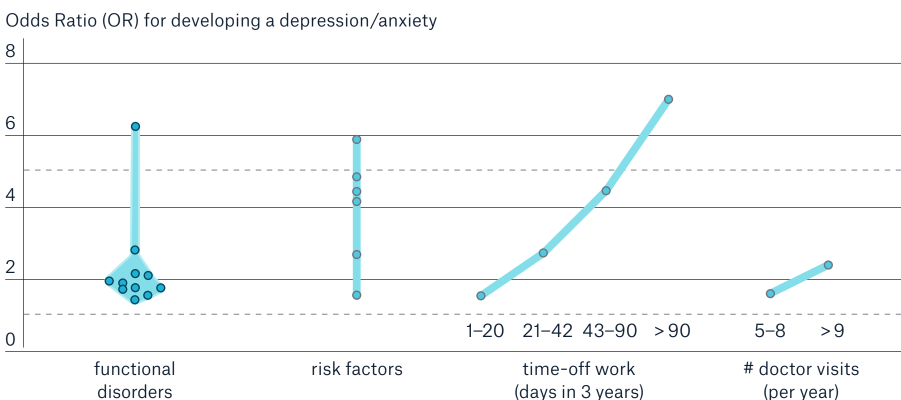
In summary, the analysis shows that all selected parameters lead to an increased risk of developing a depression or anxiety disorder; this is especially true for risk factors, but also for all functional disorders identified as relevant (Figure 4). In addition, increasing durations of sick leave (absenteeism) correlate with increased risk of developing depression or anxiety in a dose-response relationship.

However, these increased relative risks only take into account the individual functional disorders, risk factors, and work absences independently. A combination of these factors would even further increase the risk of developing a depression or anxiety.

To reflect the dependency between functional disorders and risk factors, we included a prognostic function in the MHC. This means that risk factors and functional disorders, even entered independently of a diagnosed mental health condition, may trigger an alert to consider an exclusion clause for mental health conditions or an alert to review the case individually and possibly obtain further information about the applicant's medical history.

With this new feature, we aim to mitigate the risk on early claims by detecting potentially hidden risks for the development of a mental disease.

Figure 4 – A Munich Re study conducted in 2022 based on population insurance data (2013–2020). Multivariate analysis. Plotted are the odds ratios (OR) for functional disorders, risk factors, time-off work periods and doctor visits.



To sum things up

In the previous parts of this risk-review paper, we understood that (1) underwriting cases with mental health conditions can be complex and that many factors contribute that might not be immediately apparent to the underwriter. Furthermore, we have looked in more detail at functional disorders and risk factors and how they contribute to the severity of a mental diagnosis (2). And finally, we have shown you that even in absence of a diagnosed mental disease, specific functional disorders and risk factors can be used as prognostic criteria for estimating the risk of developing one in the near future (3).

In order to be able to reflect the high complexity and impact on overall severity, our mental health calculator considers all of these inputs in five different sections: (1) General information (including suicide attempts), (2) mental disorders, (3) risk factors, (4) dependency disorders, and (5) functional disorders. A list of all diagnoses and risk factors covered by the MHC is provided in the appendix.

In addition, our new MHC covers all life insurance products based on the latest MIRA rating pages and is adapted using underlying rules for each individual product.

And lastly, the MHC cannot only be used for assessing the mental rate, but also includes all somatic rates. That is, if the underwriter enters a mental health condition and also a functional disorder, the functional disorder is automatically assessed for both, the mental and the somatic component. Therefore, the underwriter does not have to look up the somatic rate separately on the MIRA rating page, but has an all-in-one approach in the MHC.

Benefits

We as Munich Re have made it our goal to be the leading reinsurer concerning mental health problems. This purpose is not only reflected by the work that has been done in the mental health revision in 2021, but now also in our new mental health calculator. To meet our own goal and up-to-date ESG underwriting guidelines (UN Environment Programme's Principles for Sustainable Insurance Initiative. Managing environmental, social and governance risks in life & health insurance business[21]), we want to best support the increasing complexity in underwriting for mental health conditions. We want to establish processes that ensure underwriting is fair and can offer coverage to as many applicants as possible by developing new technologies and services.

Our medical and claims expertise in combination with data science approaches and most recent literature made it possible to develop a holistic approach to underwriting mental disease. This differentiated approach is fairest to the individual applicant while being fast and risk-adequate in the underwriting process. There is no need to access individual rating pages and all rates are transparently displayed at the output, which makes individual considerations easy and understandable. Using prognostic functions, we aim to reduce early claims and protect your portfolio; and by using adjusted comorbidity matrices for each product, we can increase insurability where feasible. With our new holistic MHC, we take the underwriting process of mental diseases to the next level and pave the way for a better consideration of every individual.

Appendix

Table of all mental diagnoses, risk factors, functional and dependency disorders covered in the MHC

Group	Disease
Mental disease	Agoraphobia
	Acute transient psychotic disorder
	Other anxiety disorder
	Other eating disorder (without anorexia)
	Anorexia nervosa
	Adjustment disorder
	Attention deficit disorder
	Autism
	Autism with epilepsy (without retardation)
	Bipolar disorder
	Depression
	Dysthymia
	Generalized anxiety disorder
	Shopping addiction and compulsive hoarding
	Panic disorder
	Personality disorder
	Post-traumatic stress syndrome
	Schizoaffective disorder
	Schizophrenia
	Somatoform disorder
	Social phobia
	Specific phobia
	Obsessive-compulsive disorder
	Cyclothymia
Risk factors	Bullying
	Talk therapy without mental diagnosis
	Frequent visits to the doctor
	Concentration disorder
	Prickle paralysis
	Sleep disorder
	Stress (work overload)
Dependency disorders	Cannabis
	Opiates
	Amphetamines
	Cocaine
	Tranquilizers/Sedatives
	Solvents
	Laxatives
	Performance-enhancing drugs
	Hallucinogens
	Gambling addiction
	Internet addiction (without gambling addiction)
	Concentration-enhancing drugs
Functional disorders	Back pain
	Headache/migraine
	Stomach pain
	Hyperventilation
	Irritable bowel syndrome
	Syncope
	Tinnitus
	Dizziness
	Palpitations
	Medically unexplainable symptoms
	Chronic fatigue syndrome
	Fibromyalgia

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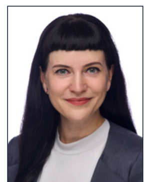

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