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Depression Anxiety Stress Scales (DASS-21) in International Contexts

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Abstract

The Depression Anxiety Stress Scales (DASS) is a tool used by psychologists to measure negative emotions like depression, anxiety, and stress. It provides individual scores for each emotion and an overall score for general mental health. The DASS is used worldwide in both general and clinical populations. In this chapter, the background of depression, anxiety, and stress is discussed along with the history of the scale's development and validation. The DASS has been shown to be a reliable and valid measure of these negative emotions. This tool has been translated into several languages and has been tested across different cultures. The importance of measuring negative emotions is significant because it helps clinicians identify and treat mental health problems. The DASS is a useful tool for screening, diagnosing, and monitoring treatment progress for those experiencing such negative emotions.

KeywordsDASS-21 -Depression anxiety stress scales -Psychological distress -Assessment -Psychometrics

Introduction

The assessment of depression, anxiety, and stress is critical as these conditions are prevalent and often overlap, making assessment and diagnosis challenging. Researchers have debated the conceptual differences between anxiety and depression (Costello & Comrey, *1967*; Dobson, *1985*), with anxiety being characterized by fear, unease, or restlessness (Barlow et al., *2017*; Beck & Steer, *1987*), while depression is characterized by emotional grief and avoidant behavior (Lovibond & Lovibond, *1995*). Additionally, anxiety is typically related to worry about events that may happen in

the future, whereas depression is often associated with negative feelings about experiences or situations from the past (Dobson, *1985*).

Earlier assessment scales, such as the Beck Depression Inventory (BDI; Beck & Steer, *1987*), relied on the psychiatric diagnostic criteria from the DSM-III (American Psychiatric Association, *1980*), and primarily focused on somatic symptoms. However, clinical reports suggested that non-somatic symptoms, such as loss of self-esteem, were also important in depression (Lovibond & Lovibond, *1995*). However, non-somatic symptoms are also relevant for measuring anxiety and stress. This motivated the development of the Depression Anxiety Stress Scales (DASS) by Lovibond and Lovibond (*1995*) to measure the three negative emotional states of depression, anxiety, and stress, that include non-somatic symptoms. For instance, DASS anxiety scale highlights fear-related symptoms and incorporates situational anxiety, which is a subjective feeling of fear in response to specific situations (Jaruzel & Gregoski, *2017*), as well as generalized anxiety, which is persistent and excessive worry (Kessler, *2000*). Stress is distinct from both depression and anxiety, but can be interrelated with them. Stress is characterized by persistent arousal and a low threshold for upset (Kato, *2007*; Nussbaum & Goreczny, *1995*), and over time, this persistent response to stressors can lead to maladaptive behaviors that overlap with depression and anxiety (Cohen et al., *1997*). Thus, the assessment of stress has been historically challenging due to its interrelated nature with other negative affective conditions.

Development of the DASS

The DASS was developed by Lovibond and Lovibond (*1995*) to measure and distinguish between anxiety, depression, and stress. The development of the DASS involved several steps. Initially, items were generated based on a review of existing measures of depression, anxiety, and stress and revised to incorporate non-somatic symptoms (Beck et al., *1988*). The items were then reviewed by a panel of clinical psychologists and refined based on their feedback. Originally, the DASS consisted of 42 items, with 14 items for each subscale measuring depression and anxiety. The results from testing conducted between 1979 and 1990, combined with factor analysis, indicated a third factor in addition to anxiety and depression. This third factor, stress, was suggested to be a shared factor of anxiety and depression but could still provide discriminatory validity as an individual subscale of the measure.

According to a study conducted by Lovibond and Lovibond in 1995, the DASS was initially evaluated on a group of 717 first-year psychology students, with 486 of them being female. The study found that the DASS demonstrated good reliability for all three subscales including depression, anxiety, and stress. The study further revealed high Cronbach's alpha coefficients for depression (0.91), anxiety (0.84), and stress (0.90), indicating strong internal consistency among the items in each subscale. The correlations between the DASS anxiety subscale and the Beck Anxiety Inventory (BAI; Beck et al., *1988*) and between the DASS depression subscale and the Beck Depression Inventory (BDI) were supportive of convergent reliability, though the correlations with the stress scale were lower (Lovibond & Lovibond, *1995*). In the study of Lovibond and Lovibond (*1995*), the underlying structure of the DASS was examined using both principal components analysis (PCA) and confirmatory factor analysis (CFA). The results indicated that a tripartite model was the best fit, with the lowest chi-square value. In addition, a second-order factor analysis was conducted, which revealed a common factor shared by all three subscales. The study concluded that

the DASS is a reliable measure of depression, anxiety, and stress, with a tripartite model providing the best fit.

Subsequent Evidence of Psychometric Properties

Along with the 42-item DASS version, the 21-item DASS (DASS-21) has also been proposed and widely researched since its publication in 1995 and validated as a reliable measure of depression, anxiety, and stress across various samples and settings. The scale has gained popularity due to its ability to measure emotional states in non-clinical populations (Medvedev et al., *2018*; Nieuwenhuijsen et al., *2003*) and provide scales for assessment of depression, anxiety, and stress individually (Roemer et al., *2021*).

In addition to assessing depression, stress, and anxiety separately, the DASS-21 can also be used to measure a common factor of psychological distress that is shared by all three subscales. To do this, the total scores of the depression, anxiety, and stress subscales are summed together. This instrument has been widely used and validated in research (Alyami et al., *2022*; Rice et al., *2016*; Uzir et al., *2022*), making the DASS-21 one of the most established psychometric tools for assessing the overall psychological distress along with stress, depression, and anxiety (Lee et al., *2019*). The three-factor structure of the DASS-21, which assesses depression, anxiety, and stress, has been repeatedly supported by CFA in multiple studies (Antony et al., *1998*; Brown et al., *1997*; Lovibond & Lovibond, *1995*). The model has been found to fit the data well using various statistical methods, such as eigenvalue greater than one, interpretation of the scree plot, and total variance explained. This tripartite model appears to provide a reliable and valid way of measuring psychological distress in individuals. Alternatively, other studies have proposed a quadripartite model that considers a fourth overarching factor of psychological stress (Henry & Crawford, *2005*). This model has demonstrated optimal fit, convergent validity with similar measures of anxiety, depression, and negative affect, and internal reliability (Henry & Crawford, *2005*).

The internal reliability of the DASS-21 has been established through the examination of Cronbach's alpha coefficients, which range from 0.83 to 0.94 for depression, 0.76 to 0.87 for anxiety, and 0.79 to 0.91 for stress (Antony et al., *1998*; Jafari et al., *2017*; Norton, *2007*; Sinclair et al., *2012*; Wood et al., *2010*). However, it has been suggested that the conventional Cronbach's alpha may overestimate or underestimate reliability (Sijtsma, *2009*). As an alternative, the McDonald's omega (ω) coefficient can be computed, with scores of 0.86, 0.82, and 0.88 reported for depression, anxiety, and stress, respectively (Osman et al., *2012*). These scores are ≥0.80, indicating acceptable reliability and supporting evidence of the scale's ability to capture its intended psychological constructs.

Finally, evidence of measurement invariance and convergent validity has been demonstrated through examination of factor loadings across multiple samples, including Australia, Chile, China, and Malaysia (Mellor et al., *2015*). The findings confirm the corresponding results of similar factor loadings across samples and adequate convergent reliability with validated measures of anxiety, depression, and negative affect (Henry & Crawford, *2005*), including the BDI, BAI, the Hospital Anxiety and Depression Scales (HADS; Snaith & Zigmond, *1986*), and the Positive and Negative Affect Scale (PANAS; Watson et al., *1988*) .

Rasch Analysis of the DASS-21

The evaluation of the DASS-21 has predominantly relied on classical test theory methods to assess its psychometric properties and reliability. The Rasch measurement model is an advanced test theory that can be used to improve the reliability of psychometric scales. This model offers the ability to increase the precision of ordinal scales by transforming their scores into interval-level data (Tennant & Conaghan, *2007*). Additionally, the Rasch analysis can estimate both item difficulty and participant ability using the same logit metric. It also controls for item bias, appropriate ordering of item response categories, and unidimensionality, which makes it a useful tool in psychometric research (Tennant & Conaghan, *2007*). Shea et al. (*2009*) explored the psychometric properties of the DASS-21 using Rasch analysis on a non-clinical sample of 420 individuals. They found adequate model fit for individual subscales, but the full scale demonstrated insufficient fit. Therefore, further research was needed to enhance the reliability of the DASS-21 (Shea et al., *2009*).

To improve the reliability of the DASS-21, Medvedev et al. (*2020*) used Rasch analysis on a sample size that met the minimum requirements. They made some adjustments to the scale such as removing Item 5 from the depression subscale due to significant misfit and creating super-items including items from individual subscales. After these modifications, the DASS-20 met requirements of the unidimensional Rasch model (Medvedev et al., *2020*). The authors created ordinal-to-interval conversion tables (Tables 1 and 2) and help to enhance the reliability of the DASS-20 while ensuring its compliance with fundamental measurement principles such as standard measurement units across the scale continuum, scale invariance across personal characteristics, and unidimensionality (Medvedev & Krägeloh, *2022*).**Table 1**

Ordinal-to-interval conversion for the three subscales of the modified DASS-21 measures (with Item 5 from the Depression subscale discarded)

	Anxiety measure		Stress measure		Depression measure	
Raw scores	**Logit scores**	**Interval scale**	**Logits scores**	**Interval scale**	**Logits scores**	**Interval scale**
0	−3.44	0.00	−4.02	0.00	−3.92	0.00
1	−2.71	2.34	−3.15	2.36	−2.98	2.27
2	−2.18	4.06	−2.52	4.09	−2.28	3.93
3	−1.79	5.32	−2.05	5.36	−1.77	5.16

4	−1.46	6.37	−1.66	6.41	−1.35	6.15
5	−1.17	7.30	−1.33	7.33	−1.00	7.00
6	−0.91	8.16	−1.02	8.16	−0.69	7.74
7	−0.67	8.93	−0.74	8.93	−0.41	8.41
8	−0.45	9.64	−0.48	9.63	−0.15	9.02
9	−0.25	10.30	−0.24	10.30	0.09	9.61
10	−0.06	10.92	−0.01	10.93	0.33	10.17
11	0.13	11.51	0.22	11.53	0.57	10.74
12	0.31	12.09	0.44	12.13	0.81	11.32
13	0.49	12.68	0.65	12.72	1.07	11.94
14	0.67	13.27	0.87	13.31	1.36	12.64
15	0.86	13.88	1.10	13.94	1.70	13.46
16	1.06	14.53	1.35	14.60	2.13	14.48
17	1.29	15.24	1.62	15.34	2.74	15.94

18	1.55	16.08	1.93	16.20	3.60	18.00
19	1.87	17.14	2.33	17.27		
20	2.36	18.70	2.89	18.81		
21	3.07	21.00	3.70	21.00		

Note: This table cannot be used for individuals with missing responses to scale items

Table 2

Ordinal-to-interval conversion for the overall score of the modified DASS measure (with Item 5 from the Depression subscale discarded)

Raw scores	Logits scores	Interval scale	Raw scores	Logits scores	Interval scale
0	−2.84	0.00	31	0.10	34.04
1	−2.25	6.86	32	0.13	34.34
2	−1.86	11.43	33	0.15	34.67
3	−1.59	14.48	34	0.18	34.98
4	−1.39	16.81	35	0.21	35.28
5	−1.23	18.68	36	0.23	35.59
6	−1.09	20.25	37	0.26	35.91

7	−0.98	21.58	38	0.29	36.22
8	−0.88	22.72	39	0.31	36.53
9	−0.79	23.72	40	0.34	36.85
10	−0.72	24.60	41	0.37	37.19
11	−0.65	25.39	42	0.40	37.52
12	−0.59	26.10	43	0.43	37.88
13	−0.53	26.74	44	0.46	38.25
14	−0.48	27.35	45	0.50	38.64
15	−0.43	27.90	46	0.53	39.03
16	−0.39	28.42	47	0.57	39.46
17	−0.35	28.91	48	0.61	39.91
18	−0.31	29.36	49	0.65	40.39
19	−0.27	29.80	50	0.69	40.93
20	−0.23	30.21	51	0.75	41.52

21	−0.20	30.61	52	0.80	42.17
22	−0.16	31.00	53	0.87	42.93
23	−0.13	31.37	54	0.94	43.79
24	−0.10	31.73	55	1.03	44.82
25	−0.07	32.08	56	1.14	46.08
26	−0.04	32.42	57	1.28	47.73
27	−0.01	32.76	58	1.48	50.03
28	0.02	33.08	59	1.81	53.80
29	0.04	33.41	60	2.34	60.00
30	0.07	33.72			

Note: This conversion table can only be used if there are no missing data

To convert ordinal scores into interval-level scores, the user should follow the procedure outlined in Medvedev et al. (*2020*), which involves removing Item 5, calculating raw scores for each subscale and the total scale, and finding the corresponding interval-level scores in the conversion Tables 1 and 2. The conversion tables developed by Medvedev et al. (*2020*) provide interval-level scores in logit units, which are the universal measurement units used in the Rasch model. Additionally, the original scale metric is included for the convenience of readers who may not be familiar with the Rasch methodology. The results of statistical tests will not be impacted by using logits or the scale metric, but the scale metric will illustrate the ordinal-scale bias by comparing it to the ordinal raw scores.

In addition to the widely used 21-item version of the Depression Anxiety Stress Scales (DASS-21), there are several other shorter versions of the scale available. These include the 18-item version (DASS-18), the 12-item version (DASS-12), and the 9-item version (DASS-9). The DASS-18 was developed by Henry and Crawford (*2005*), while the DASS-12 and DASS-9 were developed by

Sinclair et al. (*2012*). These shortened versions were created to reduce the burden on participants and researchers, as well as to provide more efficient and streamlined assessments. Research has shown that these shorter versions of the DASS are also reliable and valid measures of depression, anxiety, and stress (Henry & Crawford, *2005*; Sinclair et al., *2012*).

Translations of the DASS-21

The DASS translated versions are available into more than 50 languages, with the DASS-21 translated in over 30 languages, such as Arabic, Dutch, Malaysian, Russian, Spanish, Swedish, Thai, and Turkish (Lee et al., *2019*). To ensure the validity of the translated versions, factor analytical techniques have been used in both general and clinical population samples. Though, generalizability of the scale scores as a global measure of distress across cultures may be limited due culture-specific differences as well as the comprehensiveness and accuracy of translations. According to Scholten et al. (*2017*), only about 20 of the DASS-21 translations have been psychometrically validated, and these versions are summarized in Table 3. The comprehensive list of translated versions of the DASS and DASS-21 is available on the official DASS website (http://www2.psy.unsw.edu.au/groups/DASS/).**Table 3**

Overview of different validated versions of the DASS-21

Language	Reference	Notes
Arabic	Moussa et al. (*2017*)	Validated with a clinical sample
Cantonese	Li et al. (*2021*)	Validated with university students in Hong Kong
Bangla	Ahmed et al. (*2022*)	Validated with a general population sample
Dutch	Oei et al. (*2013*)	Validated with clinical samples; this version includes specific instructions for different levels of severity
English[a]	Lovibond and Lovibond (*1995*)	Ordinal-to-interval conversion tables are available (Tables 1 and 2); Item 5 was removed by recent Rasch analysis (Medvedev et al., *2020*)

French	Ciobanu et al. (*2018*)	Validated with young adults
German	Marheineke et al. (*2021*)	Validated with a neurorehabilitation sample
Greek	Kyriazos et al. (*2018*)	Validated with a general population sample
Hungarian	Szabó (*2010*)	Validated with a sample of young adolescents
Hindi	Kumar et al. (*2019*)	Validated in head neck cancer and oral potentially malignant disorders patients
Italian	Bottesi et al. (*2015*)	Validated with both clinical and non-clinical samples
Iranian	Asghari et al. (*2008*)	Validated with a general population sample
Malaysian	Musa et al. (*2007*)	Validated with undergraduate students
Mandarin	Jiang et al. (*2020*)	Validated with a sample of Chinese hospital workers
Nepalese	Thapa et al. (*2021*)	Validated with a general population sample
Portugese	Apóstolo et al. (*2012*)	Validated with a general population sample
Serbian	Jovanović et al. (*2014*)	Validated with student samples

Spanish	Mella et al. (*2014*)	Validated with a student sample
Swedish	Alfonsson et al. (*2017*)	Validated with a sample of Swedish adolescents
Turkish	Akin and Iskender (*2011*)	Validated with a clinical sample of patients with diabetes
Vietnamese	Le et al. (*2017*)	Validated with general population

Note. [a]First version of the instrument

Cultural Considerations

The use of the DASS-21 in cross-cultural context requires careful consideration of cultural differences. The validity and reliability of the translated versions of the DASS-21 may be affected by cultural differences in the understanding and expression of negative affect, as well as differences in translation quality. Thapa et al. (*2021*) found that the Nepalese version of the DASS-21 displayed some anomalies in its factor structure. Specifically, four stress items cross-loaded on depression, while one item from the anxiety and one from the depression subscale, cross-loaded on the stress factor. These findings suggest that the Nepali version may not effectively distinguish between the symptoms of depression, anxiety, and stress. The Nepalese DASS-21 was developed using a sample of 794 adults from a northern village and may not generalize to other Nepalese populations.

In conclusion, when using the DASS-21 in cross-cultural contexts, it is important to be aware of the potential impact of cultural differences on the validity and reliability of the translated versions. It is recommended to use validated versions of the DASS-21 and to be mindful of the potential issues with reliability and validity when comparing scores across cultures. Furthermore, it is important to be aware of any cultural differences in the understanding and expression of negative affect and to be mindful of the potential impact of these differences on the interpretation of the scale scores .

Scoring Instructions

The DASS-21 is a self-report questionnaire designed to measure the three core emotional states of depression, anxiety, and stress (Appendix 1). The scoring instructions for the DASS-21 are consistent across most versions and require individuals to rate the frequency of symptoms they have experienced in the past week on a 4-point scale ranging from 0 (*did not apply to me at all*) to 3

(*applied to me very much or most of the time*). The total score for each of the three emotional states (depression, anxiety, and stress) is calculated by summing up the scores of the relevant items (Appendix 1).

However, some translated versions of the DASS-21 may have slight variations in scoring instructions. For example, some versions may use a 5-point or a 6-point scale instead of a 4-point scale. The scoring instructions for the DASS-21 may also vary in different languages, which can impact the comparability of scores across cultures. For example, the scoring instructions for the Dutch version of the DASS-21 (Scholten et al., *2017*) include specific instructions for different levels of severity, which may not be present in other versions. Additionally, some versions may have excluded certain items, which may affect the total score for each emotional state. It is important to note that these variations may impact the reliability and validity of the DASS-21 when comparing scores across different translated versions. Thus, it is recommended to use the original English version or a validated translated version that adheres to the original scoring instructions (Lee et al., *2019*).

Limitations and Recommendations for Future Research

The DASS-21 is a widely used self-report questionnaire for measuring depression, anxiety, and stress, however, its use in international contexts has raised concerns about its cross-cultural and temporal validity. Studies have found inconsistent results when using the DASS-21 in different cultural contexts, such as in Asia where Oei et al. (*2013*) found issues with three of the stress items in a sample of six countries. The authors argued that this may be due to cultural differences in how symptoms of depression, anxiety, and stress are expressed and perceived. Culture can influence the overall experience and expression of emotional states, making it important to consider when using psychometric scales like the DASS-21 in different cultural contexts.

The lack of generalizability of the DASS-21 in international contexts highlights the need for further research investigating its cross-cultural validity. One approach to address this issue is the use of Generalizability theory (G theory), which can provide detailed estimation of variance sources and distinguish between state and trait symptoms. For example, Paterson et al. (*2018*) used G theory to validate the 10-item Children's Depression Inventory in a sample of children in New Zealand. Further studies using G theory to analyze samples from different cultures and countries can help determine the enduring aspects of the DASS-21 in international contexts. Overall, when using the DASS-21 in international contexts, it is important to be aware of potential cultural differences in the expression and perception of symptoms of depression, anxiety, and stress. Further research is needed to determine its cross-cultural validity and generalizability .

Conclusion

The DASS-21 is widely recognized as a robust tool for measuring depression, anxiety, and stress. The 21-item version of the scale has been shown to have high content validity and a robust structure validity that supports the original tripartite model. The scale has been translated into over 50

languages with the DASS-21 version available in 34 languages, which has gained popularity as a reliable measure of symptoms of negative emotional states. One advantage of the DASS-21 is the availability of interval-level scoring, which enhances its reliability.

Despite its widespread use, more cross-cultural validation studies are needed to determine the validity of the scale in non-Western countries. Culture influences the expression of symptoms and the general experience of emotional states, and it is possible that the DASS-21 may not accurately capture negative emotions in populations outside of Western societies. To address this issue, researchers should employ G theory, a method for estimating the variance of contributing error sources, to distinguish between state and trait symptoms and to produce accurate estimates of variance sources that may influence psychometric assessments.

Appendix 1 DASS-21

Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you the past week. There are no right or wrong answers. Do not spend too much time on any statement. The rating scale is as follows:

- 0 Did not apply to me at all – NEVER
- 1 Applied to me to some degree, or some of the time – SOMETIMES
- 2 Applied to me to a considerable degree, or a good part of time – OFTEN
- 3 Applied to me very much, or most of the time – ALMOST ALWAYS

1) I found it hard to wind down	0	1	2	3
2) I was aware of dryness of my mouth	0	1	2	3
3) I couldn’t seem to experience any positive feeling at all	0	1	2	3
4) I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5) I found it difficult to work up the initiative to do things	0	1	2	3
6) I tended to over-react to situations	0	1	2	3

7) I experienced trembling (e.g., in the hands)	0	1	2	3
8) I felt that I was using a lot of nervous energy	0	1	2	3
9) I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10) I felt that I had nothing to look forward to	0	1	2	3
11) I found myself getting agitated	0	1	2	3
12) I found it difficult to relax	0	1	2	3
13) I felt down-hearted and blue	0	1	2	3
14) I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15) I felt I was close to panic	0	1	2	3
16) I was unable to become enthusiastic about anything	0	1	2	3
17) I felt I wasn’t worth much as a person	0	1	2	3
18) I felt that I was rather touchy	0	1	2	3
19) I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20) I felt scared without any good reason	0	1	2	3

21) I felt that life was meaningless	0	1	2	3

DASS-21 Scoring

The depression subscale comprises items 3, 5, 10, 13, 16, 17, and 21, the anxiety subscale contains items 2, 4, 7, 9, 15, 19, and 20, and the stress subscale includes items 1, 6, 8, 11, 12, 14, and 18. The scale uses a four-point Likert- type scale format, with responses ranging from 0 = *Did not apply to me at all* to 3 = *Applied to me very much, or most of the time*.

DASS-21 Scoring Interpretation

Interpretation	**Depression**	**Anxiety**	**Stress**
Normal	0–4	0–3	0–7
Mild	5–6	4–5	8–9
Moderate	7–10	6–7	10–12
Severe	11–13	8–9	13–16
Extremely Severe	14+	10+	17+

Note. This scoring interpretation is based on the DASS-21 subscales sum scores

Although, the scale developers recommended to multiply all scores by two to make scores comparable to 42 item version, which is not impacting on the results of statistical analyses and may be ignored by researchers

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