

# AGREEMENT BETWEEN VERBAL AND ELECTRONIC VERSIONS OF THE NUMERICAL RATING SCALE (NRS-11) WHEN USED TO ASSESS PAIN INTENSITY IN ADOLESCENTS

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## INTRODUCTION

The assessment of pediatric pain is evolving fast. The field seems to be moving from a conventional pencil-and-paper environment to incorporate a more technological dimension.

Pain intensity is the most common dimension assessed by those who study and treat pediatric pain patients. Reductions in pain intensity is a standard by which most pain treatments are judged, therefore scales to assess pediatric pain intensity are among the assessment instruments that are undergoing this process of electronic conversion.

The aims of this study were: (1) to examine the agreement between the verbal and the electronic versions of the NRS-11 (vNRS-11 and eNRS-11, respectively) when used to assess pain intensity in adolescents; and (2) to report participants' preference between the two versions.

## METHOD

### Participants

191 schoolchildren enrolled in grades 7 to 11 (age mean=14.61; range=12-18) participated. The sample was composed by 74 boys (39%) and 117 girls (61%).

### Measures

#### Pain intensity

Pain intensity levels were recorded using the verbally administered and the electronic versions of the 11-point Numerical Rating Scale. The electronic version of the NRS-11 (Roset et al., 2012) was administered on an Apple-iPod Touch®, whose touch screen measures 3.5 inch (diagonal). Figure 1 shows a capture of eNRS-11.

### Procedure

Participants were asked to indicate whether they had experienced pain in the last three months, and if the response was affirmative, they were asked to identify the location of the most frequent pain. Following, they were asked to report the highest intensity experienced using both the vNRS-11 and the eNRS-11. The time between administrations was 45 minutes, and the two versions of the NRS-11 were presented counterbalanced to prevent order effects.

Finally, participants were asked about the version of the NRS-11 they preferred to report their pain intensity.

### Data analysis

Agreement analyses were done using the Bland-Altman method. We calculated the agreement between the two versions of the NRS-11 not only at 95% CI but also at 80% CI, granted that the 95% might be a CI too strict to be used with children and/or adolescents (von Baeyer, 2012). The maximum limit of agreement was set at  $\pm 1$ , limit that corresponds to the minimal clinically significant difference for children and adolescents when using the vNRS-11 (Bailey et al., 2010, Voepel-Lewis et al., 2011).



Fig. 1. Capture of the eNRS-11

## RESULTS

As can be seen on Table 1, there is no agreement between the two measures at 95% CI because the limits of agreement fall outside the limit established a priori ( $\pm 1$ ), both for the sample as a whole and when the analysis is conducted for each grade separately, but for grade 11. When the 80% CI is considered, there is agreement for the whole sample and for all the grades except for those ratings obtained from children attending grade 8.

Figures 2 and 3 shows the Bland-Altman graphs for the whole sample at 80% CI and 95% CI, respectively.

Figure 4 shows the percentage of children who prefer each version of the NRS-11. The difference was statistically significant ( $z=9.07$ ,  $p<0.001$ ).

Table 1. Limits of agreement between the vNRS-11/eNRS-11 according to the Bland-Altman method (whole sample and by grade)

Grade	N	Mean difference	Limits of Agreement			
			95% CI		80% CI	
			Lower	Upper	Lower	Upper
Total sample	191	0.14	-1.01	1.28	-0.61	0.88
Grade 7	26	0.15	-1.05	1.35	-0.63	0.94
Grade 8	44	0.14	-1.42	1.69	-0.88	1.16
Grade 9	57	0.14	-0.80	1.08	-0.47	0.75
Grade 10	36	0.19	-0.83	1.22	-0.48	0.87
Grade 11	28	0.04	-0.80	0.88	-0.51	0.58

Fig. 2. Agreement between vNRS-11 and eNRS-11 at 80% CI for the whole sample

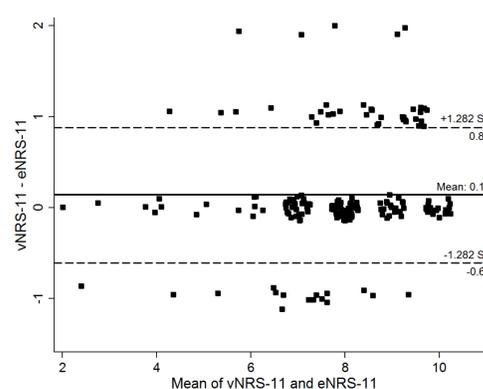


Fig. 3. Agreement between vNRS-11 and eNRS-11 at 95% CI for the whole sample

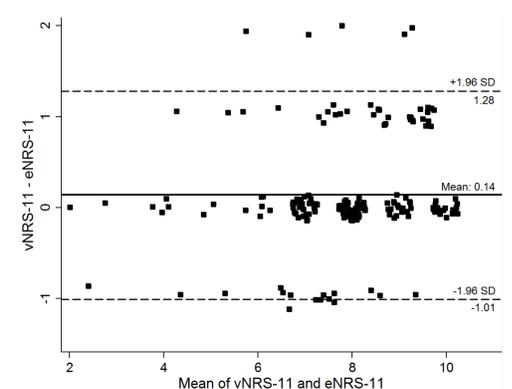
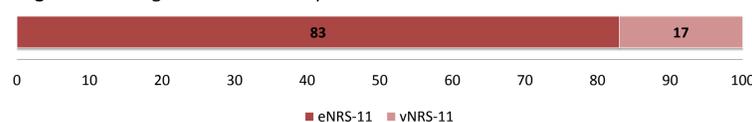


Fig. 4. Percentage of children who prefer each version of the NRS-11.



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## CONCLUSIONS

- Pain intensity ratings on vNRS-11 and eNRS-11 seem to be comparable at 80% CI, supporting that 95% CI may be a too strict criterion for agreement.
- Most of the study participants preferred the eNRS-11 to the vNRS-11.

