

Measuring Experimental Pain Intensity: Relative Validity of four common measures

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INTRODUCTION

- Participants completed a demographic and medical history questionnaire, and 4 different rating scales of pain intensity (VAS, NRS, VRS and FPS-R) during the study procedures.

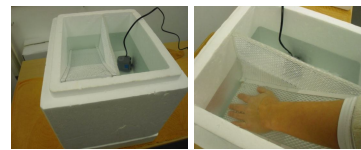


Fig. 1-2 – Thermal insulated container with 2 compartments, armrest and water pump; nondominant hand immersed to the wrist in the water.

Procedure:

- Cold Pressor Task** → 4 cold pressor trials with temperature order counterbalanced across 1°C, 3°C, 5°C and 7°C, for 20sec. After each trial, participants rated pain intensity during the trial using all 4 pain scales, followed by a rest period of 3 min. Before each trial, participants immerse their nondominant hand in tepid water for 2min [1-3].

The Visual Analogue Scale (VAS), Numerical Rating Scale (NRS), Verbal Rating Scale (VRS), and Faces scale (FPS-R) have all demonstrated reliability and validity as measures of pain intensity. However, these measures are rarely directly compared to one another in the same study, and no published studies have examined their relative validity in a Portuguese sample.

The Cold Pressor Task is one of the methods most commonly used to induce experimental pain in humans, producing effects similar to chronic pain (e.g., the stimulus is conducted by the C fibers) [1-2].

- Study Aim:** Compare the relative validity of VAS, NRS, VRS and FPS-R for detecting differences in pain intensity associated painful stimulation.

- Study Hypothesis:** All four scales will be able to detect differences in pain resulting from four temperatures (1°C, 3°C, 5°C and 7°C).

METHOD

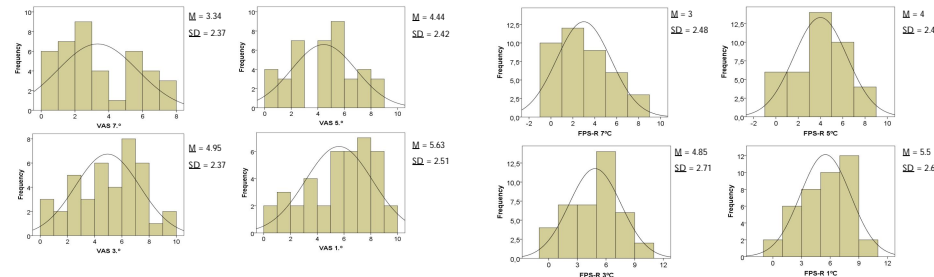
Participants:

		DEMOGRAPHIC CHARACTERISTICS				
	fr (%)	M	SD	Min	Max	
Exclusion criteria:	Sex (% female)	52.5	-	-	-	
- being under 18 years of age	Age (years)	20.87	3.14	18	30	
- musculoskeletal problems, cancer, heart disease, stroke, epilepsy, diabetes or Raynaud's syndrome						
- having an open wound, cut or fracture in any of the upper limbs						
- having a cognitive or physical disability which would prevent participation						

Material and Measures:

- 4 thermal insulated containers with armrest and two compartments separated by a metal filter, containing water chilled to 4 different temperatures (fig. 1-2), 1 extra thermal insulated container without divisions containing tepid water, 5 scientific mercury thermometers, 4 water pumps (JAD, model SP-602, 200l/h)[1].

RESULTS



VAS – REPEATED MEASURES ANOVA			
$F_{\text{Huyhns-Feldt}}(2,40, 93.52) = 33.79; p < 0.001,$			
$\eta_p^2 = 0.46; \omega = 1$			
	5°C	3°C	1°C
7°C	$p < 0.001$	$p < 0.001$	$p < 0.001$
5°C	-	$p < 0.05$	$p < 0.001$
3°C	-	-	$p < 0.001$

NRS – REPEATED MEASURES ANOVA			
$F_{\text{Huyhns-Feldt}}(2,22, 86.53) = 33.00; p < 0.001,$			
$\eta_p^2 = 0.46; \omega = 1$			
	5°C	3°C	1°C
7°C	$p < 0.001$	$p < 0.001$	$p < 0.001$
5°C	-	$p < 0.05$	$p < 0.001$
3°C	-	-	$p < 0.001$

VRS – REPEATED MEASURES ANOVA			
$F(3,114) = 25.62; p < 0.001,$			
$\eta_p^2 = 0.40; \omega = 1$			
	5°C	3°C	1°C
7°C	$p < 0.001$	$p < 0.001$	$p < 0.001$
5°C	-	n.s.	$p < 0.001$
3°C	-	-	$p < 0.001$

FPS-R – REPEATED MEASURES ANOVA			
$F_{\text{Huyhns-Feldt}}(2,62,102.21) = 30.43; p < 0.001,$			
$\eta_p^2 = 0.44; \omega = 1$			
	5°C	3°C	1°C
7°C	$p < 0.001$	$p < 0.001$	$p < 0.001$
5°C	-	$p < 0.01$	$p < 0.001$
3°C	-	-	$p < 0.001$

DISCUSSION / CONCLUSION

- Results are consistent with previous studies [1-3]:
 - Provide support for the validity of all 4 pain intensity scales, in Portugal;
 - All four scales can detect differences in pain resulting from four temperatures (1°C, 3°C, 5°C and 7°C).
 - Variations in water temperature result in statistically significant differences in pain intensity ratings, with lower temperatures resulting in higher pain ratings.
- Small differences in relative responsivity were found, with VAS and NRS showing better responsivity than the FPS-R, and the FPS-R showing better responsivity than VRS.
- The VAS and NRS may be most useful when particularly sensitive and responsive measures of pain intensity are needed.

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