# COMPARISON OF ELECTRONIC AND PAPER AND PENCIL ADMINISTRATION OF THE PARENTING STRESS INDEX - SHORT FORM (PSI-SF)

## *Comparação das formas de aplicação papel e caneta e eletrônica do índice de estresse parental versão reduzida (PSI-SF)*

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**ABSTRACT**

**Purpose:** to assess whether the electronic version of the Parenting Stress Index – Short Form (PSI-SF) is comparable to the paper and pencil administration. To evaluate stress in parents of children with normal development. **Methods:** forty adults, parents of children between six months and ten years of age, were divided into four groups matched for age, gender, education and child's age. In two different occasions, seven to ten days apart, participants completed the PSI-SF in the formats: paper-pencil/paper-pencil (PP), paper-pencil/electronic (PE), electronic/electronic (EE) and electronic/paper-pencil (PE). The PSI-SF has 36 statements, divided into three subscales: Parental Distress, Parent-Child Dysfunctional Interaction, and Difficult Child. Pearson's correlations and comparison of the PSI-SF scores within and between groups were obtained. **Results:** strong positive correlations were found between PSI-SF subscales and total scores in the first and second administration, for all groups. Significant differences were observed between the mean scores for the PP group (subscale "Difficult Child") and EE group (subscale "Difficult Child" and the total score). Such differences in scores, however, did not alter in any means the interpretation of the results. Participants' stress fell into normal values, for all subscales. **Conclusion:** the electronic format of the PSI-SF questionnaire yields similar results to the standard paper-and-pencil administration of the test. Observed stress levels were considered normal.

**KEYWORDS**: Questionnaires; Hearing; Hearing Loss; Parents; Stress, Psychological

## INTRODUCTION

Family plays a critical role on the development of hearing impaired children, for it is the family's responsibility to provide them access to hearing aids and auditory rehabilitation. Pediatric hearing healthcare programs have emphasized the importance of a family centered approach, since family's participation on the early diagnosis and intervention brings better results to children[1].

In general, after a child is diagnosed with hearing impairment, the family goes through a difficult period, having to deal with strong feelings of inadequacy, anger, guilt, vulnerability and confusion [2]. Besides, the need of restructuring their roles and learning new values and skills to deal with a hearing impairment may also be a potential source of stress for the family. Parents of hearing impaired children were more stressed than those of normal hearing children and such stress occurred due to different reasons in different stages of their children's lives [3].

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The emotional responses of parents and their approach on dealing with these stressors affect the family and, consequently, the child's results. For this reason professionals must be able to identify possible stressors within the family environment in order to provide the necessary support and appropriate orientations.

The Parenting Stress Index – Short Form (PSI-SF) [4] is used to quantify the amount of stress perceived by parents and it has been increasingly used by audiology professionals to analyze parents' perceptions on their children's temper and personality [5], to evaluate programs on stress management for parents [6] or to evaluate the impact of the results of newborn hearing screening [7].

The process of administering questionnaires, calculating scores and analyzing data in large scales is made easier by electronic means. The software PSI-SF 1st Edition is a version of PSI3 Plus for Windows that allows users to administer both the full and short form of the PSI on a computer. It automatically calculates scores and generates reports.

Studies on the validity of administering the electronic PSI-SF have not been performed up to the moment, therefore this study aims to verify whether the electronic and paper-and-pencil formats of the test yield the same results.

## METHODS

This study was performed at our home institution and was approved by the Research Ethics Commitee (process #113/2010). A prospective longitudinal study design was used. A total of 40 adults (12 men and 28 women) aging between 22 and 47 years (average of 34) voluntarily took part on this research after signing an informed consent. All volunteers had children with ages ranging between 11 months and 10 years (average of 5 years), with normal neuro-psychomotor development and free from hearing complaints.

Participants were divided in four groups of ten according to their age, gender, level of education as well as their children's age. Within each group, participants were required to answer the questionnaire in two different occasions, seven to ten days apart, according to the following scheme:

- Group PP (paper-and-pencil/paper-and-pencil): administration of the paper-and-pencil format of the questionnaire on both occasions.
- Group EE (electronic/electronic): administration of the electronic format of the questionnaire on both occasions.
- Group PE (paper-and-pencil/electronic): administration of the paper-and-pencil and electronic formats of the questionnaire, respectively, on each occasion.
- Group EP (electronic/paper-and-pencil): administration of the electronic and paper-and-pencil formats of the questionnaire, respectively, on each occasion.

Table 1 shows participants demographics.

One way analysis of variance (ANOVA) showed no statistically significant correlation between the ages of participants (p=0,52) and children (p=0,91) from each group (Table 1).

**Table 1 – Demographic data of participants (N=40)**

| Groups | Gender | | Parent's age (years) | | Child's age (months) | | Schooling | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Mean | SD | Mean | SD | HS | SC | CD |
| **Group PP** | 3 | 7 | 35,5 | 5,3 | 71,6 | 37,5 | 2 | 1 | 7 |
| **Group EE** | 3 | 7 | 32,6 | 4,3 | 63,7 | 43,3 | 1 | 2 | 7 |
| **Group PE** | 3 | 7 | 34,9 | 6,1 | 60,6 | 44,3 | 2 | 1 | 7 |
| **Group EP** | 3 | 7 | 32,5 | 6,5 | 71,5 | 42,3 | 1 | 3 | 6 |

Key for Table 1: PP: paper-and-pencil/paper-and-pencil format, EE: electronic/electronic format, PE: paper-and-pencil/electronic format, EP: electronic/paper-and-pencil format, Avg: average, Std Dev: standard deviation, HS: completed high school, SC: some college or university, CD: college or university degree

The Parenting Stress Index (PSI) was developed to evaluate the characteristics of the child, parents, family and stressing life events in the parent-child system. The full version of this tool contains 101 items in addition to an optional 19-item life stress scale [4]. The short form (PSI-SF) consists of 36 statements divided in three sub-scales:

"PD" Parental Distress (items 01 to 12). This sub-scale evaluates to what extent the participant is experiencing stress in their role as a parent.

Example: "I feel limited because of my responsibilities as a parent."

"P-CDI" Parent-Child Dysfunctional Interaction (items 13 to 24). This sub-scale assesses the extent to which the parent believes his/her child does not meet their expectations, based on unsatisfying parent-child interactions that do not reinforce their role as a parent. Example: "Sometimes the child does things to upset me, purely out of spite."

"DC" Difficult Child (items 25 to 36). This sub-scale shows how easy or difficult the parent perceives their child. It evaluates the parent's perception on basic behavioral characteristics associated to their child's self-regulatory process. Example: "My child is more demanding than the average."

The PSI-SF also features the tool "Defensive Responding", a validity scale (adicionado) that indicates whether the parent is responding in a defensive manner in order to protect him or herself from questions that may expose them to judgements. This feature, however, was not taken in consideration in this study.

This instrument has been translated and validated in many languages and for this study its European Portuguese version [8] was used and the authors adapted some words and expressions to Brazilian Portuguese. Such adaptation, as well as the usage of the PSI-SF in Portuguese, were authorized by their rights-holder, *Psychological Assessment Resources* (PAR), upon payment of copyright fees and signature of terms and contracts

As far as paper-and-pencil administrations of the test go, parents were asked to read each statement and choose the alternative that best suited them in a five-point Likert scale: strongly agree (5 points), agree (4 points), undecided (3 points), disagree (2 points), strongly disagree (1 point). Scores were calculated for each sub-scales and then added up to yield the Total Stress score. Altogether, the higher the score, the greater is the level of stress in parents [8].

The PSI-SF presents normative data collected from a sample of the US population and the distribution of responses are available in the instrument's test sheet. Scores above the 85$^{th}$ percentile of normative values are considered high and in need of intervention. These values are: 33 (PD), 26 (P-CDI), 33 (DC) and 86 points (total score).

The electronic administration of the PSI-SF was made possible by designing a survey at *kwiksurveys.com.* The first part of the survey consisted of an informed consent form, whereas its second part was made of demographic questions (the parent's gender, age, marital status, education and profession, and the child's gender and date of birth). The third part consisted of the PSI-SF itself. Participants of the groups PE, EP and EE received an email with instructions (including username and password) and a link to an online copy of the PSI-SF questionnaire.

The time spent by participants was computed either by the researcher (paper-and-pencil administration) or by the *kwiksurveys* (electronic administration).

Statistical analysis was performed with the software Stata. The percentile of distribution of responses was computed for the first administration of the PSI-SF. The difference in score between the first and second administrations of the questionnaire was compared by means of paired t-test. The Pearson correlation coefficient between the first and second administration was also calculated. In order to determine whether differences in variability where related to a specific way of administering the questionnaire (P or E), an analysis of variance (ANOVA) was performed with the covariant of results from the first administration, comparing the scores of the second administration of the questionnaire in all groups. For all cases, the significance level was chosen as 5%.

## RESULTS

The amount of time spent on each administration of the PSI-SF is available on Table 2.

Data referring to participants 9 (group EE) and 8 (group EP) were not included in the analysis due to a mistake in computing the time spent to complete the questionnaire, as the survey was left on the background for a few minutes and the browser ended up taking all these minutes in account instead of only considering time spent answering the questions.

Table 3 shows the correlations (Pearson) between the two administrations of the test.

The average scores (total and for each sub-scale) obtained in each administration of the PSI-SF can be found on Table 4.

The ANOVA with the covariant of the results of the first administration of the PSI-SF was performed with the intent of comparing the scores of each sub-scale among the groups (EE, PP, EP, PE). No statistically significant differences were found between scores in any sub-scales: Parental Distress (PD, p=0,91), Parent-Child Dysfunctional Interaction (P-CDI, p=0.85), Difficult Child (DC, p= 0,78) or Total Score (Total, p=0,70).

**Table 2 – Time elapsed (in minutes) in each administration of the PSI-SF and statistical significance among them (N=40)**

| Participant | Group PP | | Group EE | | Group PE | | Group EP | |
|---|---|---|---|---|---|---|---|---|
| | 1st Paper | 2nd Paper | 1st Electronic | 2nd Electronic | 1st Paper | 2nd Electronic | 1st Electronic | 2nd Paper |
| **1** | 11 | 5 | 10 | 8 | 3 | 4 | 8 | 7 |
| **2** | 9 | 12 | 7 | 14 | 8 | 6 | 19 | 15 |
| **3** | 10 | 8 | 15 | 5 | 7 | 6 | 10 | 8 |
| **4** | 10 | 8 | 6 | 4 | 10 | 8 | 7 | 4 |
| **5** | 3 | 4 | 12 | 8 | 12 | 13 | 17 | 14 |
| **6** | 5 | 3 | 11 | 6 | 13 | 8 | 7 | 5 |
| **7** | 4 | 3 | 10 | 7 | 7 | 8 | 23 | 7 |
| **8** | 10 | 9 | 11 | 7 | 15 | 9 | - | - |
| **9** | 14 | 12 | - | - | 13 | 11 | 11 | 7 |
| **10** | 10 | 8 | 7 | 7 | 9 | 5 | 10 | 12 |
| **Average** | 8,6 | 7,2 | 9,8 | 7,3 | 9,7 | 7,8 | 12,4 | 8,7 |
| **SD** | 3,4 | 3,3 | 2,8 | 2,8 | 3,6 | 2,7 | 5,7 | 3,9 |
| **T-test** | 0,08 | | 0,12 | | **0,04** | | 0,05 | |

Key for Table 2: PP: paper-and-pencil/paper-and-pencil format, EE: electronic/electronic format, PE: paper-and-pencil/electronic format, EP: electronic/paper-and-pencil format, SD: standard deviation
*Outliers were not computed for statistical accuracy

**Table 3 – Pearson correlation coefficients and the significance between scores in the first and second administration of the PSI-SF (N=40)**

| PSI-SF Subscales | Groups | | | |
|---|---|---|---|---|
| | PP | EE | PE | EP |
| **Parental Distress** | r = 0,86<br>p = 0,01 | r = 0,88<br>p = 0,01 | r = 0,74<br>p = 0,01 | r = 0,93<br>p = 0,00 |
| **Parent-Child Dysfunctional Interaction** | r = 0,82<br>p = 0,03 | r = 0,96<br>p = 0,00 | r = 0,78<br>p = 0,00 | r = 0,90<br>p = 0,00 |
| **Difficult Child** | r = 0,94<br>p = 0,00 | r = 0,84<br>p = 0,02 | r = 0,79<br>p = 0,00 | r = 0,64<br>p = 0,04 |
| **Total Score** | r = 0,93<br>p = 0,00 | r = 0,91<br>p = 0,00 | r = 0,69<br>p = 0,02 | r = 0,91<br>p = 0,00 |

Key for Table 3: PP: paper-and-pencil/paper-and-pencil format, EE: electronic/electronic format, PE: paper-and-pencil/electronic format, EP: electronic/paper-and-pencil format.

**Table 4 – Average of scores in each sub-scale of the PSI-SF in both administrations, difference and statistical difference between scores.**

| PSI-SF sub-scales | | Groups | | | |
|---|---|---|---|---|---|
| | | PP | EE | PE | EP |
| "PD" Parental Distress | Average 1 | 27,90 | 28,40 | 23,00 | 26,20 |
| | Average 2 | 26,40 | 25,70 | 22,20 | 24,90 |
| | Difference | -1,50 | -2,70 | -0,80 | -1,30 |
| | T-test | 0,42 | 0,08 | 0,71 | 0,19 |
| "P-CDI" Parent-Child Dysfunctional Interaction | Average 1 | 16,50 | 19,70 | 14,80 | 14,30 |
| | Average 2 | 16,70 | 19,30 | 14,80 | 15,20 |
| | Difference | 0,20 | -0,40 | 0,00 | 0,90 |
| | T-test | 0,80 | 0,57 | 1,00 | 0,27 |
| "DC" Difficult Child | Average 1 | 24,00 | 29,20 | 19,00 | 19,60 |
| | Average 2 | 21,20 | 25,70 | 17,90 | 19,60 |
| | Difference | -2,80 | -3,50 | -1,10 | 0,00 |
| | T-test | 0,03* | 0,03* | 0,37 | 1,00 |
| Total Score | Average 1 | 68,40 | 77,30 | 56,80 | 60,10 |
| | Average 2 | 64,30 | 70,70 | 54,90 | 59,70 |
| | Difference | -4,10 | -6,60 | -1,90 | -0,40 |
| | T-test | 0,18 | 0,04* | 0,63 | 0,86 |

Key for Table 4: PP: paper-and-pencil/paper-and-pencil format, EE: electronic/electronic format, PE: paper-and-pencil/electronic format, EP: electronic/paper-and-pencil format.
*p < 0,05 statistically significant

Figure 1 and Table 5 show, respectively, the average scores and distribution of answers for all participants, according to the first administration of the PSI-SF.

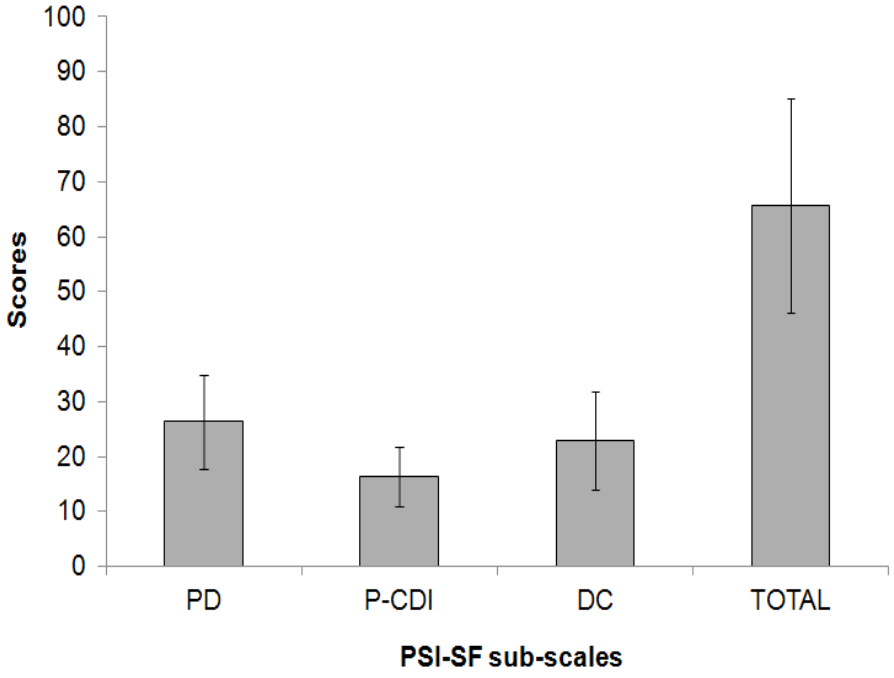


**Figure 1 – Average and standard deviation of the scores in each PSI-SF sub-scale (N=40)**

Key for Figure 1: PD: Parental Distress, P-CDI: Parent-child Dysfunctional Interaction, DC: Difficult Child

**Table 5 – Distribution of participants' answers in the first administration of the PSI-SF (N=40)**

| Percentile | Scores | | | |
|---|---|---|---|---|
| | Parental Distress (PD) | Parent-Child Dysfunctional Interaction (P-CDI) | Difficult Child (DC) | Total |
| **99** | 47 | 31 | 42 | 112 |
| **95** | 42 | 29 | 38 | 105 |
| **90** | 34 | 25 | 37 | 97 |
| **85** | 34 | 22 | 35 | 88 |
| **80** | 32 | 18 | 33 | 80 |
| **75** | 31 | 17 | 29 | 74 |
| **70** | 30 | 17 | 24 | 68 |
| **65** | 30 | 16 | 23 | 63 |
| **60** | 28 | 15 | 23 | 62 |
| **55** | 26 | 14 | 21 | 62 |
| **50** | 26 | 14 | 20 | 62 |
| **45** | 24 | 14 | 19 | 60 |
| **40** | 24 | 14 | 19 | 59 |
| **35** | 23 | 13 | 18 | 56 |
| **30** | 21 | 13 | 16 | 55 |
| **25** | 20 | 12 | 15 | 54 |
| **20** | 19 | 12 | 15 | 50 |
| **15** | 17 | 12 | 14 | 46 |
| **10** | 14 | 12 | 13 | 44 |
| **5** | 14 | 12 | 12 | 41 |
| **1** | 13 | 12 | 12 | 39 |

## DISCUSSION

The average time spent by participants on the PSI-SF (Table 2) reveals its feasibility for use in clinical practice, since it can be administered within the duration of a typical appointment.

Time spent on the second administration of the PSI-SF was always lower than in the first time. This, however, was only statistically significant to the group PE. This may have happened due to the fact that participants were already familiar with the instructions on how to answer the questions in the second administration of the PSI-SF. A study that compared the time spent on the administration of different questionnaire formats (electronic of paper-and-pencil) found that the time spent answering an electronic questionnaire may be greater or less than the time spent with the paper-and-pencil format according to the devices used on the administration of the test: hand held computer, touchscreen desktop and tablet [9].

Statistically significant positive correlations of strong and moderate nature were found between the first and second administration of the PSI-SF for the Total Score and also for all sub-scales (PD, P-CDI, DC), as indicated by Table 3, showing that scores were kept stable in spite of the format (electronic, paper-and-pencil) of the questionnaire. Hasket *et al*. [10] have also found correlations between two administrations of the paper-and-pencil format of

the PSI-SF: 0,61 and 0,75 for subscales and Total Score, respectively, corroborating our results.

Table 4 shows significant differences between the average scores for the groups "PP" ("DC" sub-scale) and "EE" ("DC" sub-scale and Total Score). Such differences, however, do not drastically alter the interpretation of the PSI-SF results, which should be carefully analyzed by the professional. Test-retest reliability of the PSI-SF was evaluated in a six months test-retest interval and the values found were 0,84 (Parental Distress), 0,85 (Parent-Child Dysfunctional Interaction) 0,68 (Difficult Child) and 0,78 (Total Score) [10]. Other studies compared the administration of different questionnaires in electronic and pencil-and-paper formats and, for none of them, a statistically significant difference was found between the results of the first and second administration [11,12].

The analysis of variance did not identify any significant difference among groups for the subscales or total score, confirming that variance is equivalent among them.

A systematic review on the equivalency of administering tests on electronic and paper-and-pencil formats has analyzed a total of 46 original studies, evaluating 278 scales. Results showed that either formats yield equivalent scores. Correlations were high and differences between means were very small and neither statistically nor clinically significant [13].

The computer-administered PSI-SF may facilitate aspects such as calculating scores, storing (results?) on databases, saving financial and natural resources and distance testing.

The average scores obtained in the first administration of the PSI-SF (Figure 1) were similar to those found by Minetto et al. [14] when the same version of the test was administered in parents of children with normal development. Nonetheless, another Brazilian study with similar population found slightly higher scores on the sub-scale P-CDI of the PSI, as well as a higher total score [15]. This may have been due to the lower average age of the children in this study, or even by the fact that Bazon et al. [15] used a variation of the Canadian version of the PSI-SF in their research.

For all participants of this study, the PSI values were, in all sub-scales, within the acceptable range (between the 15$^{th}$ and 80$^{th}$ percentile)[4]. As mentioned before, normative values refer to the US population since such data cannot be found for the Brazilian population. With that in mind, cautious must be taken since during result's interpretation since normative data may be influenced, among others, by linguistic, cultural, educational, social and economic aspects of the population studied.

Nevertheless, the distribution of scores obtained for the PSI-SF in this study (Table 5) was very similar to the normative US values. Although this study counted with a reduced number of participants and did not intend to create normative data for the Brazilian population, Table 5 may be taken as a reference when interpreting the results of the PSI-SF. Further studies should be performed with the intent of validating this tool to the Brazilian population.

## CONCLUSION

This study's results have shown that the computer-administered version of the Parenting Stress Index – Short Form (PSI-SF) yields similar results to the paper-and-pencil administration of the test. Participants presented parental stress levels that were considered normal.

**RESUMO**

**Objetivo:** avaliar se a aplicação eletrônica do Índice de Estresse Parental – versão reduzida (PSI-SF) é comparável à aplicação em formato papel e caneta. Verificar o estresse em pais de crianças com desenvolvimento normal. **Métodos:** quarenta adultos, pais de crianças entre seis meses e 10 anos, foram divididos em quatro grupos, sendo pareados por idade, sexo, escolaridade e idade da criança. Cada participante completou o questionário em duas ocasiões, com intervalo de sete a dez dias, nas versões: papel-caneta/papel-caneta (PP), papel-caneta/eletrônico (PE), eletrônico/eletrônico (EE), eletrônico/papel-caneta (EP). O PSI-SF apresenta 36 afirmações, divididas em três subescalas: Sofrimento Parental (SP); Interações Disfuncionais entre Pai e Criança (IDPC) e Criança Difícil (CD). Para análise dos dados foram realizadas as correlações (Pearson) e comparação da pontuação do PSI-SF intra e inter-grupos. **Resultados:** foram obtidas correlações positivas fortes e médias e significantes entre a pontuação total e das subescalas do PSI-SF na primeira e segunda aplicação, para todos os grupos. Diferenças significantes foram observadas entre as médias das pontuações para o grupo PP (subescala "Criança Difícil") e grupo EE (subescala "Criança Difícil" e pontuação total). No entanto, tais diferenças de pontuação não alteraram a interpretação do resultado do questionário. Não houve diferença significante entre os grupos para as quatro subescalas analisadas, confirmando equivalência da variância entre os grupos. O estresse dos participantes, em todas as subescalas, recaiu dentro da normalidade **Conclusão:** a aplicação no formato eletrônico do questionário PSI-SF apresenta resultados semelhantes à aplicação papel e caneta. Os níveis de estresse observados foram considerados normais.

**DESCRITORES:** Questionários; Audição; Perda Auditiva; Pais; Estresse Psicológico

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