

Cross-cultural adaptation of the Type D Personality Scale for use with patients diagnosed with Ischemic Heart Disease in Sri Lanka

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(Index words: Ischemic Heart Disease, Type D Personality, DS-14)

Abstract

Introduction Ischemic Heart Disease (IHD), a major cardiovascular disease globally, has become the primary cause of death in Sri Lanka. Negative affectivity (NA) and social inhibition (SI) are two personality traits which increase the risk of IHD. The Type D Scale (DS-14) evaluates a person's general level of distress on NA and SI. However, DS-14 has not been translated and validated into Sinhala in Sri Lanka.

Objectives The study aimed to cross-culturally adapt and validate the DS-14 for use with Sinhala speaking patients diagnosed with IHD.

Methods Translation, back translation and pre-test were conducted before two-rounds of a Delphi process which assessed content and consensual validity of the instrument. The validated questionnaires were administered to 140 patients diagnosed with IHD at a Base Hospital. Factor structure was confirmed through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) and reliability, by internal consistency with Cronbach's alpha.

Results The questionnaire was administered among 140 participants (85 females), aged 18-60 years. The DS-14 Sinhala version showed good content and consensual validity. Factor analysis proved two factors compatible with the original instrument, which explained the variance of 62.9%. CFA confirmed the two-factor model. The reliability analysis indicated Cronbach's alpha for NA and SI as 0.93 and 0.88, respectively.

Conclusion The cross-culturally adapted DS-14 Sinhala version indicated the same psychometric properties as the original instrument, in the local context with IHD patients. It can be confidently applied in the investigation of Type D personality in IHD prevention and treatment, as well as in research.

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Introduction

Ischemic heart disease (IHD) is considered the foremost cause of death [1], and disability around the world and its prevalence are approximately one in every six deaths in Western countries [2]. Although the mortality of IHD has declined gradually over the last decades in Western countries, it is still responsible for about one-third of all deaths in individuals older than 35 years of age [1]. Further, a study conducted among individuals over 18 years revealed that the IHD prevalence was 6.1, 6.4, 5.3 and 3.7% in Caucasian, African, Latino and Asian populations, respectively [3]. Moreover, it is the prevalence increases with age, and males are at a higher risk [4]. A study has indicated that IHD deaths in Southeast Asia have amplified from 5.73 to 8.14 million from 1990 to 2013 [5]. Ischemic Heart Disease has been identified as the foremost cause of morbidity and mortality in Sri Lanka [6] where risk factors are more significant in urban areas, higher socioeconomic classes and among younger people [7,8].

Psychological distress is closely related to the advancement of IHD and directly associated with the medical consequences of IHD [9,10]. Type D (distressed) personality is an emerging risk factor in patients with cardiovascular diseases (CVDs) and closely connected with poor prognosis, reduced health status, and mental health issues such as depression, anxiety and Post Traumatic Stress Disorder [12-14]. DS-14 (14) is an instrument which is used to evaluate a personality type commonly associated with IHD, and it was developed from the 16-item, DS-16 [15] scale. The impact of Type D personality on the prognosis of CVDs has been widely discussed with the use of both instruments [16,17]. Type D personality is the person's consistent inclination to experience negative affectivity (NA) and social inhibition (SI) [18]. While NA signifies the inclination to experience

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negative emotions (i.e. depression, anger, anxiety), SI signifies restraining from disclosing feelings and opinions in social interactions to avoid others' disapproval [18].

The DS-14, which describes the Type D personality shows two factorial NA and SI dimensions [18]. The Type D personality and the factorial structure of DS-14 have been widely explored and validated in many countries [19-25]. Further, the internal consistencies of these various validated versions are acceptable [i.e.; United Kingdom and Ireland ($\alpha_{NA} = 0.85$; $\alpha_{SI} = 0.82$) [25]; Denmark ($\alpha_{NA} = 0.83$; $\alpha_{SI} = 0.76$) [22]; Turkey ($\alpha_{NA} = 0.82$; $\alpha_{SI} = 0.81$) [26]. Since only a few research studies have been carried out on Type D personality in non-western contexts, the information available on the applicability of Type D typology in these other cultures is low [28-31], for which an instrument that assesses Type D personality is required.

Although several studies have been conducted in Sri Lanka on diverse aspects of IHD, no instrument has been found in Sinhalese with proven reliability and validity which assesses Type D personality in IHD patients. The majority (>75%) of Sri Lankans speak the Sinhala language as the mother tongue, and having an instrument in the Sinhala language to evaluate type D personality will be valuable in the treatment and prevention of IHD which has become a crisis in the country. Therefore, the present study was carried out to cross-culturally adapt and evaluate the validity and reliability of the DS-14 for use in patients diagnosed with IHD in Sri Lanka.

Methods

The DS14 is consisted of NA and SI where the subjects are rated on their personality on a 5-point Likert scale ranging from 0 = false to 4 = true. The NA and SI scales can be scored as continuous variables (ranging from 0-28) to assess these personality traits in their own right. A cutoff of 10 on both scales is used to classify subjects as Type D (i.e., $NA \geq 10$ and $SI \geq 10$).

Study population

Participants were chosen using the systematic sampling method, from patients who are diagnosed with IHD attending medical clinics at a Base Hospital in the Southern Province of Sri Lanka. Patients between 18-60 years and diagnosed with IHD within the last three months of the data collection were selected for the study. The selection of IHD patients were done by going through their clinic records and by further confirming the diagnosis of IHD with the physicians working in the medical clinics at the Base Hospital. Among them, patients of various ethnic groups and competent in the Sinhala language were selected. Patients who had significant health problems, physical disabilities, previously diagnosed with significant health problems (data were gathered through previous

clinic reports), critically ill and pregnant women were omitted. The DS-14 is consisted of 14 items and the participants per item were kept at a ratio of 5:1 as per the literature [31]. Accordingly, the calculated total sample size of the validation study was 140 by allocating equal subsamples for CFA ($n=70$) and EFA ($n=70$).

Translation and pre-test

Initially, the instrument was translated and then it was back-translated, the translated version back into English by two subject specialized professional translators. Afterwards, to determine the conceptual equivalency of the translated and back-translated versions, they were scrutinised by a bilingual professional in the field of behavioural sciences, and the corrections were made accordingly.

A structured interview with four patients diagnosed with IHD was carried out as the pre-test of the DS-14 Sinhala version. Minor revisions were made according to the comments made by these patients on aspects such as the ease of comprehending the instrument, difficulty level when responding, and the length of the DS-14 instrument's items.

Content and consensual validity

The content and consensual validity were determined by an expert panel of two psychiatrists and four clinical psychologists through a Delphi process. In terms of consensual validity, the panel of experts rated each item, on a scale of 0 (total disagreement) to 9 (full agreement): (i) if an item's conceptual meaning was maintained after it was translated to Sinhala; (ii) if the items were suitable to be used with patients diagnosed with IHD, and (iii) if the instrument items were culturally relevant to Sri Lanka. Concerning content validity, the panel of experts again rated the instrument from 0 to 9: (i) if each item was a suitable indicator of its scale/sub-scale, and (ii) if the combination of items in the scale/sub-scale was adequate to measure the concept assessed by the scale/sub-scale. The ratings received from stage one was summarised and presented for a second round of the Delphi Process. The repeat ratings were evaluated for their degree of consensus.

Ethical considerations

Initially, the permission was obtained from the original author to translate, cross-culturally adapt and validate the DS-14 into the Sinhala language. Ethics approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Colombo, Sri Lanka (EC-18-011) and institutional permission was obtained from the Medical Superintendent of the Base Hospital in which the patient data was collected. Informed written consent was obtained from all the study participants.

Statistical analysis

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were performed by the R (3.6) and R Studio (1.2) statistical software to evaluate the invariance of the instrument, and model-data fit. The data were divided randomly into two equal subsamples; one subsample was used to analyse EFA (n=70), and the other was used to do CFA (n=70) to confirm the factorial structure of the original study.

To evaluate the sample adequacy subsample for the exploratory factor analysis, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett test of sphericity were performed, and KMO values of ≥ 0.70 were considered average [32]. A scree plot was shown to determine the number of components to extract. EFA by principal components was performed with Varimax rotation. Reliability was verified with internal consistency, using Cronbach's alpha, and coefficients of ≥ 0.70 were considered to possess a satisfactory internal consistency [33]. In CFA, following values were calculated and compared: the comparative fit index (CFI), the Tucker-Lewis index (TLI), the incremental fit index (IFI), the root-mean-square error of approximation (RMSEA), the ratio of chi-squared test χ^2 to the degree of freedom (χ^2/df). The two-factor model of the original study was tested. The model was considered as consistent with the experimental data at the values of CFI [34], TLI [35] and IFI ≥ 0.90 , RMSEA [36] less than 0.08 and χ^2/df less than five.

Results

Sample characteristics

The study sample population consisted of 140 which represented 39.3% (n=55) males and 60.7% (n=85)

females. The average age was 53.87 years (SD ± 4.10) and the age range found was 34-59. All the participants were Sinhalese (100%; n= 140) and the majority (43.6%; n=61) had studied up to GCE (Ordinary Level) Examination (Table 1).

Delphi process

The following principles were used in the Delphi process to select the items in DS-14 Sinhala version; (i) if 70% or more of the re-ratings were in category 0-3, that item/sub-scale was omitted or reworded to make it acceptable. If reworded, the Delphi Process was repeated for that item/sub-scale, and (ii) if 70% or more of the re-ratings were in categories 4-6 and 7-9 (summatively), that item/subscale was retained. None of the items was removed from the original instrument. Some items were reworded according to suggestions made at stage one, by the experts, to retain the conceptual meaning when translated to Sinhala.

Factor structure

Exploratory factor analysis (EFA)

The KMO-index (0.83) and Bartlett's test of sphericity ($\chi^2(91)=559.68$, $p<0.05$) showed appropriate sample adequacy on the data to carry out the factor analysis. EFA (Principal components, Varimax rotation) of the DS-14 items showed two components (Eigenvalue > 1) explaining 62.90% of the variance (34.69% of the first factor and 28.21% of the second factor (Table 2). The scree plot showed a significant break after the 2nd component. Using Cattell's scree test, and it was confirmed to retain two components (Figure 1).

Table 1. Sample characteristics

| <i>Demographic characteristics</i> | | <i>Sample (n=140)</i> | |
|------------------------------------|----------------|-----------------------|-----------------------|
| | | <i>Frequency</i> | <i>Percentage (%)</i> |
| Age | | Mean = 53.87 | |
| | | SD ± 4.096 | |
| | | Range = 34-59 years | |
| Gender | Male | 55 | 39.3 |
| | Female | 85 | 60.7 |
| Race | Sinhala | 140 | 100 |
| Level of education | No schooling | 20 | 14.3 |
| | Primary | 55 | 39.3 |
| | Ordinary Level | 61 | 43.6 |
| | Advanced Level | 04 | 2.9 |

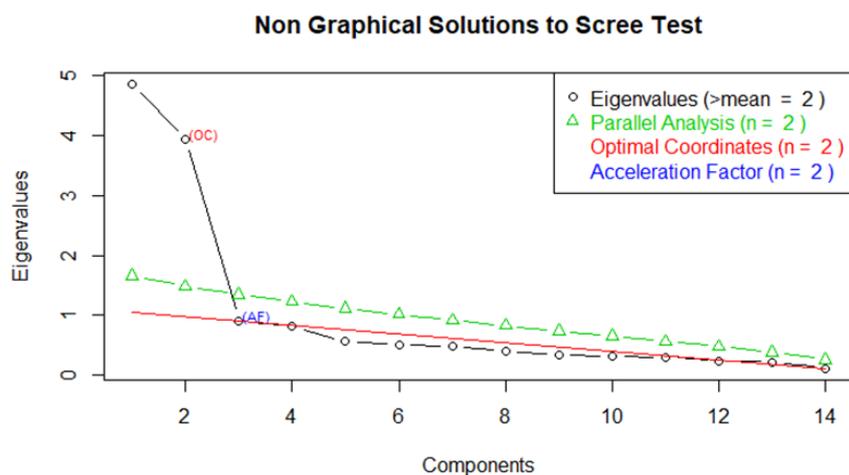


Figure 1. Scree plot showing the eigenvalues of the factors representing the items from the DS-14 for IHD patients.

Table 2. Factor structures and loadings of 14 items in DS-14 (*values above 0.5)

| Items of the DS14 | FA-Total sample | | Internal consistency |
|--|-----------------|-----------|----------------------|
| | Factor I | Factor II | |
| Negative affectivity | | | |
| 4. I often feel unhappy | 0.71* | 0.06 | 0.81 |
| 7. I take a gloomy view of things | 0.79* | 0.14 | 0.82 |
| 13. I am often down in the dumps | 0.91* | -0.02 | 0.91 |
| 2. I often make a fuss about unimportant things | 0.75* | 0.01 | 0.82 |
| 12. I often find myself worrying about something | 0.88* | 0.02 | 0.92 |
| 5. I am often irritated | 0.55* | 0.16 | 0.73 |
| 9. I am often in a bad mood | 0.79* | -0.08 | 0.82 |
| eigenvalue I = 4.25 | | | $\alpha = 0.93$ |
| Social inhibition | | | |
| 6. I often feel inhibited in social interactions | 0.04 | 0.83* | 0.84 |
| 8. I find it hard to start a conversation | -0.06 | 0.74* | 0.80 |
| 14. When socialising, I do not find the right things to talk about | 0.01 | 0.52* | 0.64 |
| 10. I am a closed kind of person | -0.02 | 0.73* | 0.78 |
| 11. I would rather keep other people at a distance | 0.10 | 0.75* | 0.75 |
| 1. I make contact easily when I meet people | 0.06 | 0.74* | 0.78 |
| 3. I often talk to strangers | 0.15 | 0.75* | 0.79 |
| eigenvalue II = 3.76 | | | $\alpha = 0.88$ |

Confirmatory factor analysis (CFA)

CFA was performed to test the predicted two-factor structure of the DS14 directly. The second sample (n=70) was used to check the factorial structure of the original study. A CFA of the two-factor structure of the DS-14 Sinhala version indicated a good model fit. The two-factor model gave a chi-squared value of 559.68 (df=91) (p<0.001), and for the 2-factor solution we found, CFI=0.919, TLI=0.903 and RMSEA=0.104 (90% CI 0.074-0.133), confirming full conformity of the theoretical two-factor model with the obtained data.

Reliability analysis

Cronbach’s alpha values on the subscale of NA and SI were 0.93 and 0.88, respectively. Mean inter-item total correlations were identified as 0.645 for the NA and 0.522 for SI items. The values for “alpha if item deleted” in both subscales NA and SI were lower than corresponding subscale values in the alpha of 0.001. Therefore, the Cronbach’s alpha coefficient proved an acceptable internal consistency for the two subscales of the DS-14 Sinhala version.

Table 3. Internal consistencies for each subscale in the current study, original study, and other studies

| Study | Negative affectivity | Social inhibition |
|-----------------------------------|----------------------|-------------------|
| Original study | 0.89 | 0.82 |
| Sinhalese version (Current study) | 0.93 | 0.88 |
| Chinese version | 0.90 | 0.85 |
| Danish version | 0.87 | 0.91 |
| Norwegian study | 0.87 | 0.83 |
| Persian version | 0.84 | 0.86 |
| French version | 0.88 | 0.88 |

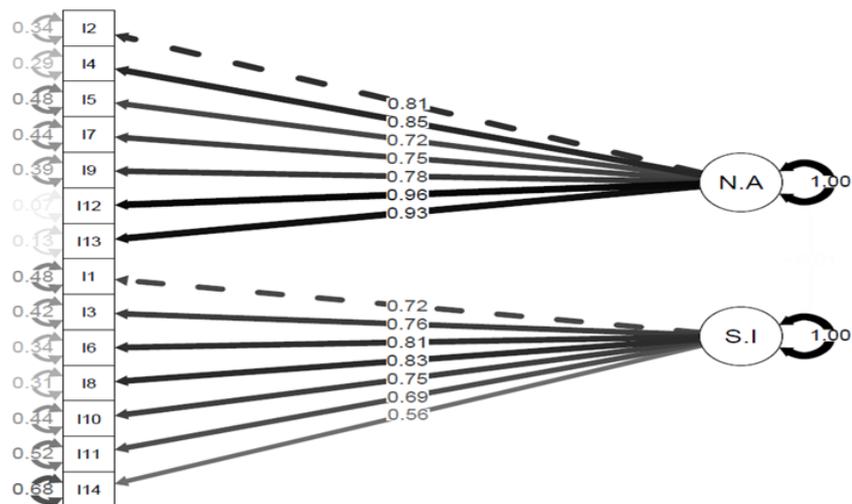


Figure 2. Confirmatory factor analysis path diagram for the DS-14. NA (negative affectivity), SI (social inhibition).

Discussion

Negative affectivity (NA) and social inhibition (SI) are two traits which increase the risk of IHD(11) and impacts its treatment and prevention. The DS-14 is a widely used instrument, with excellent psychometric properties, which evaluates an individual's general level of distress, based on NA and SI. The present study aimed to translate, cross-culturally adapt, and assess the psychometric properties of the Sinhala version of DS-14, as an assessment tool to detect type D personality among the Sinhala speaking community.

Forward translation, back translation, bilingual scrutinization, and pre-tests were undertaken to obtain acceptable content and consensual validity of the instrument. Two rounds of the Delphi process tested content and consensual validity. The Delphi panel consisted of experts in mental health – two psychiatrists and four clinical psychologists. None of the items was removed from the original instrument, and rewording of some items was done according to suggestions made by some experts, such that the conceptual meaning was retained when translated to Sinhala.

EFA was performed to find out the probable underlying factors, and CFA was utilized to confirm the factor structure. Exploration of factor structure was led with the first subsample data, and verification of factor, with other subsample data, considering the recommendations [37,38]. Factor analyses of the DS-14 in several different languages had identified NA and SI items loading on the two factors [22,24,30,39,40]. Considering the CFA data, an acceptable model fit with construct validity was detected, and the values of the fit guides for the two-factor model were acceptable and closer to the desired level. Therefore, the original two-factor model best fitted and clarified the items of the DS-14 Sinhala version in the tested sample.

Reliability analysis was performed through evaluating the internal consistency using Cronbach's alpha. Cronbach's alpha coefficients were calculated for each subscale were NI=0.93 and SI= 0.88; all of which lie above the commonly accepted thresholds for internal consistency. Results are equivalent to those of the original study and other language versions [22,24,30,39,40] as illustrated in table 03.

Conclusion

The validated DS-14 Sinhala version has indicated acceptable psychometric properties, in par with the original instrument. It can confidently be applied in research, investigation of Type D personality and IHD preventive programmes.

Data availability

The data used to support the findings of this study are available with the corresponding author upon request.

Conflicts of interest

All authors declare that they have no conflicts of interest.

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