

# Study finds new factors linked to suicide

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First-of-its-kind study used machine learning and health data from the entire Danish population to create sex-specific suicide risk profiles, illuminating the complex mix of factors that may predict suicide.

A new study led by Boston University School of Public Health (BUSPH) researchers finds that [physical illness](#) and injury raises the risk of [suicide](#) in men but not women, along with a plethora of other insights into the

complex factors that may increase a person's risk of suicide. The study, published in *JAMA Psychiatry*, is the first to use data from the population of an entire country (Denmark) and parse it with a [machine-learning](#) system to identify suicide risk factors.

"Suicide is incredibly challenging to predict, because every suicide death is the result of multiple interacting risk factors in one's life," says lead study author Dr. Jaimie Gradus, associate professor of epidemiology at BUSPH.

Denmark has a national healthcare system with the entire population's healthcare information compiled in government registries. This allowed Dr. Gradus and her colleagues to look at thousands of factors in the health histories of all 14,103 individuals who died from suicide in the country from 1995 through 2015, and the health histories of 265,183 other Danes in the same period, using a machine-learning system to look for patterns.

Many of the study's findings confirmed previously-identified [risk factors](#), such as psychiatric disorders and related prescriptions. The researchers also found new potential risk patterns, including that diagnoses and prescriptions four years before a suicide were more important to prediction than diagnoses and prescriptions six months before, and that physical health diagnoses were particularly important to men's suicide prediction but not women's.

The findings of this study do not create a model for perfectly predicting suicide, Dr. Gradus says, in part because [medical records](#) rarely include the more immediate experiences—such as the loss of a job or relationship—that combine with these longer-term factors to precipitate suicide. Risk factors and patterns may also be different outside of Denmark. Still, after decades of research with little reduction in [suicide rates](#), Dr. Gradus says the findings point to new factors to examine in

working to prevent this persistent public health issue.

**More information:** Jaimie L. Gradus et al, Prediction of Sex-Specific Suicide Risk Using Machine Learning and Single-Payer Health Care Registry Data From Denmark, *JAMA Psychiatry* (2019). [DOI: 10.1001/jamapsychiatry.2019.2905](https://doi.org/10.1001/jamapsychiatry.2019.2905)

Provided by Boston University School of Medicine

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