

# Are the Zung Depression and Anxiety Scales Still Valid in 2023?

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## Abstract

The Zung Self-Rating Anxiety Scale (SAS) and Zung Self-Rating Depression Scale (SDS) were developed by Dr. William Zung in the early 60s and 70s to assess the level of anxiety and depression in patients. These 2 scales have withstood the test of time being used in clinical practice, but it is of interest to assess if these scales are still relevant in practice today.

A natural question is whether the distribution of Zung's sample population has shifted in the past 50 years. This is especially relevant in the era where psychiatric diagnoses are billed using ICD10 diagnoses. In this retrospective chart review, we analyzed 51 patients at an outpatient psychiatric clinic that received an ICD10 billing code for a psychiatric disorder and whose chart contained either a Zung Anxiety or Zung Depression test.

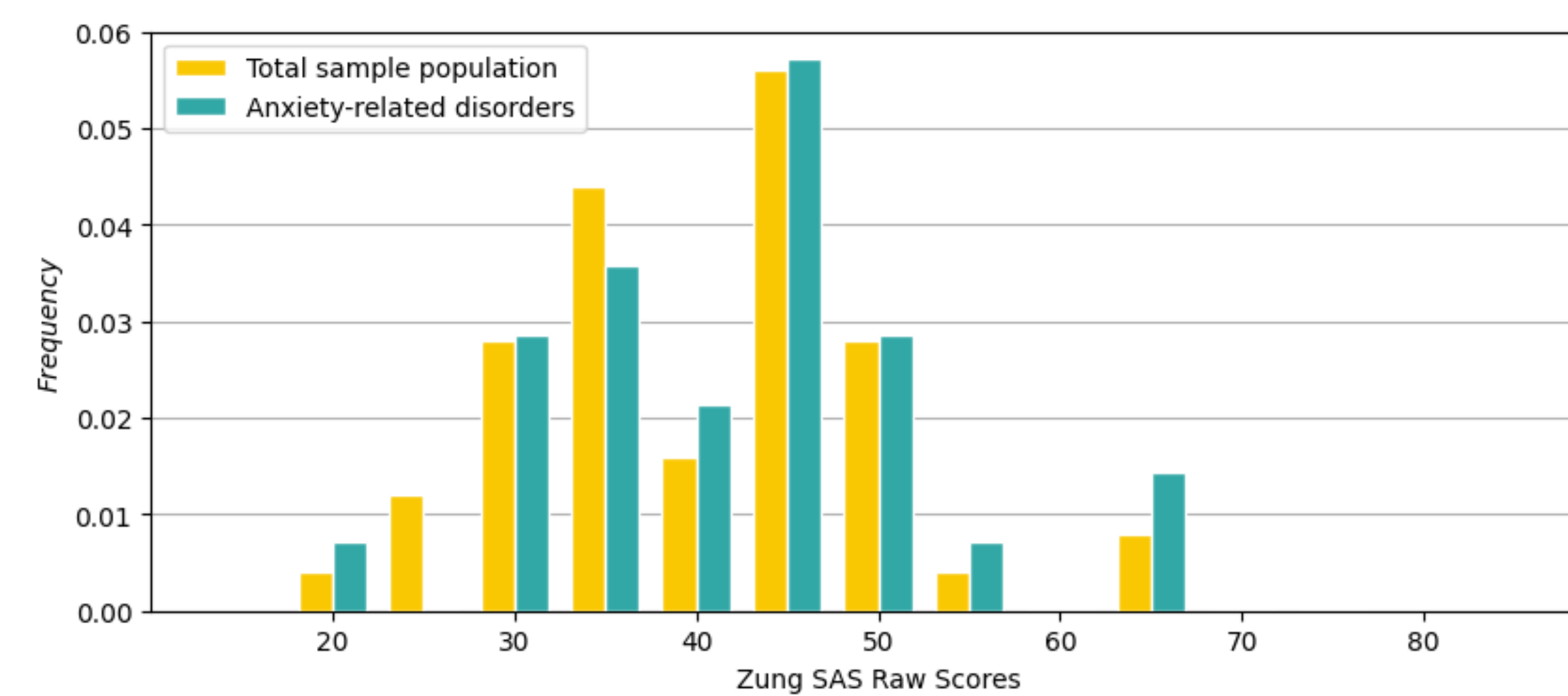
We analyzed the Zung SAS and SDS scales of 51 patients at an outpatient psychiatric clinic in South Carolina and compared the results of these self-rated assessments with the ICD-10 billing codes that these patients were assigned by a psychiatrist at the clinic.

We show in this work that for those patients diagnosed with either an anxiety or depressive disorder, the corresponding Zung Scale reflects these diagnoses. Indeed, patients with an anxiety disorder typically scored in the mild-to-moderate range for anxiety on the SAS. Likewise, patients with a depressive disorder also scored in the mild-to-moderate range for depression on the SAS.

These results suggest that the Zung Depression and Zung Anxiety scales still correlate well with the modern understanding of these psychiatric disorders (depression and anxiety) established by ICD10 diagnoses.

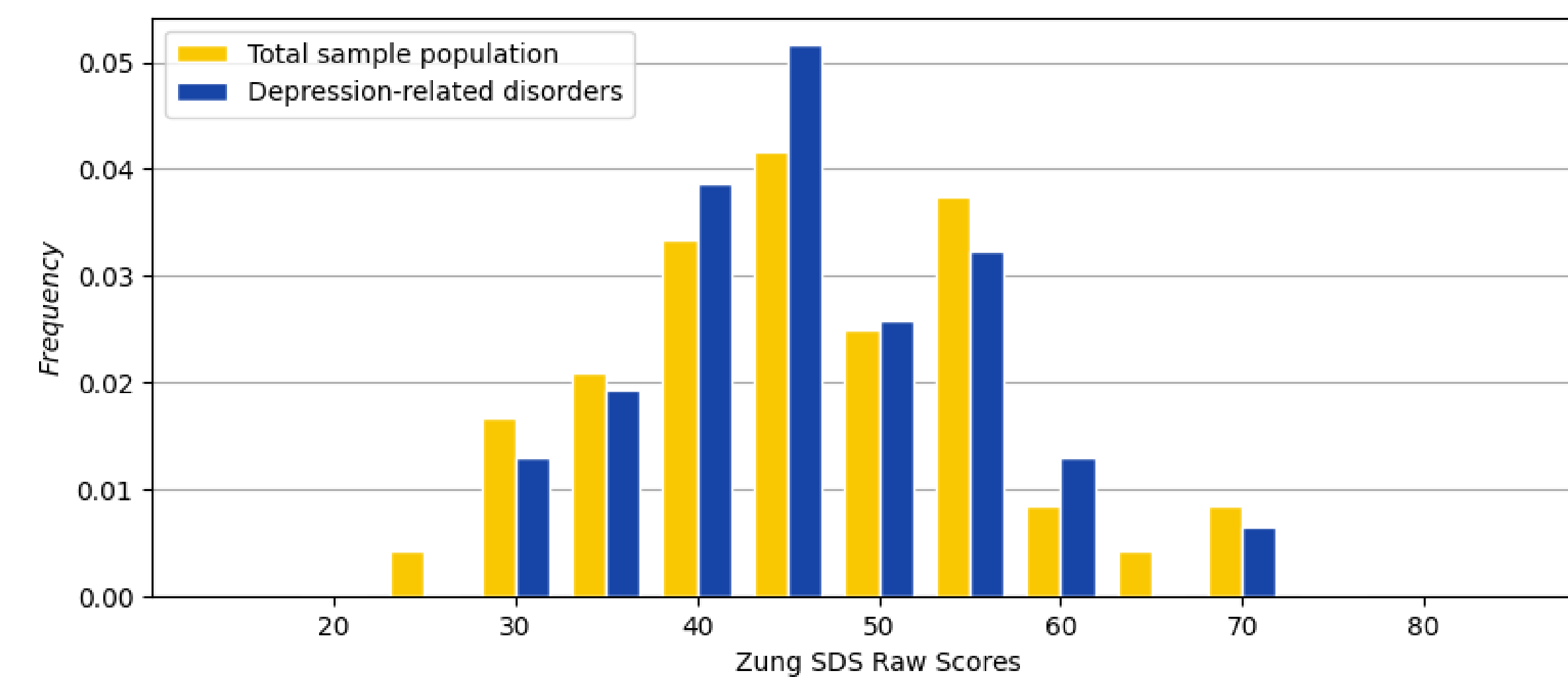
## Results

**Figure 1.** Distribution of raw scores on the Zung Anxiety Scale for the total sample population ( $n = 50$ ) and the subpopulation only for those with an anxiety-related disorder ( $n = 21$ ).



The mean Zung Anxiety (raw) score for those diagnosed with an anxiety disorder ( $n = 28$ ) was 44.4286 (adjusted index score = 55) with standard deviation 9.7959, which places most of the distribution in the mild-to-moderate anxiety range.

**Figure 2.** Distribution of raw scores on the Zung Depression Scale for the total sample population ( $n = 48$ ) and the subpopulation only for those with a depression-related disorder ( $n = 31$ ).



The mean Zung Depression (raw) score for those diagnosed with a depressive disorder ( $n = 31$ ) was 48.1935 (adjusted index score = 60) with standard deviation 9.0676, so that most of the distribution lies roughly in the mild-to-moderate depression range.

**Table 1.** Table for Zung Anxiety Scale ranges based off index score

Zung Anxiety Scale Ranges	Total sample population ( $n = 50$ )	Subpopulation with anxiety disorder ( $n = 28$ )
Normal	26.0% ( $n = 13$ )	17.9% ( $n = 5$ )
Mild-to-moderate anxiety	40.0% ( $n = 20$ )	39.3% ( $n = 11$ )
Marked-to-severe anxiety	30.0% ( $n = 15$ )	35.7% ( $n = 10$ )
Extreme anxiety	4.0% ( $n = 2$ )	7.1% ( $n = 2$ )

**Table 2.** Table for Zung Depression Scale ranges based off index score

Zung Depression Scale Ranges	Total sample population ( $n = 48$ )	Subpopulation with depressive disorder ( $n = 31$ )
Normal	20.8% ( $n = 10$ )	16.1% ( $n = 5$ )
Mild Depression	29.2% ( $n = 14$ )	32.3% ( $n = 10$ )
Moderate depression	25.0% ( $n = 12$ )	29.0% ( $n = 9$ )
Severe depression	25.0% ( $n = 12$ )	22.6% ( $n = 7$ )

The subpopulation with an anxiety disorder has a slightly higher level of anxiety relative to the total sample population. Likewise, the subpopulation with a depressive disorder also has a slightly higher level of depression relative to the total sample population. While this difference is not particularly large, for both subpopulations with either an anxiety or depressive disorder, most of the distribution lies outside the normal ranges for either anxiety or depression according to the Zung scales.

## Conclusions

Zung SAS and SDS scores are elevated in those with anxiety and depressive disorders (defined according to the criteria specified by ICD-10 billing codes) respectively. This suggests that despite these tests being over 50 years old, they still have relevance and translate to some degree for assessing the state of depression and anxiety in patients.

This study was limited by difficult-to-control factors such as implicit bias, e.g., the SAS and SDS results may have influenced to some degree the diagnosis of anxiety or depression. This would potentially result in over-reporting of the relation between ICD-10 diagnoses and Zung SAS/SDS scores. However, this does not exclude the possibility that these scales still have utility in the clinical setting. Future research should be aimed at designing studies that can control for these biases.

Based off this study, there are many paths that could be researched further surrounding this topic. Researchers could compare the effectiveness of the Zung scales with other widely used and more modern scales such as:

- Patient Health Questionnaire (PHQ),
- Sheehan Disability Scale (SDS) [6],
- DSM-V Self-Rated Cross-Cutting Symptom Measure Scales
- Depression Anxiety Stress Scale (DASS)
- Generalized Anxiety Disorder Assessment (GAD-7).

Further research can also delve into the relationships between the Zung scale scores and ICD-10 diagnoses and billing codes as well as the relevance of other more modern scales to these same billing codes. This can also examine whether older scales like the Zung scales align with modern diagnostic criteria for these billing codes.

It would also be relevant to consider how sensitive each of these scales are to these diagnoses. Anxiety and Depression often occur with each other and other disorders; future studies could delve into the relationships between these diagnoses, how to accurately and efficiently diagnose them, and specific relevant billing codes. It could be pertinent to investigate how different scales are also related to each other. By conducting further research, our understanding of clinical relevance and accuracy of these scales can be enhanced.

## References

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## Introduction and Methods

### Introduction:

The Zung Self-Rating Anxiety Scale (SAS) was developed in 1971 by Dr. William Zung as a way to screen people for anxiety-related psychological and somatic symptoms. The Zung Self-Rating Depression Scale (SDS) was developed in 1965 by Dr. William Zung to assess the level of depression for patients with depressive disorder [1]. Both the SAS and SDS scales consist of a list of twenty questions (each scored a value 1-4), answered by the patient, that cover symptoms of anxiety and depression, respectively. The raw total (ranging from 20-80) is then converted to an index score which grades the level of anxiety or depression:

Zung Anxiety Scale Ranges	Zung Depression Scale Ranges
Normal: Index Score $\leq 44$	Normal: Index Score $\leq 49$
Mild-to-moderate anxiety: $45 \leq$ Index Score $\leq 59$	Mild depression: $50 \leq$ Index Score $\leq 59$
Marked-to-severe anxiety: $60 \leq$ Index Score $\leq 74$	Moderate depression: $60 \leq$ Index Score $\leq 69$
Extreme anxiety: $75 \leq$ Index Score	Severe depression: $70 \leq$ Index Score

These tools have historically helped medical providers gauge the level of mental health severity their patient is experiencing. On the other hand, consider the modern era where psychiatric disorders are labeled with a certain billing code using ICD-10 disease classification system. For instance, there are 10 symptoms associated with depression, and to meet the ICD-10 diagnosing criteria for depression at least four symptoms must be present.

While the Zung SAS and SDS have withstood the test of time and are still used in clinical practice, it is of value to assess if the validity of these scales has held up to the standard of being used in a clinical setting. Prior works have considered the relevance of both the SDS and SAS in the modern clinical setting. Dunstan and Scott [4] showed that the research community has, in many cases, failed to use these tools correctly, e.g., failing to convert the raw score to its normalized index score. Using these scales correctly also depends on an appropriate threshold for a clinically significant marker of psychiatric disorder. Carefully tuning this cutoff point is fundamental in achieving a desirable sensitivity and specificity of these scales in assessing psychiatric disorder. Zung in 1980 [5] modified his original threshold based on a statistical model of the sample population he analyzed.

A natural question is whether the distribution of Zung's sample population has shifted in the past 50 years. Some research has suggested that the recommended threshold could use some modification [2,3] based on comparisons with the patient health questionnaire (PHQ) and Depression Anxiety Stress Scale (DASS). We thus explore in this work the relation between the Zung SAS and SDS in comparison with ICD-10 billing codes to assess the relevance of these scales in the modern era.

### Methods:

Data was collected from an outpatient psychiatric clinic in South Carolina. Many of these patients came to this clinic as a last resort, with many displaying extreme symptoms. We looked at 51 patients that all met the inclusion criteria consisting of (1) possessing psychiatric diagnoses billed under ICD-10, as well as (2) at least one of the Zung Anxiety or Zung Depression Scales filled out. Patients were classified as having either an anxiety or depressive disorder based on the ICD-10 billing codes in their chart. We used these billing codes:

- **Anxiety disorders:** F41.0 – panic disorder (episodic paroxysmal anxiety); F41.1 - generalized anxiety disorder
- **Depressive disorders:** F32.9 - major depressive disorder (MDD), single episode; F33.3 – MDD with psychotic symptoms; F33.9 – MDD, recurrent; and F34.1 – dysthymic disorder.

We then used descriptive statistics to look at the Zung Anxiety and Zung Depression scales conditioned on the subpopulation that had either an anxiety or depressive disorder respectively, looking at the distribution of scores (Figures 1 and 2), as well as how the scale graded the levels of anxiety and depression.