

•Original research article•

Psychometric properties of the Chinese version of the Arabic Scale of Death Anxiety

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Background: Death anxiety is regarded as a risk and maintaining factor of psychopathology. While the Arabic Scale of Death Anxiety (ASDA) is a brief, commonly used assessment, such a tool is lacking in Chinese clinical practice.

Aim: The current study was conducted to develop a Chinese version of the ASDA, i.e., the ASDA(C), using a multistage back-translation technique, and examine the psychometric properties of the scale.

Methods: A total of 1372 participants from hospitals and universities located in three geographic areas of China were recruited for this study. To calculate the criterion-related validity of the ASDA(C) compared to the Chinese version of the longer-form Multidimensional Orientation toward Dying and Death Inventory (MODDI-F/chin), 49 undergraduates were randomly assigned to complete both questionnaires. Of the total participants, 56 were randomly assigned to retake the ASDA(C) in order to estimate the one-week, test-retest reliability of the ASDA(C).

Results: The overall Cronbach's alpha was 0.91 for the whole scale. The one-week, test-retest reliability was 0.96. Exploratory Factor Analysis (EFA) revealed three factors, "fear of dead people and tombs," "fear of lethal disease," and "fear of postmortem events," accounted for 57.09% of the total variance. Factor structure for the three-factor model was sound. The correlation between the total scores on the ASDA(C) and the MODDI-F/chin was 0.54, indicating acceptable concurrent validity.

Conclusions: ASDA(C) has adequate psychometrics and properties that make it a reliable and valid scale to assess death anxiety in Mandarin-speaking Chinese.

Keywords: Arabic Scale of Death Anxiety; Chinese version; psychometric properties

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1. Introduction

Death anxiety is a basic fear underlying numerous psychological conditions.^[1] Given the fear of death is described as a "worm at the core" of many mental disorders,^[2] such as social anxiety, panic disorders, phobias, and depression, death anxiety is believed to be a trans-diagnostic factor^[3] that plays a significant role in the development and degree of severity of a range of anxiety disorders^[4] and anxiety-related

problems.^[5] While death anxiety has been evaluated in many countries, primarily in non-clinical populations^[6] of nurses, health care professionals, students, it has also been assessed among individuals facing terminal illness and among patients^[7, 8] with anxiety disorders, schizophrenia, and substance addiction.^[9] A considerable number of studies reported on the treatment of death anxiety.^[10] Greenberg and colleagues^[11] claimed that the Terror Management Theory was the leading

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and most influential approach to death anxiety. The accuracy of outcome measurement for desensitization treatment among students with high death anxiety may be influenced by the choice of death anxiety inventory used,^[12] suggesting the importance of using a reliable, valid scale when evaluating the degree of death anxiety.

Tools such as Templer's Death Anxiety Scale (T-DAS),^[13] the Collett Lester Fear of Death Scale (CLFOD),^[14] the Spanish Death Anxiety Inventory (SDAI),^[15] and the Arabic Scale of Death Anxiety (ASDA),^[16] have been developed and demonstrate adequate reliability and validity.

In China, this assessment has not been applied in clinical settings partly because of lacking tools. Chinese culture is influenced by several religious traditions, including Confucianism, Buddhism, and Taoism, that have shaped attitudes toward death. For example, Confucius recommended dedicating oneself selflessly during a limited lifetime, while the Buddha thought of death as a terrifying and mysterious transmigration. Although the Chinese have always avoided discussing death, superstitious thoughts, which are highly prevalent in Chinese societies, are related to death anxiety.^[17] With the growing interest in mental health in China, and accumulating evidence to recommend that a death anxiety assessment supplement other measures of mood and psychological functioning^[3], it is necessary to develop a scale to assess death anxiety and ensure early treatment of this transdiagnostic construct^[3].

In recent years, a Chinese Death Anxiety Inventory (CDAI)^[18] was developed based on the T-DAS. The CDAI had been used in the clinical sample in Hong Kong.^[19] However, the inventory was developed for Cantonese speakers. Although Cantonese is spoken in Hong Kong, Mandarin is spoken by the majority of Chinese. Since the ASDA is one of the most commonly used self-reporting inventories for death anxiety, it was the basis for our current study. The ASDA consists of 20 statements, whereas the recently developed Multidimensional Orientation toward Dying and Death Inventory (MODDI-F/chin)^[20, 21] consists of 47-items and is more time-consuming. Although the ASDA was developed in Arabic, it has been translated into and validated in other languages, including Spanish, English,^[22, 23] and Turkish (unpublished).

We aimed to examine the psychometric properties of the ASDA Chinese version, i.e., the (ASDA (C)) using a sample population of Chinese medical staffs and undergraduates in three different parts of mainland China. To the best of our knowledge, this is the first study designed to assess the reliability and validity the ASDA (C).

2. Participants and Methods

2.1 Ethical Approval

This study was approved by the Ethics Committee of the Shanghai Mental Health Center. All participants

reviewed and signed the written informed consent prior to being included in the study.

2.2 Participants

Participants were primarily medical staff and undergraduates who were recruited from hospitals and universities in three different Chinese provinces: Shanghai, located in the eastern portion of the country; Jiangxi in the central portion; and Heilongjiang in the northern portion. The flow chart of study participation is shown in Figure 1. In total, 1357 participants took part in this study and completed the questionnaire. The convenience sample consisted of 768 university students and 589 hospital staff members. Data collected from 1201 participants (437 men and 764 women) were included in the study; data from 156 participants were excluded because of incomplete questionnaire responses. The ages of participants ranged from 18 to 64 years. To estimate the test-retest reliability, 56 participants were randomly assigned to repeat the questionnaire one week after the initial testing. To test the criterion-related validity, 49 undergraduates were required to also complete the MODDI-F/chin.^[21]

2.3 Assessment tools

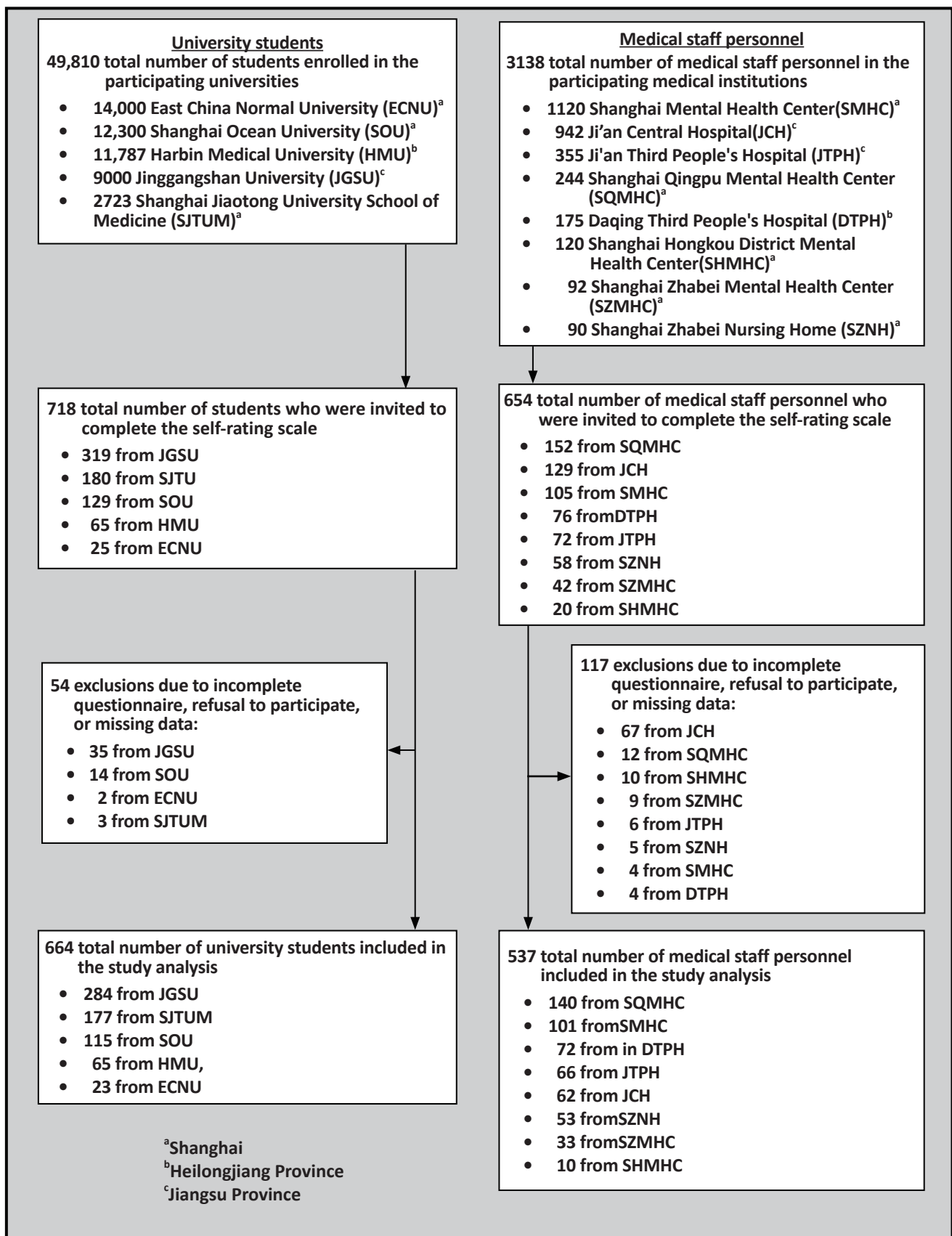
2.3.1 The Arabic Scale of Death Anxiety - Chinese Version [ASDA(C)]

The ASDA^[16] was developed to assess death anxiety or fear of death, and it was validated in a large sample of undergraduates from three Arab countries: Egypt, Kuwait, and Syria. In its final form, the ASDA consists of 20 short statements. Each item is answered on a 5-point intensity, Likert scale, anchored by 1 = no and 5 = very much. Scores can range from 20 to 100, with higher composite scores indicative of greater perceived death anxiety. The Alpha reliabilities ranged from 0.88 to 0.93; and item-remainder correlations ranged between 0.27 and 0.74. The 1-week, test-retest reliability was 0.90 (Egyptians only), denoting high internal consistency and stability.^[16] The ASDA is available in English and Spanish versions.^[22, 23] A multistage, back-translation technique^[24, 25] was used to develop the Chinese version of the ASDA.^[16] The stages of adaptation – including specific items requiring several cycles of translation and back-translation – are shown in Figure 1.

2.3.2 The Multidimensional Orientation toward Dying and Death Inventory (MODDI-F)

The MODDI-F^[20] is one of the more recent multidimensional assessment techniques. The 47-item questionnaire was originally developed in German and then adapted for the English language. The tool is based on a 2 × 4 dimensional a priori structure proposed by Collett and Lester with respect to the fear of dying and death and adds a new component on the attitude of acceptance. Each item is rated according to a 4-point

Figure 1. Flowchart of the study



Likert scale from 0 (agree not at all) to 3 (agree almost totally). For the German version of the MODDI-F, the internal consistency among a community sample ranged from 0.82 to 0.92.^[20] For the Chinese version of the MODDI-F, the internal consistencies of the eight subtests ranged from 0.68 to 0.91.^[21] The MODDI- F/ chin was used in the present study as a criterion for the ASDA(C).

2.4 Procedure

Students and medical staff completed the self-rating scale within a class or a department as a group, after giving their informed consent. Forty-nine undergraduates were randomly selected to complete both questionnaires. Of the total participants, 56 were randomly selected to retake the ASDA(C).

2.5 Statistical analysis

All data analysis was conducted using SPSS 19.0 statistical software and Mplus(Version 7; Muthén&Muthén, 2012). The internal consistency reliability was assessed using Cronbach’s alpha coefficient. Test-retest reliability of the scale was examined with the Spearman’s correlation of the two scores obtained one week apart. To test the dimensionality of the ASDA(C), the sample was randomly split into two separate groups. The first group was subjected to an exploratory factor analysis (EFA). The sample adequacy was assessed by the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The second group was subjected to a confirmatory factor analysis (CFA). Criterion-related validity of the ASDA(C) was assessed by Pearson correlation coefficients between the factors and total score of the ASDA(C) on one side and the MODDI-F/chin on the other.

3. Results

3.1 Participant characteristics

A total of 1357 participants were enrolled in this study: 768 were recruited from universities and 589 from hospitals. Of the 1357 participants, 1201 completed the questionnaire; 156 participants were excluded because of incomplete questionnaire responses. The demographic details of the total sample are included in Table 1.

3.2 Reliability

Cronbach’s alpha reliability of the ASDA(C) was 0.91. A sample of 56 participants repeated the ASDA(C) one week later. The 1-week, test-retest reliability was 0.96 for the entire scale. These results indicate high internal consistency and temporal stability.

3.3 Exploratory factor analysis (EFA)

A principal components analysis and Varimax rotation was conducted to study the construct validity, after measuring the sample adequacy by the Bartlett’s test of sphericity ($p = 0.0001$), and the Kaiser-Meyer-Olkin test

Table 1. Demographic information of participants

measure	total (n=1201)
Area: 1university in Jiangxi Province; n (%)	284 (23.6%)
2 hospitals in Jiangxi province; n (%)	128 (10.7%)
3 universities in Shanghai; n (%)	315 (26.3%)
5 hospitals in Shanghai; n (%)	337 (27.9%)
1 university in Heilongjiang province; n (%)	65 (5.4%)
1 hospital in Heilongjiang province;n (%)	72 (6.0%)
age: mean in years (sd)	26.6 (9.80)
gender: female; n (%)	764 (63.6%)
ethnic group: Han; n (%)	1188 (98.9%)
education: mean in years (sd)	13.51 (2.45)
major: medical staff; n (%)	537 (44.7%)
university students; n (%)	664 (55.3%)
religious: no; n (%)	1130 (94.1%)
ASDA(C) total score: mean (sd)	42.14 (13.55)
medical staff's score: mean (sd)	41.06 (13.42)
university students' score: mean (sd)	43.02 (13.60)

(KMO=0.92). For Kaiser criterion eigenvalues greater than 1.0, three factors were identified that accounted for 57.09% of the variance, as shown in Table 2. Factor 1 consisted of 8 items, labeled “fear of dead people and tombs,” (Items 2, 3, 8, 9, 11, 12, 16, and 17) and accounted for 39.84% of the variance. Factor 2 consisted of 7 items, labeled “fear of lethal disease,” (Items 1, 4, 5, 6, 10, 19, and 20) and accounted for 9.66% of the variance. Factor 3 consisted of 5 items, labeled “fear of postmortem events,” (Items 7, 13, 14, 15, and 18) and accounted for 7.58% of the variance. Item loadings ranged from 0.442 to 0.844, as shown in Table 2.

3.4 Confirmatory factor analysis (CFA)

The CFA was calculated using a maximum likelihood estimation method to examine whether the three-factor

Table 2. Exploratory factor analysis results of the Chinese version of the Arabic Scale of DeathAnxiety [ASDA(C)] (Half of total sample, n=600)

factors and corresponding contents of Items	component		
	1	2	3
Fear of dead people and tombs (39.84% of variance)			
Q.3 I fear visiting graves.	0.827	0.114	0.058
Q.8 I am afraid of looking at a corpse.	0.826	0.262	0.051
Q.2 I fear looking at the dead.	0.812	0.228	-0.027
Q.12 I dread walking in graveyards.	0.694	0.090	0.325
Q.11 Witnessing the burial procedure terrifies me.	0.688	0.199	0.379
Q.9 I fear the torture of the grave.	0.603	0.263	0.409
Q.17 The sight of a dying person frightens me.	0.587	0.297	0.264
Q.16 I get upset by witnessing a funeral.	0.442	0.151	0.501
Fear of lethal disease (9.66% of variance)			
Q.19 I am afraid of getting cancer.	0.098	0.844	0.134
Q.10 I fear getting a serious disease.	0.175	0.783	0.140
Q.20 I fear death.	0.168	0.760	0.189
Q.6 I worry that death may deprive me of someone dear to me.	0.245	0.640	0.012
Q.1 I fear death whenever I became ill.	0.100	0.537	0.325
Q.4 The possibility of having a surgical operation terrifies me.	0.399	0.530	0.138
Q.5 I am afraid of suffering a heart attack.	0.267	0.493	0.296
Fear of postmortem events (7.58% of variance)			
Q.14 I am afraid of sleeping and not waking up again.	0.031	0.031	0.784
Q.13 I am preoccupied with thinking about what will happen after death.	0.075	0.174	0.693
Q.18 Talking about death upsets me.	0.315	0.238	0.598
Q.7 I am apprehensive of unknown things after death.	0.234	0.344	0.544
Q.15 The pain accompanying death terrifies me.	0.156	0.468	0.471
Eigenvalue	7.968	1.931	1.516
Cronbach's alpha coefficient	0.898	0.847	0.747

Q= item number of ASDA(C)

model fit the other half sample. The fit of the model was acceptable with the results of the CFA analysis: $\chi^2=1184.175$ ($df=167$, $p<0.001$). Root Mean square Error of Approximation (RMSEA)=0.099 (90%CI=0.093, 0.104). Comparative Fit Index (CFI)=0.916. Tucker-Lewis index (TLI)=0.905.

3.5 Criterion-related validity

In terms of the scale's concurrent validity, the correlation between the total scores on the ASDA(C) and the MODDI-F/chin was 0.54 ($p < 0.001$). The correlation coefficients between the factors of the ASDA(C) and the total score on the MODDI-F/chin ranged from 0.358 to 0.664, as shown in Table 3.

4. Discussion

4.1 Main Findings

The participants in our study are a representative sample of the general population as indicated by the fact that 94.1% of participants reported no religious beliefs, which is consistent with results from a 2012 Chinese survey.^[26] The participants in the present study were recruited from universities and hospitals. Undergraduates comprised 55% of the sample, while nurses and clinicians accounted for 45%. Health care professionals reported lower levels of death anxiety than undergraduates in the present study, which may be due to the fact health care professionals hold positive attitudes toward death and the dying process during routine work^[27].

Table 3. Correlations between factors of the ASDA and the MODDI-F/ chin (n= 49).

	MODDI-F total	factor 1	factor 2	factor 3
ASDA total	0.534 ^b			
factor 1	0.358 ^a	1		
factor 2	0.561 ^b	0.611 ^b	1	
factor 3	0.469 ^b	0.664 ^b	0.572 ^b	1

^a $p < .05$ level (2-tailed); ^b $p < .01$ level (2-tailed)

The average total score of the Chinese version of the ASDA(C) in undergraduates was around 42, which is almost similar to the score of undergraduates from Lebanon, Spain and the United Kingdom, but less than the anxiety reported by undergraduates from Egypt, Kuwait, and Syria.^[16, 23] The differences in death anxiety scores among undergraduates might be attributed to country-specific differences in religious beliefs and world views.^[28]

Our study shows the Cronbach's alpha of the ASDA(C) was 0.91 in this sample. Reliability coefficients for other language versions of the ASDA range from 0.86 – 0.93.^[16, 29, 30] The test-retest reliability of the Chinese version was 0.96, indicating the ASDA(C) was stable over time.

Previous studies have shown that the ASDA has concurrent validity ranging between 0.60 and 0.74 with Templer's Death Anxiety Scale.^[16] In addition, the Pearson correlations between the total scores on the ASDA and CLFDS were significant among Kuwaiti undergraduates.^[31] In the current study, the ASDA(C) is significantly correlated with the (MODDI-F)/chin ($r = 0.53$, $p = 0.0001$), which confirms the construct validity of this scale.

With regard to the Egyptian and Syrian samples, the ASDA yielded four factors and were labeled: (a) fear of dead people and tombs, (b) fear of postmortem events, (c) fear of lethal disease, and (d) death preoccupation or death concern.^[16] As for the Kuwaiti sample, three factors were extracted: (a) fear of dead people and tombs, (b) fear of lethal disease, and (c) fear of postmortem events.^[16] In the present Chinese study, the EFA extracted the same three factors that were extracted from the Kuwaiti study. "Death preoccupation" was not extracted in this study because traditional Chinese beliefs may suppress any kind of death preoccupation. For example, death is a taboo subject that is not to be mentioned or thought about, according to Chinese tradition,^[32] and the perception that discussing death can bring bad luck is widespread in Chinese culture.^[33] The three factors extracted from this study were similar to the results from the original version, indicating that the ASDA exhibits cross-cultural adaptation and a highly replicable factor structure.^[23] Although CFA was not used to confirm the goodness of fit of the other ASDA versions, CFA results in our study

demonstrate the data fit the three-factor solution model of the ASDA(C).

4.2 limitations

Although an accessible sample is suitable for exploring the psychometric properties of the death anxiety inventory, the sampling method does have some limitations. The sample is comprised of individuals recruited from universities and hospitals in three geographic areas of China, thus it may not be representative of the Chinese population in general. Previous research showed that age and education influenced the degree of death anxiety.^[34] Although the medical staff included doctors, nurses, and workers providing personal care, there was a sample bias in the study. Future research should avoid the sample bias as much as possible. Replications of the present study with a randomized sample would enhance generalizability. Given that death anxiety appears to be a basic fear at the core of a range of mental disorders, including hypochondriasis, panic disorder, anxiety and depressive disorders, further research is warranted to explore the transdiagnostic role of the ASDA(C) in additional clinical and non-clinical populations.

4.3 Importance

Our study demonstrates the adequate reliability and validity of the ASDA(C), which can be a useful tool to assess death anxiety among majority of the Chinese population.

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Conflict of interest statement

The authors report no competing interests.

Author contributions

QQ performed the statistical analyses and drafted the manuscript. SYZ and XL helped with data analyses and assisted with writing the paper. CXB, HBY, ZWL, JRW, and TW were responsible for data collection and clarification. AMAK provided the English version of the ASDA,

supervised the back-translation editing, and edited the manuscript. SFX made substantial contributions to the research and the text. XL formulated and supervised the research and the text. All authors approved the final manuscript.

阿拉伯死亡焦虑量表中文版的心理测量学特性

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背景: 死亡焦虑被视为精神病学症状的风险因素和持续存在的因素。虽然阿拉伯死亡焦虑量表 (ASDA) 是一种简单而常用的评估工具, 但是在国内临床实践中缺少这样的工具。

目标: 本研究旨在采用多级回译法开发 ASDA 中文版, 即 ASDA(C), 并研究该量表的心理测量学特性。

方法: 从国内三个地区的医院和大学共招募了 1372 名参试者。为了计算出 ASDA(C) 的效标相关效度与有关死亡和死亡清单的多维度取向表格中文版 (MODDI-F/chin) 相比较, 随机指定 49 名大学生完成这两份调查问卷。在所有参试者中随机指定 56 名再做一次 ASDA(C) 问卷调查, 来评估 ASDA(C) 的一周后重测信度。

结果: 量表总的 Cronbach's α 值为 0.91。一周后的重测信度为 0.96。探索性因子分析 (EFA) 显示三个因素, “对死人和坟墓的恐惧”, “对致命疾病的恐惧” 和 “对死亡事件的恐惧”, 占总方差的 57.09%。因而构建三因素模型。量表 ASDA(C) 总分与 MODDI-F/chin 的相关系数是 0.54, 表示信度都可以接受。

结论: ASDA(C) 有较好的心理测量学特性, 说明这是一个可靠有效的量表。该量表能用于讲普通话的中国人, 来评估死亡焦虑。

关键词: 阿拉伯死亡焦虑量表; 中文版; 心理测量学特性

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