

## Journal Pre-proof

Whodas 2.0-12 items Portuguese version: face-to-face, telephone, and digital media agreement and reliability results in older adults

Daniela Sofia da Cruz Domingues, José Joaquim Marques Alvarelhão, Margarida de Melo Cerqueira

DOI: <https://doi.org/10.34624/jshd.v3i2.7695>  
Reference: 7695

Received date: 07-11-2019  
Revised date: 31-05-2020  
Accepted date: 09-11-2021

Please cite this article as: Domingues DS, Alvarelhão J, Cerqueira M. Whodas 2.0-12 items Portuguese version: face-to-face, telephone, and digital media agreement and reliability results in older adults. *Journal of Statistics in Health Decision* (2021), <https://doi.org/10.34624/jshd.v3i2.7695>

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2021 The Author(s).

**TITLE**

Whodas 2.0-12 items Portuguese version: face-to-face, telephone, and digital media agreement and reliability results in older adults

**RUNNING TITLE**

Agreement of telephone and digital media versions of WHODAS 2.0-PT 12

**AUTHORS**

Daniela Sofia da Cruz Domingues <sup>1</sup> , MSc	danielacruzdomingues@gmail.com
José Joaquim Marques Alvarelhão <sup>2</sup> , OTR, MPH	jalvarelhao@ua.pt
Margarida de Melo Cerqueira <sup>2,3</sup> , PHD	mcerqueira@ua.pt

<sup>1</sup> Department of Medical Sciences, University of Aveiro, Aveiro, Portugal  
<sup>2</sup> School of Health Sciences, University of Aveiro, Aveiro, Portugal  
<sup>3</sup> CINTESIS – Center for Health Technology and Services Research, Aveiro, Portugal

**CORRESPONDING AUTHOR**

Name: Joaquim Alvarelhão  
 Adress: Escola Superior de Saúde da Universidade de Aveiro Agras do Crasto - Campus de Santiago, 3890 – 193 Aveiro, Portugal  
 Email address: [jalvarelhao@ua.pt](mailto:jalvarelhao@ua.pt)  
 Telephone: +351 234 372 460

**Funding**

Not applicable

**Conflict of interest**

The authors report no conflict of interest.

## 25 **Authors contribution**

26 Daniela Domingues – Study planning, data collection, wrote the manuscript Joaquim  
 27 Alvarelhão – Study planning, data analysis, wrote the manuscript Margarida Cerqueira –  
 28 Study planning, revised the manuscript

29

## 30 **Abstract**

31 **Aims:** Agreement and reliability analysis of WHODAS 2.0-12 items, Portuguese version,  
 32 applied by telephone or digital media for people aged 50 or more years old.

33 **Method:** Face-to-face, telephone and digital media versions were conducted in 31  
 34 participants, with an interval of three days between administrations. Internal consistency was  
 35 assessed with Cronbach's Alpha, agreement was analyzed by Bland-Altman plots while  
 36 reliability by Intraclass Correlation Coefficient.

37 **Results:** The telephonic and digital media versions like face-to-face interview of the  
 38 WHODAS 2.0-PT12 has shown good internal consistency. Agreement between face-to-face  
 39 vs telephone administration was ICC=0.99 (CI95%=[0.98-1.00]), and between face-to-face vs  
 40 digital media was ICC=0.98 (CI95%=[0.96-0.99]). The Bland-Altman plots revealed no  
 41 systematic bias. Administration by telephone or by digital media discriminate between  
 42 persons with and without limitations in Activities of Daily Living and between  
 43 institutionalized and non-institutionalized participants.

44 **Conclusions:** WHODAS 2.0 - PT12 applied by telephone or digital media to people 50 years  
 45 of age or older showed excellent reliability and agreement with face-to-face administration.

46

47 **Keywords:** Functional Health Status, Epidemiology, Disability

## Introduction

World Health Organization Disability Assessment Schedule 2.0 – WHODAS 2.0<sup>1</sup> was developed for capture function in terms of self-perceived limitations or restrictions on social participation<sup>2</sup> underpinning the concepts of the International Classifications of Functioning, Disability and Health<sup>3</sup>. This instrument which includes six domains of functioning, is being used worldwide<sup>4,5</sup> and being non-specific for a health condition makes it suitable for use among different populations or groups of patients<sup>6</sup>. Three formats are available for assessment, comprising a version with 36 items, a second one which allow to use the items in two parts (12+24) and a short version with 12 items. The short version of WHODAS 2.0 comprise two items per domain providing a global indicator of functioning which could be useful for assessments in large protocols or where time limitation is an issue. As the other two versions of WHODAS 2.0, the twelve items versions allow three different administration forms: administered by the interviewer, self-administered and administered to a proxy<sup>1</sup>. The increasing use of technology for data collection related to health issues is a consequence of social changes, technological advances and the wide acceptance of information and communication technologies<sup>7</sup>. Using technologic media for health data collection are reported as more accurate, cheaper and convenient to the respondent<sup>8</sup>. To this date there are only a few studies directly comparing different methods of administration (e.g. face-to-face, telephone or digital media), as well validated tools for administration via telephone or computer/tablet for older adults, despite an example for physical activities<sup>9–12</sup>. This study aimed to contribute to the validation of Portuguese version of WHODAS 2.0 – 12-items applied by telephone and by digital media to people with 50 or more years old.

## Methods

### Participants and Procedures

Participants were invited from community services and residential units available for persons with more than 50 years old in two small villages at Littoral North of Portugal. Inclusion criteria were: (i) be aged 50 years old or older; (ii) having access to telephone and tablet or computer and (iii) be able to use them. Not be able to give informed consent was used as exclusion criteria. The medical ethics committee of Public Health Institute of Porto approved the study and informed consent was obtained from all individual participants included.

A specific telephone script was developed and tested in a small sample prior to data collection phase. For digital media, an application form was developed like the paper version of WHODAS 2.0 – PT12

Participants provided sociodemographic variables and daily living activities (ADL) performance difficulties during the first face to face interview which also included WHODAS 2.0 – PT12 administration. The second interview was made by telephone and the third administration was made using a personal computer or tablet. The option for this order for data collection privileged the establishment of a relationship to keep participants throughout the study. The interviews were conducted by the same professional of gerontology, within a space of three days between them to meet a balance between the risk of recalling the answers and the possible change of functioning status.

### Instruments

The twelve items Portuguese version of WHODAS 2.0 was translated and validated for this group age in previous work <sup>13</sup> which reported good psychometrics values for internal consistency ( $\alpha=0.86$ ) and temporal stability (ICC=0.77) and is being used in recent studies <sup>14,15</sup>. The first page of WHODAS 2.0 – PT12 form includes sociodemographic and clinic data entries, such ‘age’, ‘gender’, ‘level of education’, ‘marital status’ and ‘chronic diseases’. A

‘yes/no’ question about the need of assistance in performing ADL was added to this part of the form. WHODAS 2.0 – 12PT scores were computed according to the simple scoring method after recoding assigned to each of the 12 items: “none” (0), “mild” (1), moderate (2), severe (3) and extreme (4). The sum score for global disability therefore ranged from 0 (no disability) to 48 (complete disability), with higher scores indicating higher levels of disability.

## Data Analysis

Descriptive statistics were used to characterize the sample in terms of sociodemographic and functioning variables (WHODAS 2.0-12PT and ADL performance difficulties). Internal consistency for each method of administration was analyzed through Cronbach’s Alpha which was rated as "very good" when  $\alpha \geq 0.9$ ; "Good" when  $0.8 \leq \alpha < 0.9$ , "reasonable" when  $0.7 \leq \alpha < 0.8$  and "weak" when  $\alpha < 0.7$ <sup>16</sup>. Face-to-face interview was used as the gold standard as long as it was already validated. The reliability between methods was assessed using a two-way mixed effects (absolute agreement) Intraclass Correlation Coefficient (ICC)<sup>17</sup> and agreement with Bland-Altman plot<sup>18</sup>. Proportional bias was assessed by linear regression<sup>19</sup>. Mann-Whitney U test was used to assess differences between groups and association between variables was performed using Spearman coefficient. Data were analyzed using the Statistical Package for Social Sciences (SPSS) 24.0 and significance level was set at  $\alpha = 0.05$ .

## Results

Thirty-one participants with a mean age of 76 years (SD=10 years 11 months) completed all the data collection phases. The majority were female (n=19; 61.3%), widowed (n=16; 51.6%), had completed compulsory education (n=23; 74.2%), and reported no difficulties performing activities of daily living (n=23; 74.2%) – Table 1.

The Cronbach's alpha obtained for the face-to-face, telephone and digital media administration methods of WHODAS 2.0 - PT12 was  $\alpha = 0.92$ ,  $\alpha = 0.93$  and  $\alpha = 0.93$ , respectively, indicating a very high internal consistency for all three administrations. For each item, ICC ranged between 0.53 to 1.00 for face-to-face and telephone administration returned and between 0.57 to 1.00 for face-to-face and digital media support administration -- Table 2. For total score, the ICC was 0.99 (CI=0.98-1.00) for face-to-face and telephone administration and 0.98 (CI=0.96-0.99) for face-to-face and digital media support administration. The overall ICC for the three methods was 0.99 (CI=0.98-1.00). Bland-Altman plots confirmed the agreement between administrations - Figure 1 and Figure 2. Linear regression between methods of administration revealed that bias trend is statistically not different from the zero bias line (ANOVA  $F(1,29)=1,14$ ;  $p=0,294$  for face-to-face vs telephone and ANOVA  $F(1,29)=0,37$ ;  $p=0,549$  for face-to-face vs digital media). The mean for WHODAS 2.0-PT12 was 11.5 (sd=11.2) for face to face interview, 10.7 (sd=11.7) for interview by telephone and 10.4 (sd=11.6) for administration by digital media (tablet or computer) - Table 3. A correlation was found between WHODAS 2.0-PT12 and age (telephone: Spearman  $r=0.71$ ;  $p<0.001$ ; digital media Spearman  $r=0.77$ ;  $p<0.001$ ). The administration via telephone or via digital media discriminate between persons with and without limitations in Activities of Daily Living ( $p<0.001$ ), and between institutionalized and non-institutionalized participants ( $p<0.001$ ) - Table 3.

## Discussion

Data analysis revealed that participants responses to WHODAS 2.0 – PT12 are highly consistent whether administered by telephone, by digital media or in person, suggesting that the psychometrics properties of the original questionnaire was maintained. Composite and individual item responses showed minimal variation between administrations. High internal

consistency coefficients denote very good reliability which is in line with other studies, that report values above 0.80<sup>20,21</sup>. Furthermore, ICC analysis and the Bland-Altman plot showed strong agreement between administration methods. The discrimination of the functional capacity between groups, namely between institutionalized or non-institutionalized persons and between those with or without difficulties in performing ADL, was also confirmed in the different administration methods, which indicates that the form of administration does not change the characteristics related to the validity of WHODAS 2.0–PT12. Main limitations of the study are related with sampling and the possible selection bias. On the other hand, the use of technology with older people should consider the issues of usability, like the efficiency and satisfaction of use, that were not included in this work.

### **Implications**

Despite limitations, these findings show that WHODAS 2.0-PT12 is adequate to assess functioning via telephone or digital media in persons with 50 or more years old, which can contribute to improve a better understanding of disability issues among this population.



## References

1. World Health Organization. *Whodas 2.0. Measuring Health, Health Statistics*. Vol 11.; 2010.
2. Moen VP, Drageset J, Eide GE, Klokkeud M, Gjesdal S. Validation of World Health Organization Assessment Schedule 2.0 in specialized somatic rehabilitation services in Norway. *Qual Life Res*. 2017;26(2):505-514. doi:10.1007/s11136-016-1384-5
3. World Health Organization. The International Classification of Functioning, Disability and Health. *Geneva*. 2001.
4. Henstra MJ, Feenstra TC, van der Velde N, et al. Apathy is Associated with Greater Decline in Subjective, but Not in Objective Measures of Physical Functioning in Older People without Dementia. *J Gerontol A Biol Sci Med Sci*. 2018. doi:10.1093/gerona/gly014
5. Gyasi RM, Dip AE, Phillips DR, Buor D. The Role of a Health Protection Scheme in Health Services Utilization Among Community-Dwelling Older Persons in Ghana. *J Gerontol B Psychol Sci Soc Sci*. 2018;XX:1-13. doi:10.1093/geronb/gby082
6. Üstün TB, Chatterji S, Kostanjsek N, et al. Developing the world health organization disability assessment schedule 2.0. *Bull World Health Organ*. 2010;88(11):815-823. doi:10.2471/BLT.09.067231
7. Holt JB. Technology and Data Collection in Chronic Disease Epidemiology. *Prev Chronic Dis*. 2015;12:150400. doi:10.5888/pcd12.150400
8. Hollier LP, Pettigrew S, Slevin T, Strickland M, Minto C. Comparing online and telephone survey results in the context of a skin cancer prevention campaign evaluation. *J Public Heal (United Kingdom)*. 2017;39(1):193-201. doi:10.1093/pubmed/fdw018
9. Tinôco MA, Gouveia ÉR, Ihle A, Marques A, Gouveia BR, Kliegel M. The Cognitive

- Telephone Screening Instrument (COGTEL): a reliable and valid tool for the assessment of cognitive functioning in the Brazilian elderly. *Rev Bras Geriatr e Gerontol.* 2019;22(1). doi:10.1590/1981-22562019022.180130
10. Mayer CJ, Steinman L, Williams B, Topolski TD, LoGerfo J. Developing a Telephone Assessment of Physical Activity (TAPA) questionnaire for older adults. *Prev Chronic Dis.* 2008;5(1):A24. doi:A24 [pii]
  11. Pegoraro LG de O, Gvozđ R, Haddad M do CFL, Vannuchi MTO, Silva LG de C, Rossaneis MA. Validation of instrument to assess software of patients' risk classification. *Rev Bras Enferm.* 2018;71(3):975-982. doi:10.1590/0034-7167-2017-0053
  12. Rentz DM. Validating Use of Technology for Cognitive Test Assessment. *EBioMedicine.* 2016;11:23-24. doi:10.1016/j.ebiom.2016.08.002
  13. Moreira A, Alvarelhão J, Silva AG, Costa R, Queirós A. Validation of a Portuguese version of WHODAS 2.0 - 12 items in people aged 55 or more. *Rev Port Saude Publica.* 2015;33(2). doi:10.1016/j.rpsp.2015.06.003
  14. Antunes A, Frasilho D, Azeredo-Lopes S, et al. Disability and common mental disorders: Results from the World Mental Health Survey Initiative Portugal. *Eur Psychiatry.* 2018;49:56-61. doi:https://doi.org/10.1016/j.eurpsy.2017.12.004
  15. Silva AG, Cerqueira M, Raquel Santos A, Ferreira C, Alvarelhão J, Queirós A. Inter-rater reliability, standard error of measurement and minimal detectable change of the 12-item WHODAS 2.0 and four performance tests in institutionalized ambulatory older adults. *Disability and Rehabilitation.* 2017:1-8.
  16. Darren G, Mallery P. *SPPS for Windows Step by Step: A Simple Guide and Reference, 14.0 Update.* 7th ed. Person Education; 2007.
  17. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation

- Coefficients for Reliability Research. *J Chiropr Med*. 2016;15(2):155-163.  
doi:10.1016/j.jcm.2016.02.012
18. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet (London, England)*. 1986;1(8476):307-310.  
doi:https://doi.org/10.1016/S0140-6736(86)90837-8
19. Montenij LJ, Buhre WF, Jansen JR, Kruitwagen CL, Waal EE De. Methodology of method comparison studies evaluating the validity of cardiac output monitors : a stepwise approach and checklist †. *BJA*. 2016;116(6):750-758.  
doi:10.1093/bja/aew094
20. Axelsson E, Lindsäter E, Ljótsson B, Andersson E, Hedman-Lagerlöf E. The 12-item Self-Report World Health Organization Disability Assessment Schedule (WHODAS) 2.0 Administered Via the Internet to Individuals With Anxiety and Stress Disorders: A Psychometric Investigation Based on Data From Two Clinical Trials. Eysenbach G, ed. *JMIR Ment Heal*. 2017;4(4):e58. doi:10.2196/mental.7497
21. Andrews G, Kemp A, Sunderland M, Von Korff M, Ustun TB. Normative Data for the 12 Item WHO Disability Assessment Schedule 2.0. Ross JS, ed. *PLoS One*. 2009;4(12):e8343. doi:10.1371/journal.pone.0008343

227 *Table 1 - Characteristics of the 31 participants*

<b>Characteristics</b>	
<b><i>Gender, n (%)</i></b>	
Male	12 (39%)
Female	19 (61%)
<b><i>Age in years, mean (SD)</i></b>	76y (10y 11m)
<b><i>Marital status, n (%)</i></b>	
Currently married/Cohabiting	13 (42%)
Widowed	16 (52%)
Single	1 (3%)
Divorced	1 (3%)
<b><i>Education in years, n (%)</i></b>	
≤ 4	23 (74%)
5-12	8 (26%)
<b><i>ADL difficulties, n (%)</i></b>	
Yes	8 (26%)
No	23 (74%)
<b><i>Institutionalized, yes(%) / no(%)</i></b>	14 (45%) / 17 (55%)

228 y – years; m – months, ADL's- Activities of Daily Living; SD – standard deviation

229

230

Table 2 – Internal consistency and reliability of Whodas 2.0 – PT12 by administration method

	Cronbach's alpha		ICC (CI 95%) face to face vs:	
	telephone	digital media	telephone	digital media
1. Standing for long periods such as 30minutes?	0,91	0,92	0,97 [0,93-0,98]	0,96 [0,91-0,98]
2. Taking care of your household responsibilities?	0,92	0,92	0,98 [0,97-0,99]	0,99 [0,97-0,99]
3. Learning a new task, for example, learning how to get to a new place?	0,92	0,93	0,90 [0,80-0,95]	0,85 [0,68-0,93]
4. How much of a problem did you have in joining in community activities for example, festivities, religious or other activities) in the same way as anyone else can?	0,91	0,92	0,88 [0,76-0,94]	0,89 [0,78-0,95]
5. How much have you been emotionally affected by your health condition?	0,93	0,92	0,91 [0,89-0,95]	0,72 [0,43-0,86]
6. Concentrating on doing something for ten minutes?	0,92	0,93	0,85 [0,69-0,93]	0,83 [0,65-0,92]
7. Walking along distance such as a kilometer or equivalent?	0,91	0,91	0,99 [0,98-0,99]	0,99 [0,97-0,99]
8. Washing your whole body?	0,91	0,92	0,97 [0,94-0,99]	0,98 [0,97-0,99]
9. Getting dressed?	0,92	0,92	0,99 [0,98-0,99]	0,98 [0,95-0,99]
10. Dealing with people you do not know?	0,93	0,94	0,57 [0,14-0,79]	0,57 [0,14-0,79]
11. Maintaining a friendship?	0,93	0,94	0,53 [0,01-0,77]	0,65 [0,29-0,83]
12. Your day today work/school?	0,92	0,92	1,00 [0,99-1,00]	1,00 [0,99-1,00]
<b>All items</b>	0,93	0,93	0,99 [0,98-1,00]	0,98 [0,96-0,99]

*Table 3 – WHODAS 2.0 – PT12 total scores according to administration method*

Administration method	All sample (n=31)		Non-institutionalized sample (n=17)	Institutionalized sample (n=14)	ADL No-difficulties	ADL difficulties
	Mean (SD)	Min.-Max.	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
<i>Face to face</i>	11.5 (11.2)	0.0 - 35.0	2,9 (3,3)	21,9 (8,0)	5,8 (6,3)	27,6 (3,3)
<i>Telephone</i>	10.7 (11.7)	0.0 - 34.0	1,4 (1,4)	22,1 (7,7)	4,8 (6,5)	27,6 (3,0)
<i>Digital media</i>	10.4 (11.6)	0.0 - 30.0	1,2 (1,7)	21,5 (7,8)	4,3 (5,8)	27,8 (1,5)

ADL – Activities of Daily Living; Min. – Minimum; Max. – Maximum, SD – Standard Deviation

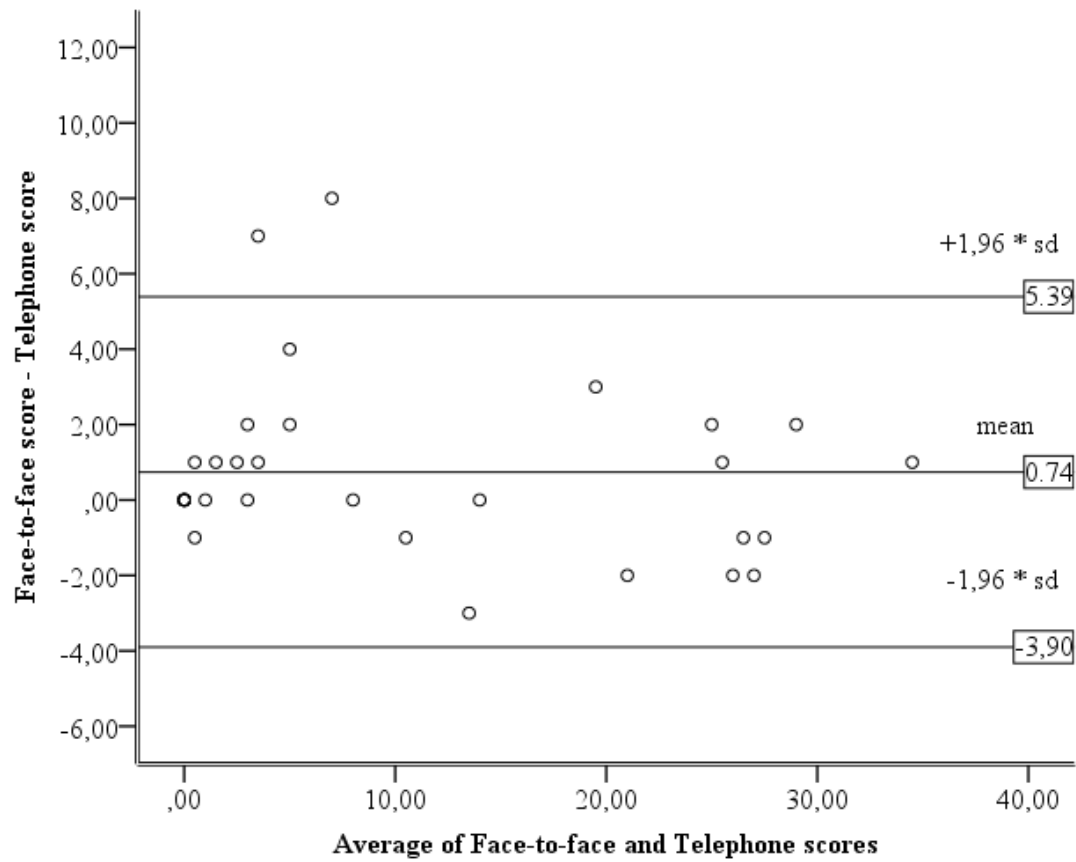


Figure 1 - Bland-Altman plot of Face-to-face and Telephone responses.

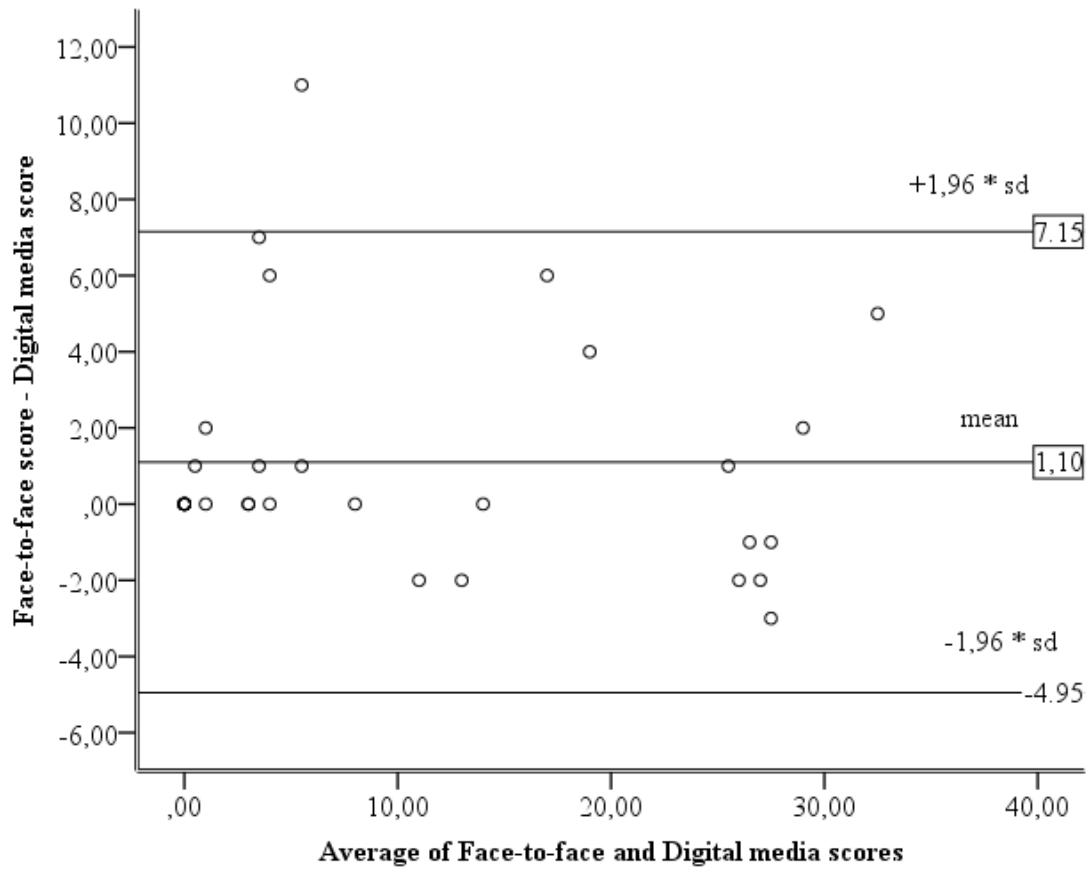


Figure 2 - Bland-Altman plot of Face-to-face and Digital media responses