Trends
in Psychiatry and Psychotherapy

JOURNAL ARTICLE PRE-PROOF
(as accepted)

Original Article

Psychometric Properties of the Death Anxiety Scale for Adult Chronic Patients

Ximena Palacios-Espinosa, Ricardo Sánchez Pedraza, Ana-María Gómez-Carvajal, Juan Sebastián Botero-Meneses, Diana María Escallón, Diego Armando Leal

http://doi.org/10.47626/2237-6089-2023-0630

Original submitted Date: 09-Mar-2023

Accepted Date: 11-Jun-2023

Psychometric Properties of the Death Anxiety Scale for Adult Chronic Patients

Ximena Palacios-Espinosa[1]; Ricardo Sánchez Pedraza[2]; Ana-María Gómez-Carvajal[1]
Juan Sebastián Botero-Meneses[3],Diana María Escallón[4],Diego Armando Leal[5]

[1]Universidad del Rosario, Escuela de Medicina y Ciencias de la Salud, Grupo de Investigación Individuo, Familia y Sociedad, Bogotá, Colombia; [2] Instituto de Investigaciones Clínicas, Facultad de Medicina, Universidad Nacional de Colombia; [3]Universidad del Rosario, Escuela de Medicina y Ciencias de la Salud, Grupo de Investigación en Neurociencia (NEUROS), Centro de Neurociencia Neurovitae-UR, Bogotá, Colombia; [4]Hopsital Universitario Méderi, Bogotá, Colombia; [5]Universidad del Rosario, Escuela de Medicina y Ciencias de la Salud

Corresponding Author: Ximena Palacios-Espinosa, Cr 26# 63B-48 postal code: 111221,

Phone: 2970200, Ext 3486

E-mail: ximena.palacios@urosario.edu.co

Abstract

Introduction: Death anxiety is a predictor of exacerbations in both physical and psychological symptoms of chronic diseases. Therefore, having short and easy-to-apply instruments to assess the presence of death anxiety and adopting a multidisciplinary approach to address it are important. Method: This study analyzes the psychometric properties of the Death Anxiety Scale (DAS) developed by Donald Templer in a Colombian population of adult patients diagnosed with a chronic disease. The original

instrument was linguistically, conceptually, and culturally adapted to Colombian Spanish to be subsequently applied to 301 adult patients with chronic diseases. Results: The exploratory factor analysis revealed a 3-factor structure, with a variance of 47%. Internal consistency was observed (Cronbach's alpha: 0.71; McDonald's omega: 0.76; Guttman's lambda 6 (G6): 0.74; greatest lower bound: 0.54). A correlation coefficient of 0.64 was found between the total score of the DAS and the Beck Anxiety Inventory. Conclusion: When comparing the results with the versions of the DAS in Spanish from Mexico and Spain, variability in the psychometric properties was observed; therefore, language cannot be assumed to be a guarantee of the reliability and validity of the instrument.

Keywords: chronic disease, death anxiety, instrumental case study, psychometric properties.

Introduction

Death anxiety (DA) is a universal phenomenon [1] defined as an "emotional reaction produced by the perception of real or imaginary signs of danger or threat to one's own existence, that may be triggered by environmental, situational, or dispositional stimuli, associated with one's own or other people's death" [2]. It includes negative emotional reactions [3-4], nonspecific feelings of discomfort or unease [3] caused by the individual's anticipation of a state wherein the self does not exist [4] and the "apprehension about the idea of their demise, the 'nonbeing,' and the uncertainty of what awaits us (or not) after death" [3]. The stimuli triggering death anxiety can be either learned or innate (thoughts or images) [5]. Nowadays, DA is acknowledged as a "multidimensional construct related to the fear or anxiety caused by the anticipation and awareness of the reality of death or dying,

including emotional, cognitive, and motivational components that vary according to the developmental stage and the sociocultural context" [5]. The cultural history, personal background, and ways of coping with separation and changes are factors linked to DA [3].

Empirical background indicates that DA tends to be present in people suffering from chronic diseases, such as cancer [6–9], HIV/AIDS [10], cardiovascular conditions [8,11-12], chronic obstructive pulmonary disease (COPD) [13-14], or diabetes mellitus [8,15], which interferes with their health-related quality of life [10,16-17] and represents an additional burden to their experiences with the disease and coping skills. Assessing DA experienced by patients with chronic diseases is useful to help them in adjusting after identifying the disease and taking prompt action to treat it. The medical conditions of such patients that may include tiredness, dyspnea, pain, and distress, among other signs and symptoms that interfere with their willingness to participate in and tolerate extensive evaluation processes are worth considering. Thus, it would be advisable to have short and effective instruments to measure death anxiety. The Death Anxiety Scale (DAS) developed by Donald Templer is a 15-item valid and reliable instrument that is widely used, short, and can be self-administered [18]. The instrument's factor structure was not initially reported by Templer, although it was later used in other studies that described it, obtaining different results (see Supplementary Table 1).

Overall, in addition to its widespread use and its translation into 26 languages, the DAS is easy to understand. Although versions in Spanish from Spain [19] and Mexico [20] are already available, the linguistic varieties of this language may be difficult for other groups of Spanish speakers. Moreover, as far as we know, there is no version of this scale that has been translated to Colombian Spanish; furthermore, its psychometric properties in

a Colombian population of chronic patients are unknown. In this context, this study assesses the psychometric properties of the DAS developed by Donald Templer in a Colombian population of adult patients diagnosed with chronic disease.

Materials and Methods

Participants

This study included adults who were diagnosed with a chronic illness, either receiving outpatient care or treated in two private hospitals in the city of Bogotá (Colombia), enrolled in the health and social security, once their informed consent to participate had been obtained. Patients with altered states of consciousness or those feeling unwell at the moment of evaluation were excluded from the study. Based on these criteria, 301 individuals were sampled under a non-probabilistic sequential convenience method. Twelve patients decided not to take part in the study, and two were in severe pain at the time of the assessment, which prevented them from participating.

Instruments

Death Anxiety Scale

The DAS comprises 15 items in a dichotomous scale, wherein 9 items are true and 6 are false. The interviewee is asked to mark their response considering whether each statement is true or false (always or most of the time). Each item is scored with values of 0 or 1, such the score may range from 0 to 15; a score closer to 0 represents a lower death anxiety, while that closer to 15 indicates greater death anxiety. The test–retest reliability

was 0.83, with a K Richardson 20 of 0.76, indicating the instrument's internal reliability. We applied the cross-culturally adapted Spanish version for this study (see Table 1).

Table 1 - *Death Anxiety Scale Colombian Spanish Version*

1. Tengo mucho miedo de morir.	VERDARERO	FALSO
2. La idea de la muerte casi nunca entra en mi mente.	VERDARERO	FALSO
3. No me pone nervioso que la gente hable sobre la muerte.	VERDARERO	FALSO
4. Me aterra pensar que me tengan que operar.	VERDARERO	FALSO
5. No tengo ningún temor de morir.	VERDARERO	FALSO
6. No le tengo especial miedo a tener cáncer.	VERDARERO	FALSO
7. No me molesta la idea de la muerte.	VERDARERO	FALSO
8. Con frecuencia me siento preocupado(a) por lo rápido que pasa el tiempo.	VERDARERO	FALSO
9. Me da miedo morir dolorosamente.	VERDARERO	FALSO
10.Me perturba mucho el tema de la vida después de la muerte.	VERDARERO	FALSO
11.Tengo mucho miedo de tener un infarto.	VERDARERO	FALSO
12. Con frecuencia pienso en lo corta que es la vida.	VERDARERO	FALSO
13. Me estremezco cuando escucho a la gente hablar de una tercera guerra mundial.	VERDARERO	FALSO
14. Ver un cadáver es espantoso para mí.	VERDARERO	FALSO
15. Siento que no tengo nada que temer con respecto al futuro	VERDARERO	FALSO

Note. The instructions for scale administration are: *Por favor responda las siguientes 15 preguntas. Si para usted la afirmación es verdadera,* ***SIEMPRE O LA MAYORÍA DE VECES****, marque VERDARERO. Si para usted la afirmación es falsa,* ***SIEMPRE O LA MAYORÍA DE VECES****, marque FALSO.*

Beck Anxiety Inventory (Beck & Steer—Spanish version)

Used to assess the discriminant validity of the DAS, the BAI measures general clinical anxiety. It includes 21 symptoms that are scored on a scale from 0 to 3, according to their presence. Scores between 0 and 63 are thus obtained, ranking the degree of anxiety as minimum, mild, moderate, or severe. This study used the Spanish version developed by

Sanz (internal consistency: 0.90), currently represented by the R&D Department of Pearson Clinical and Talent Assessment [21].

Death Anxiety Inventory (DAI) (Tómas-Sábado & Gómez-Benito)

This instrument contains 20 items in a 6-point Likert ranking scale (Cronbach's alpha: 0.90; test–retest correlation: 0.94). The DAI is positively correlated with the DAS (0.79), and comprises five factors: (1) externally generated death anxiety, (2) meaning and acceptance of death, (3) thoughts about death, (4) life after death, and (5) brevity of life [22].

Procedure

An independent Research Ethics Committee evaluated and approved the study, authorizing the use of oral informed consent (code: DVO005-1-181-CEI903). All participants gave their consent to participate.

The study took place in three phases: translation and cross-cultural adaptation of the DAS, pilot testing, and application for its validation.

Statistical Analysis

Conventional statistical tools were used for the descriptive component in accordance with the characteristics of the variables: means and standard deviations (SD) for continuous variables and percentages for categorical variables.

An exploratory factor analysis was conducted with the sample of 301 patients to establish the instrument's factor structure and explore the item distribution between these factors or domains. Given the characteristic measurement method of the items, a tetrachoric

correlation matrix was used for this analysis. The factorizability of the correlation matrix was checked through Barlett and Kaiser–Meyer–Olkin tests. The number of factors to assess was determined using the optimum coordinate method, by evaluating the characteristics of the sediment graphs. Additionally, orthogonal and oblique rotations were performed to select the factorial structure with greater interpretability.

For the exploratory factor analysis, the robust weighted least squares method was used for the sample of 301 patients, given the dichotomous nature of the items. The model's adjustment was deemed appropriate provided the following values for these indices were met: ratio χ^2/degrees of freedom (df) <3, non-normed fit index (NNFI) >0.9, root mean square error of approximation (RMSEA) <0.08, goodness-of-fit index (GFI) >0.9, comparative fit index (CFI) >0.9, and standardized root mean squared residual (SRMR) 0.08.

The instrument's reliability, assessed based on internal consistency values, was measured using Cronbach's alpha, McDonald's omega, Guttman's lambda and, greatest lower bound (see Supplementary Table 2).

The concurrent criterion validity was evaluated in 241 patients, estimating Pearson's correlation coefficients between the total scores of the DAS and DAI scales and between the scores of the DAS domains and the overall score of the DAI scale.

To assess test–retest reliability, means were compared using the signed rank-sum tests; additionally, Lin's concordance correlation coefficients were estimated, and the Bland–Altman limits of agreement plots were evaluated. All statistical analyses were conducted using R statistical software; 5% levels of significance and the 2-tailed hypothesis were used for hypothesis tests (see Supplementary Table 3).

For Rasch analysis, considering the characteristics of the items (yes – no responses) a dichotomous Rasch model has been performed using Winsteps (version 5.2.2). Two Rasch assumptions (unidimensionality and local independence) have been assessed. For unidimensionality we used a Principal Component Analysis of Residuals (PCAR) as well as an estimation of mean squared infit and outfit values. Unidimensionality is supported by eigenvalues < 2 for the first contrast and infit mean squared values of 0.6-1.5.

Unidimensionality is questionable when considering eigenvalues > 3 for all contrasts and infit-outfit estimators that fall out of the 0.7-1.3 range. Another criterion for establishing unidimensionality is based on the proportion of explained variance using the following measurements: Variance should be > 20% (ideally 40%), whilst the variance that is not explained by the first contrast should not be over 15% [23]. Local independence assumes that responses to an item are independent from responses to another item because the effect of causal dimension has been controlled for; this assumption was evaluated calculating the correlations of standardized residuals. Considering Item and person measures, we described them on a common, linear interval-level scale, using the logit (log odds). For evaluating item and person fit, the criterion of infit mean-square (MNSQ) (sensitive to unexpected responses close to the persons' skill level) and outfit (which prioritizes items that are far from the persons' skill level) have been used. Item difficulty has been analyzed by using a Wright map; this tool allows to visually evaluate where the items are located on a continuum of difficulty. Reliability has been evaluated using person and item reliability indexes, and person and item separation indexes. Person separation index evaluates how the instrument is capable of distinguishing between two groups of subjects. Item separation index allows to verify if a larger sample size is required to

confirm the separation of items (between lower or higher difficulty). Separation indexes of 1.5 and reliability coefficients of 0.7 represent acceptable levels [24-25].

Results

Cross-Cultural Adaptation

The translation/back-translation processes were performed to find a linguistically, conceptually, and culturally equivalent translation. Initially, two bilingual health professionals translated the original scale into Spanish. These translations were sent to two bilingual healthcare providers, who back-translated one of them into English, being blinded to the original items of the scale. Next, a committee of experts assessed the equivalence of the content between the test items in the English and Spanish versions. Each translation considered the aspects associated with meaning, expression, and grammar, and all items were included in a single translated version. Finally, an expert group was asked to compare the back-translation against the original version, item by item, thus resulting in the final version of the 15-item instrument. This version was applied to a pilot test including 20 adult patients with chronic diseases (mean age: 66.9 years; SD = 3.43 years), of whom 57.9% were women. Patients were individually asked about the difficulties in completing the test and understanding the items, and their suggestions were solicited. Adjustments were specifically made to four items.

Participants' Characteristics

The study included 301 adults with chronic disease (mean age: 63.5 years; SD = 15.7; see Supplementary Table 4).

Content Validity

The results obtained through the exploratory factor analysis revealed a 3-factor structure accounting for 47% of the variance (20%, 15%, and 12% in charge of factor 1, 2, and 3, respectively) (see Table 2).

Table 2 - *Death Anxiety Scale Factor Structure*

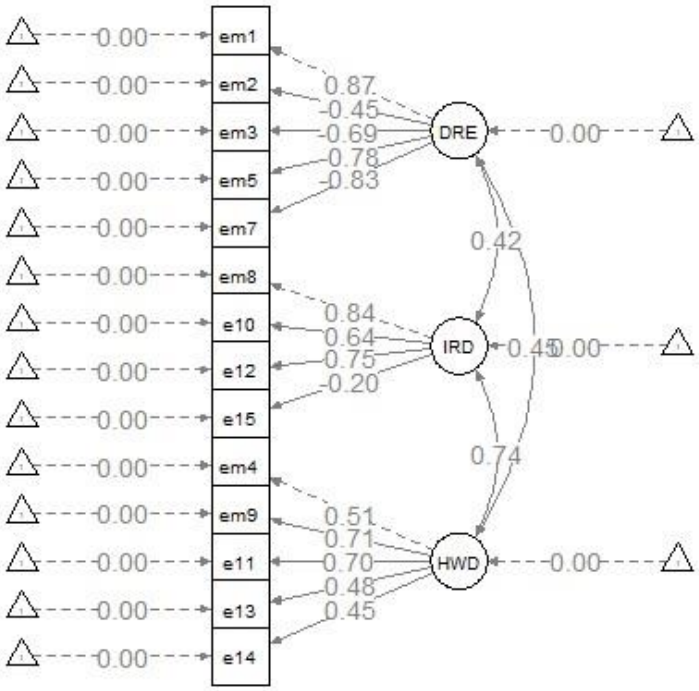
Ítems	F1	F2	F3	u2*
1. I am very much afraid to die.	**−0.73**	0.37	−0.14	0.33
2. The thought of death seldom enters my mind.	**0.41**	−0.09	0.02	0.81
3. It doesn´tmake me nervous when people talk about death.	**0.68**	0.01	−0.02	0.53
4. I dread to think about having to have an operation.	0.04	0.09	**0.51**	0.7
5. I am not at all afraid to die.	**0.99**	0.15	0.12	0.14
6. I am not particularly afraid of getting cancer.	0.05	−0.05	−0.27	0.9
7. The thought of death never bothers me.	**0.83**	−0.04	0.02	0.3
8. I am often distressed by the way time flies so very rapidly.	0.05	**0.9**	0.04	0.18
9. I fear dying a painful death.	−0.02	0.09	**0.71**	0.41
10. The subject of life after death troubles me greatly.	−0.17	**0.45**	0.12	0.65
11. I am really scared of having a heart attack.	−0.16	0.3	**0.33**	0.61
12. I often think about how short life really is.	0	**0.77**	0.02	0.39
13. I shudder when I hear people talking about a World War III.	0.22	0.26	**0.45**	0.68

14. The sight of a dead body is horrifying to me.	0.03	−0.1	**0.62**	0.68
15. I feel that the future holds nothing for me to fear.	0.33	**0.34**	−0.33	0.73

Note: Analysis using principal factor solution with varimax rotation. *u2: uniqueness

As seen in Table 4, factor 1 (DRE) is associated with death-related emotional aspects measured by five items (1, 2, 3, 5, and 7), whereas factor 2 (IRD) deals with aspects not directly associated with death, measured by four items (8, 10, 12, and 15). Factor 3 (HWD) is more heterogeneous, being related to health issues and witnessing death, measured by five items (4, 9, 11, 13, and 14). Item 6 ("I am not particularly afraid of getting cancer") had no suitable factorial load in any of the three domains and showed the highest uniqueness value (u2 = 0.9).

Owing to the dichotomous nature of the items, confirmatory factor analysis was performed using the robust weighted least squares estimation method (see Figure 1).



The circles in Figure 1 represent the three domains or factors, rectangles stand for the 14 items, and arrows pointing in a single direction indicate the causal relations between the domain and the item, while the correlation between factors are represented by 2-way arrows. The structural equation model conducted showed the following estimators: χ^2= 135.693, df = 74.000, χ^2/df = 1.83, RMSEA = 0.053, NNFI = 0.936, CFI = 0.948, GFI = 0.93, and SRMR = 0.108. The values of these indicators represented appropriate fit of the structural model.

Internal Consistency

The reliability estimators obtained from the analysis based on 301 remarks were as follows: Cronbach's alpha 0.71, McDonald's omega 0.76, Guttman's lambda 0.74, and greatest lower bound 0.54. Supplementary Table 3 shows the values of the alpha coefficients and Guttman's lambda; none of them increased after removing any one of the DAS items.

Concurrent Criterion Validity

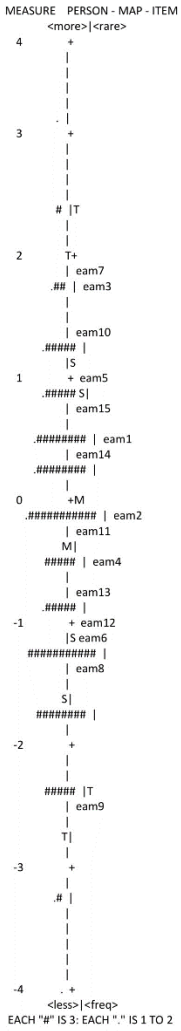
The study analysis was conducted based on 241 remarks to estimate the correlation coefficients between the total scores of the two scales and between the scores of the DAS domains and the total score obtained in DAI. The Pearson's correlation coefficient between the total scores of both scales was 0.64 (significantly different from 0). Values higher than 0.45 were found for the correlation coefficient between the DAI and the DAS domains, showing that the total scores of the two instruments had a correlation coefficient of 0.64 (see Supplementary Table 5).

Test–Retest Reliability

The test–retest reliability analysis was performed based on 82 repeated measurements, separated by an interval of 5–7 days (mean of 5 days, interquartile range = 2 days). The scale scores corresponding to each of the two measurements (pre and post tests) are shown in Supplementary Table 6.

The stability of the total scores and of the scores corresponding to each of the two domains were obtained using signed rank-sum tests with 2-tailed hypothesis. No

statistically significant differences were observed between pre- and post-measurements or for the global score or each domain score (see Figure 2).



As seen in the correlation matrix (Pearson's correlation coefficients), all correlation values were different from 0 (statistically significant difference, $p < 0.00001$) (see Supplementary Table 7).

Supplementary Table 2 shows Lin's correlation concordance coefficient values, which indicate an acceptable degree of concordance in Domains 1 and 3 and a low degree of concordance in Domain 2.

As shown by Bland–Altman goodness-of-fit plots (Supplementary Figures 1-5), no correlation patterns were observed based on the different scale scores or in any domain.

Rasch analysis

The PCAR showed that 34.55% of the variance was explained by a measurement model and that the first residue component had a value of 2.1, which represented a 9.4% of the total non-explained variance. Moreover, mean squared infit and outfit value of the items remained between 0.6-1.5. These findings support the hypothesis of unidimensionality. All correlations of standardized residuals correlations have low values (under 0.4), the highest observed among items 8 and 12. (r=.35) ("*I am often distressed by the way time flies so very rapidly."- "Often think about how short life really is").* Based on the aforementioned calculations, it can be assumed that the local independency hypothesis is fulfilled.

Description of scores in the logit metric scale

The difficulty level of the items was between -2.46 logits and 1.85 logits (mean=0; SD=0.16), while the skill level of subjects was between -4.55 logits and 3.17 logits (mean=0.39; SD=0.66). Considering the estimations of difficulty of the items, the one with

the lowest difficulty (equivalent to the one with the smallest discrimination capability and high sensitivity) was item 9 ("*I fear dying a painful death*"). The one with the highest difficulty was item 7 ("*The thought of death never bothers me*").

To compare the scores in the DAS among different groups of variables, the transformed version was used, using logit units on a scale of 0 to 100. Findings are summarized in supplementary table 8. None of the differences in means among strata were statistically significant.

Measures of items fit

Infit and outfit mean-squares (MNSQ) fall all within the recommended range (0.5-1.5); this is an indicator of adequate adjustment to the RASCH model [26].

Measures of persons fit

According to what some authors have described [27]. ZSTD values of outfit> 3 are indicators of poor adjustment in persons. According to that criterion, only two individuals (0.83%) show a poor adjustment to the RASCH model (See Figure 2). The mean, for both persons and items, is close to zero and has similar variability.

No overlapping items were found. The item with the least difficulty 'I fear dying a painful death', was approximately at a 1 logit distance from the item that follows; to properly cover the construct, it might be necessary to incorporate items that cover the lower spectrum of difficulty in the scale (e.g. the distance between eam8 and eam9).

Reliability of persons and items

For persons and items, the index of reliability is 0.71 and 0.98, respectively. Separation index are 1.56 for persons and 7.2 for items. These findings suggest adequate level of reliability for both persons and items.

Discussion and Conclusion

The recognition of DA as an entity that adds to the clinical picture of a chronic patient is essential for clinical follow-up and a comprehensive care intervention. DA exacerbates the negative affect of chronic disease, distorts perceptions about recovery, distances patients from health professionals [17,28-29], significantly decreases the quality of life of both the patient and the patient's partner [17,30], increases vulnerability to psychological stress and physical and emotional distress [31], is predictive of the onset of psychopathologies, and increases the number of hospitalizations and the need for or resistance to pharmacological treatment [32]. Some authors believe that DA should be studied as a transdiagnostic construct, as it promotes the development and maintenance of different mental disorders [31-32].

Our results show that the cross-cultural adaptation of DAS into Colombian Spanish comprises three factors that measure death-related emotional aspects (DRE), aspects indirectly related to death (IRD), and aspects related to health and witnessing death (HWD).The instrument's internal consistency is adequate based on a Cronbach's alpha of 0.71, which differs from the study by Rivera-Ledesma and Montero-López [33]conducted in Mexico on older adults (n = 165) and university students (n = 149) (0.86 in older adults and 0.83 in students) [33]. In this regard, the following has been considered: (1) unlike our study

population, some older adults in the Mexican sample may have had a chronic condition but not the entire cohort, (2) the difference in sociocultural context and the meaning of death. In fact, when comparing the results of both studies with a Spanish version (from Mexico and Spain) against ours, it is clear that, as reported by Sharif et al. [1], the psychometric variability in the results is caused by cultural and linguistic differences. This aspect fully justifies the need to further investigate the behavior of the psychometric properties of the instruments applied in different contexts, and (3) variations in the scale of response. In our study, analyses were conducted based on the dichotomous scale of the original instrument, while other in the study by Rivera-Ledesma and Montero-López [33], the dichotomous format was replaced by a Likert-type scale.

Our study found a correlation coefficient of 0.64 between the DAS domain scores and the DAI total score, showing adequate validity of the concurrent criterion between tests. No significant differences were found in the pre- and post-application for the total score or in any of the domains.

The results of this study confirm the need to always carry out cross-cultural adaptation and analysis of the psychometric properties of instruments that are to be used for research and clinical purposes. Assuming that language guarantees the reliability and validity of an instrument, as well as the understanding by the population, would be unwise.

In addition to an acceptable level of reliability, this Colombian Spanish version of DAS has been shown to be valid, which allows us to conclude that this is a short and effective instrument available to measure a variable of broad interest for both research on death anxiety and clinical interventions in chronic adult patients.

The key points of the Rasch analysis are that basic assumptions for the model (unidimensionality and local independence) are fully met in the data analysis and that the item "*The thought of death never bothers me*", had the highest specificity, hence it is the one that is only answered by subjects with high levels of DA.

Moreover, no significant differences in scores were found between subjects of different socioeconomic strata. Items and subjects were adequately adjusted to the Rasch model, variability amongst items and subjects was similar, and no redundant items were identified. A non-measured space exists between items eam8 and eam9. If this space were to be filled, better metrics and properties could be yielded upon analysis. Reliability markers are present.

Of the limitations of this study, it is worth mentioning that the sample was limited to chronic patients of a hospital in Bogotá. Colombia is a country of broad cultural and regional diversity. The study sample included adults from rural and urban areas of the country, but their origin was not specified. Additionally, adult chronic patients of high socioeconomic strata were not represented in this study. Future research should observe the behavior of DAS in different regions of the country and in populations of high socioeconomic strata, even though the latter represent a low percentage of the Colombian population.

Furthermore, psychometric studies with general population and health professionals must be conducted and all these results should be analyzed as a whole. It is likely that many interesting insights will come out of the comparison between these three populations. Our research group is currently developing studies with these characteristics.

Declaration of interest statement

The authors report there are no competing interests to declare.

Funding: This research did not receive any external funding.

References

1. Sharif NH, Lehto RH, Pahlevan SS, Mashrouteh M, Goudarzian AH, Rahmatpour P, et al. A Cross-Cultural Evaluation of the Construct Validity of Templer's Death Anxiety Scale: A Systematic Review. Omega. 2019;83:760-776

2. Huertas AL, Pérez SR, Avilés VE. Creencias, actitudes y ansiedad ante la muerte en un equipo de cuidados paliativos oncológicos. Psicooncología. 2014;11:101–115.

3. Tomás-Sábado J, Fernández-Narváez P, Fernández-Donaire L, Aradilla-Herrero A. Revisión de la etiqueta diagnóstica ansiedad ante la muerte. Enferm Clin.2007;17:152–156.

4. Tomer A, Eliason G. Toward a comprehensive model of death anxiety. Death Stud. 1996;20:343–365.

5. Limonero JT. Ansiedad ante la muerte. Ansiedad y Estrés. 1997;3:37–46.

6. Ali MS, Osmany M, Khan W, Mishra D. Fear of death, depression and coping among cancer patients. IJHW.2014;5:681–686.

7. Bibi A, Khalid MA. Death anxiety, perceived social support, and demographic correlates of patients with breast cancer in Pakistan. Death Stud.2020;44:787–792.

8. Khawar M, Aslam N, Aamir S. Perceived Social Support and Death Anxiety Among Patients with Chronic Diseases. Pak.J.Med.Res.2013;52:75–79.

9. Soleimani MA, Bahrami N, Allen KA, Alimoradi Z. Death anxiety in patients with cancer: A systematic review and meta-analysis. Eur J Oncol Nurs.2020;48:1-9

10. Ifeagwazi CM, Chukwuorji JC, Onu DU. Death anxiety as a factor in health-related quality of life among people living with HIV/AIDS. NJP Research. 2018;14:1-7

11. López-Castedo A, González-Rodríguez R, Vázquez Pérez R. Psychometric properties of the Death Anxiety Scale in patients with ischemic cardiomyopathy. Rev Esp Salud Pública.2019;93:1–8.

12. Şahan E, Eroğlu MZ, Karataş MB, Mutluer B, Uğurpala C, Berkol TD. Death anxiety in patients with myocardial infarction or cancer. Egypt Heart J. 2018;70:143–147.

13. Majidi S, Bolourchifard F,Esmaeili R, Zolghadr Z. The correlation between death anxieties with self-care in elderly patients with chronic obstructive pulmonary disease referring to masih daneshvari hospital. JOGE.2018;4:1–8.

14. Nal B, Avcı IA, Ayyildiz M. The correlation between death anxiety and anxiety in elderly with chronic obstructive pulmonary disease. Health Prog.2016;6:63–69.

15. Aghajani S, Samadifard H. The relationship between cognitive fusion and cognitive distortion with death anxiety in patients with diabetes mellitus. J. Chronic Dis.2018;27:18–22.

16. Shafaii M, Payami M, Amini K, Sharif S. The relationship between death anxiety and quality of life in hemodialysis patients. HAYAT.2017;22:325–338.

17. Soleimani MA, Lehto RH, Negarandeh R, Bahrami N, Nia HS. Relationships between Death Anxiety and Quality of Life in Iranian Patients with Cancer. Asia Pac J Oncol Nurs.2016;3:183–191.

18. Templer DI. The Construction and Validation of a Death Anxiety Scale. J.Exp.Psychol. Gen.1970;82:165–177.

19. Tomás-Sábado J, Gómez-Benito J. Psychometric properties of the Spanish form of Templer's Death Anxiety Scale. Psychol Rep.2002;91:1116–11120.

20. Rivera-Ledesma A, Montero-Lopez Lena M. Propiedades psicométricas de la escala de ansiedad ante la muerte de Templer en sujetos mexicanos. Perspect Psicol.2010; 30:135.

21. Beck AT, Steer RA. Manual. BAI. Inventario de Ansiedad de Beck. Madrid:Pearson Educación; 2011.

22. Tomás-Sábado J, Gómez-Benito J. Construction and Validation of the Death Anxiety Inventory (DAI). Eur J Psychol Assess.2005;21:108–114.

23. Sumintono B, Widhiarso W. Aplikasi pemodelan rasch pada assessment pendidikan. Trim komunikata; 2015.

24. Duncan PW, Bode RK, Lai SM, Perera S, Investigators GA in NA. Rasch analysis of a new stroke-specific outcome scale: the Stroke Impact Scale. Arch.Phys. M.2003;84:950–963.

25. Fisher W. Reliability, Separation, Strata Statistics [Internet]. Rasch Measurement Transactions. 1992 [cited 2022 Aug 17]. Available from: https://www.rasch.org/rmt/rmt63i.htm

26. Linacre JM, Wright BD. Winsteps [Internet].2000 [cited 2022 Aug 17].Available from: http://www winsteps com/index htm

27. Boone WJ, Staver JR, Yale MS. Rasch analysis in the human sciences. New York: Springer; 2014.

28. Gonen G, Kaymak SU, Cankurtaran ES, Karslioglu EH, Ozalp E, Soygur H. The factors contributing to death anxiety in cancer patients. J Psychosoc Oncol. 2012;30:347–358.

29. Sherman DW, Norman R, McSherry CB. A comparison of death anxiety and quality of life of patients with advanced cancer or AIDS and their family caregivers. J Assoc Nurses AIDS Care.2010;21:99–112.

30. Graça PM, Figueiredo AP, Fincham FD. Anxiety, depression, traumatic stress and quality of life in colorectal cancer after different treatments: A study with Portuguese patients and their partners. Eur J Oncol Nurs.2012;16:227–232.

31. Iverach L, Menzies RG, Menzies RE. Death anxiety and its role in psychopathology: reviewing the status of a transdiagnostic construct. Clin Psychol Rev.2014;34:580–593.

32. Menzies RE, Sharpe L, Dar-Nimrod I. The relationship between death anxiety and severity of mental illnesses. Br J Clin Psychol.2019;58:452–467.

33. Rivera-Ledesma A, Montero-López Lena M. Templers death anxiety scale. Diversitas: Perspectivas en Psicología.2010;6:135–140.

Supplementary Table 1 - *Factorial Structure of Templer's Death Anxiety Scale*

Authors	Population	Factors
(33)	Australian students	. Death anxiety . General concerns . Fear of pain and surgery
(34)	General population (17–97 years old) (n = 211)	. Fear of one's death . Concern about suffering and waiting too long before dying . Subjective nearness to death . Death-related fears . Disturbing thoughts about death
(35)	Professionals with different levels of experience treating dying patients and death	. Cognitive affective changes . Physical changes . Sense of time . Stress and pain
(36)	Canadian nurses	0. Denial of death anxiety 1. General death anxiety 2. Anticipatory fear of death 3. Fear of physical death 4. Fear of a catastrophic death
(37)	Not reported	Four universal factors: 5. Cognitive and affective responses to death 6. Real and/or imaginary physical changes accompanying severe disease and death

		7. Perception of the passing of time that may reduce the future and extend the past 3. Pain and stress, either real and/or anticipated, which may arise due to both chronic and terminal illnesses or because of personal fears.
(38)	Egyptian students (n = 428)	9. Thoughts about death 0. Fear of death 1. Concerns about death 2. Brevity of life 3. Apprehension about the future
(39)	Italian general population (n = 257)	4. Fear of death and dying 5. Passage of time 6. Fear of pain and surgery
(40)	Dutch general population	7. Fear of dying in the future 8. Perception of the passing of time The third and four factors are ambiguous The fifth factor is only represented by item 11
(19)	Spanish psychology students (n = 187)	9. Cognitive–affective factors 0. Pain and disease 1. Death-related stimuli 2. Perception of the passing of time
(20)	Mexican patients with chronic renal failure	Two factors that were not reported

Note: Table was prepared by the authors.

Supplementary Table 2 - *Measures of Internal Consistency After Removing Each Item*

Items	raw_alpha	G6
das 1-	0.67	0.7
das 2-	0.7	0.73
das 3-	0.69	0.72
das 4	0.69	0.73
das 5-	0.69	0.71
das 6-	0.71	0.74
das 7-	0.69	0.71
das 8	0.68	0.71
das 9	0.69	0.72
das 10	0.69	0.72
das 11	0.68	0.71
das 12	0.69	0.71
das 13	0.7	0.73
das 14	0.7	0.73
das 15	0.71	0.73

Note: DAS = Death Anxiety Scale; G6 = Guttman's Lambda 6 (G6).

Supplementary Table 3 - *Lin's Concordance Correlation Coefficient*

	Lin's ρ	95% CI	Bias correction factor
Total pre–Total post	0.8	0.73−0.88	0.99
Domain 1 pre–post	0.72	0.61−0.82	0.99
Domain 2 pre–post	0.62	0.48−0.75	0.99
Domain 3 pre–post	0.7	0.58−0.81	0.99

Supplementary Table 4 - *Participants' Characteristics*

Characteristics	Ratio (%)
Clinical diagnosis	
Cancer	29.2
Cardiovascular diseases	29.2
Respiratory diseases	18.3
Diabetes mellitus	13
Renal disease	3
Rheumatic or autoimmune disorders	1.7
HIV/AIDS	0.77
Comorbidities	
Organic	88.3
Psychiatric	7.3
- Anxiety disorders	23.8
- Sleep disorders	23.8
- Depression	19
- Addictions	14.3
Sex	

Women	53%
Men	47%
Civil status	
Married or cohabiting	55
Single	21.3
Widow/widower	15.7
Inpatient	66.8
Outpatient	33.2
Origin	
Urban	93%
Rural	7%
Socioeconomic status	
Low	54
Middle	41
High	5.1
Level of education	
Incomplete primary or secondary school	48
High school diploma	25
Technical level	12.5
University degree	8.8
Postgraduate degree	2.4
None	3
Occupationally active	74.4
Retired	38
Requiring assistance by a caregiver	46
Supported by family caregivers	97

Living with their immediate family	54
Catholic religion	83.5
Religious practice	78.2

Supplementary Table 5 - *Concurrent Criterion Validity Between Death Anxiety Inventory (DAI) and Death Anxiety Scale (DAS)*

	Total DAS	**Total DAI**	**Total F1**	**Total F2**	**Total F3**
Total DAS	1				
Total DAI	0.6448	1			
Total F1	0.7001	0.4546	1		
Total F2	0.7338	0.4546	0.3078	1	
Total F3	0.7686	0.5427	0.2373	0.4510	1

Supplementary Table 6 - *Scores of the Pre- and Post-Measures Obtained on Death Anxiety Scale (DAS)*

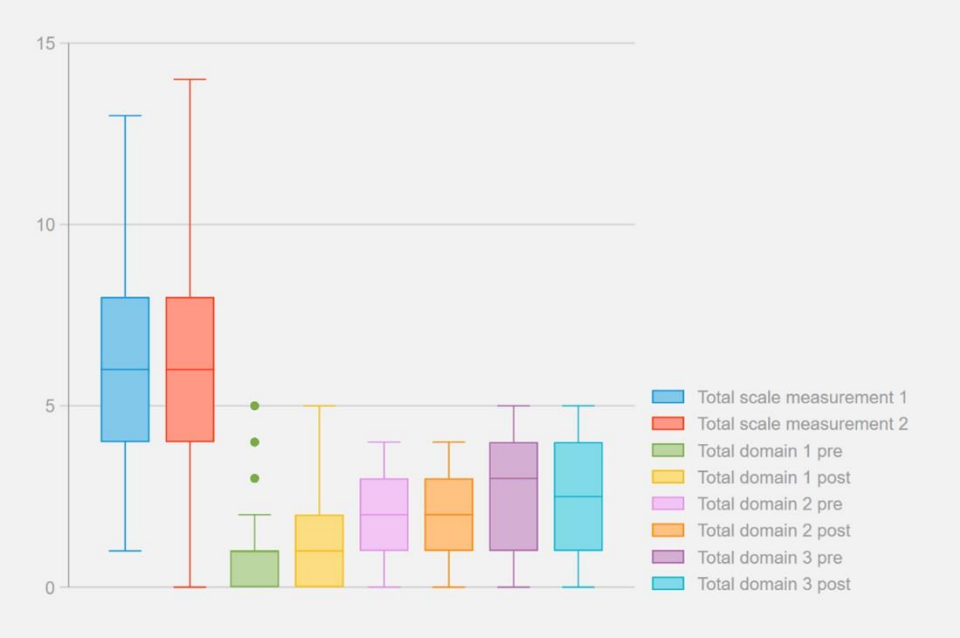
	Mean	SD
Total pre-DAS	6.268293	2.998143
Total post-DAS	6.219512	3.220399
Total Domain 1_Pre	1.182927	1.388916
Total Domain 1_Post	1.365854	1.45307
Total Domain 2_Pre	1.902439	1.117866
Total Domain 2_Post	1.865854	1.108466
Total Domain 3_Pre	2.54878	1.371243
Total Domain 3_Post	2.414634	1.456795

Supplementary Table 7 - *Correlation Coefficients Between Pre- and Post- Death Anxiety Scale (DAS) Measurements*

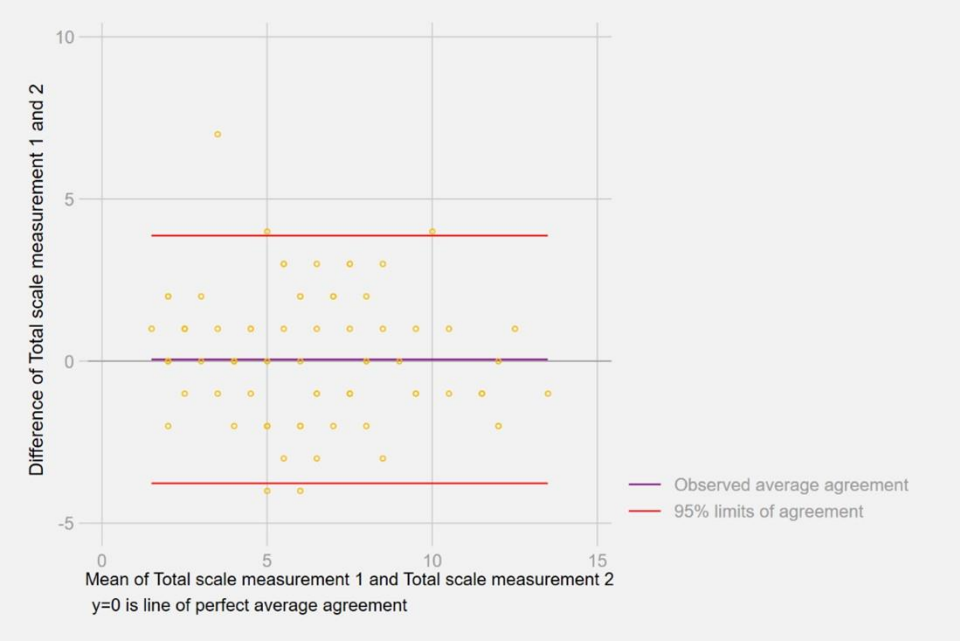
	Total pre	Total post	F1 pre	F2 pre	F3 pre	F1 post	F2 post	F3 post
Total pre	1.00							
Total post	**0.805**8	1.00						
p	0.0000							
F1 pre	0.7204	0.6478	1.00					
p	0.0000	0.0000						
F1 post	0.6035	0.7741	**0.7250**	1.00				
p	0.0000	0.0000	0.0000					
F2 pre	0.7667	0.5650	0.3933	0.2959	1.00			
p	0.0000	0.0000	0.0003	0.0070				
F2 post	0.5645	0.7139	0.3690	0.3681	**0.6170**	1.00		
p	0.0000	0.0000	0.0000	0.0007	0.0000			
F3 pre	0.7235	0.5874	0.2124	0.3007	0.4058	0.3333	1.00	
p	0.0000	0.0000	0.0554	0.0060	0.0002	0.0022		
F3 post	0.6469	0.7619	0.3587	0.3415	0.4118	0.3942	**0.7005**	1.00
p	0.0000	0.0000	0.0009	0.0017	0.0001	0.0002	0.0000	

Supplementary Table 8 - *Distribution of DAS scores*

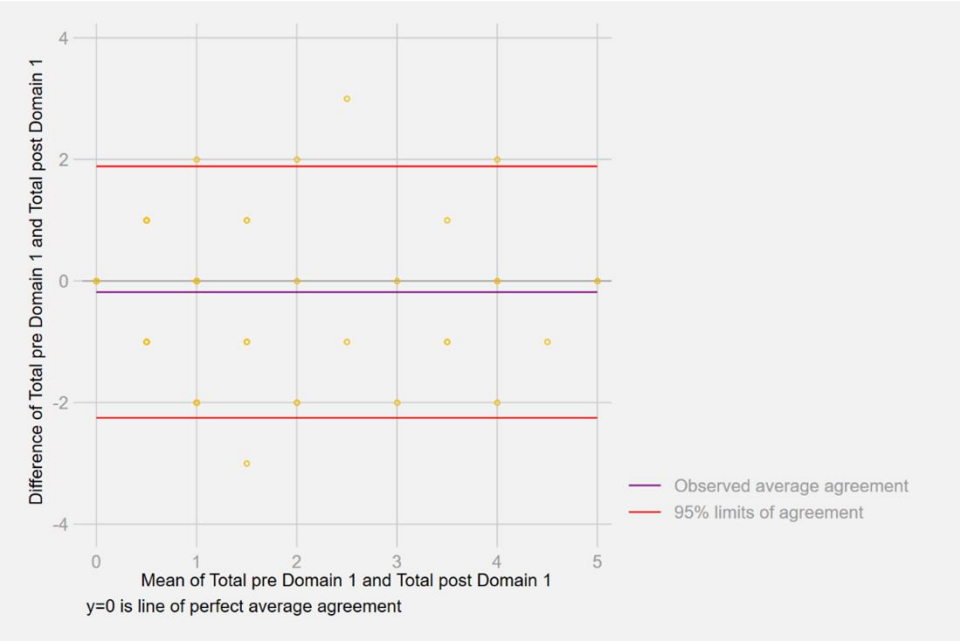
Variable	Obs	Mean	Std. Dev.
Gender			
F	131	47.08374	13.48422
M	108	44.67796	14.61005
Setting			
Rural	13	50.04385	18.71211
Urban	227	45.94084	13.71313
Practices a specific religion or faith			
No	52	45.85769	13.87961
Si	183	46.53153	13.84423
Socioeconomic strata			
1	23	47.54957	14.74498
2	106	46.57189	14.39278
3	97	44.78691	13.52415
4	13	49.71154	14.71616
Relationship status			
Single	51	47.19922	14.04423
Married	98	45.3299	13.55493
In a relationship, Cohabiting	35	45.78686	15.84817
Widower	38	47.03132	13.69782
Separated/Divorced	18	45.02278	14.52257
Educational level			
None	7	40.51286	15.48408
Incomplete elementary	20	48.8415	14.64996
Elementary	77	45.81481	13.37998
Incomplete High School	13	45.89462	11.33481
High school	62	48.63968	14.0545
Technical degree	32	43.52156	12.62556
Undergraduate	22	44.90727	17.72187
Graduate	5	35.334	12.22989
Lives alone			
No	217	46.33544	14.25649
Yes	24	43.97333	11.63695



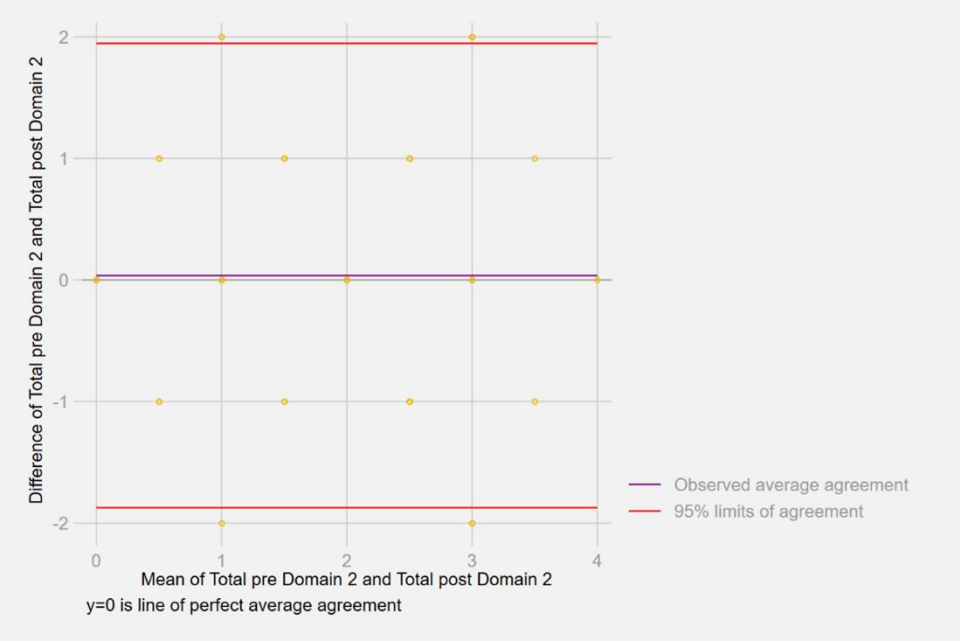
Supplementary Figure 1 - *Total Death Anxiety Scale Scores and Scores by Domain*



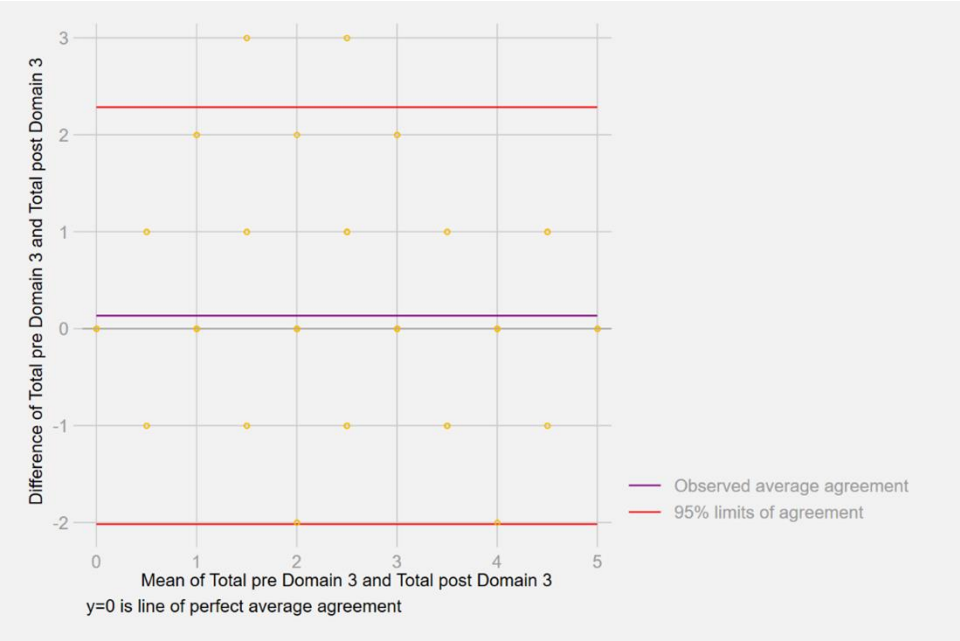
Supplementary Figure 2 - *Bland–Altman Limits of Agreement of Death Anxiety Scale: Pre- and Post-Total Score Measurements*



Supplementary Figure 3 - *Bland–Altman Limits of Agreement in Domain 1: Pre- and Post-Measurements*



Supplementary Figure 4 - *Bland–Altman Limits of Agreement in Domain 2: Pre- and Post-Measurements*



Supplementary Figure 5 - *Bland–Altman Limits of Agreement in Domain 3: Pre- and Post-Measurements*