Is pain contagious? The effect of observation on pain induction and its influence on placebo studies

Ewa Buglewicz[1], Wacław M. Adamczyk[1,2], Przemysław Bąbel[1]
[1] Jagiellonian University, Institute of Psychology, Pain Research Group, Kraków, Poland
[2] The Jerzy Kukuczka Academy of Physical Education, Laboratory of Pain Research, Katowice, Poland

PAIN RESEARCH GROUP

JAGIELLONIAN UNIVERSITY IN KRAKÓW

INSTITUTE OF PSYCHOLOGY JAGIELLONIAN UNIVERSITY

NATIONAL SCIENCE CENTRE POLAND

BACKGROUND

- ✓ Research indicates that pain can be learned (allodynic effect) through classical and operant conditioning (for review see: Adamczyk et al. 2019; Madden et al. 2015)
- ✓ Very few studies have investigated the role of the third learning process, i.e., observational learning, in pain induction. Due to some methodological issues, their results do not allow to draw any definite conclusions (Craig & Weiss,1971, 1972)
- ✓ The results of a few recent studies indicate that observational learning may modulate pain experience and induce both placebo analgesia and nocebo hyperalgesia (Colloca & Benedetti, 2009; Świder & Bąbel, 2013, 2016)

RESEARCH QUESTIONS

- ✓ May pain be a reaction triggered and sustained by observational learning?
- ✓ Does time between observing the model and experiencing stimuli influence the magnitude of the allodynic effect evoked by observational learning?
- ✓ Does presence of the model influence the magnitude of the allodynic effect evoked by observational learning ?
- ✓ What psychological characteristics moderate allodynic effect?

METHODS

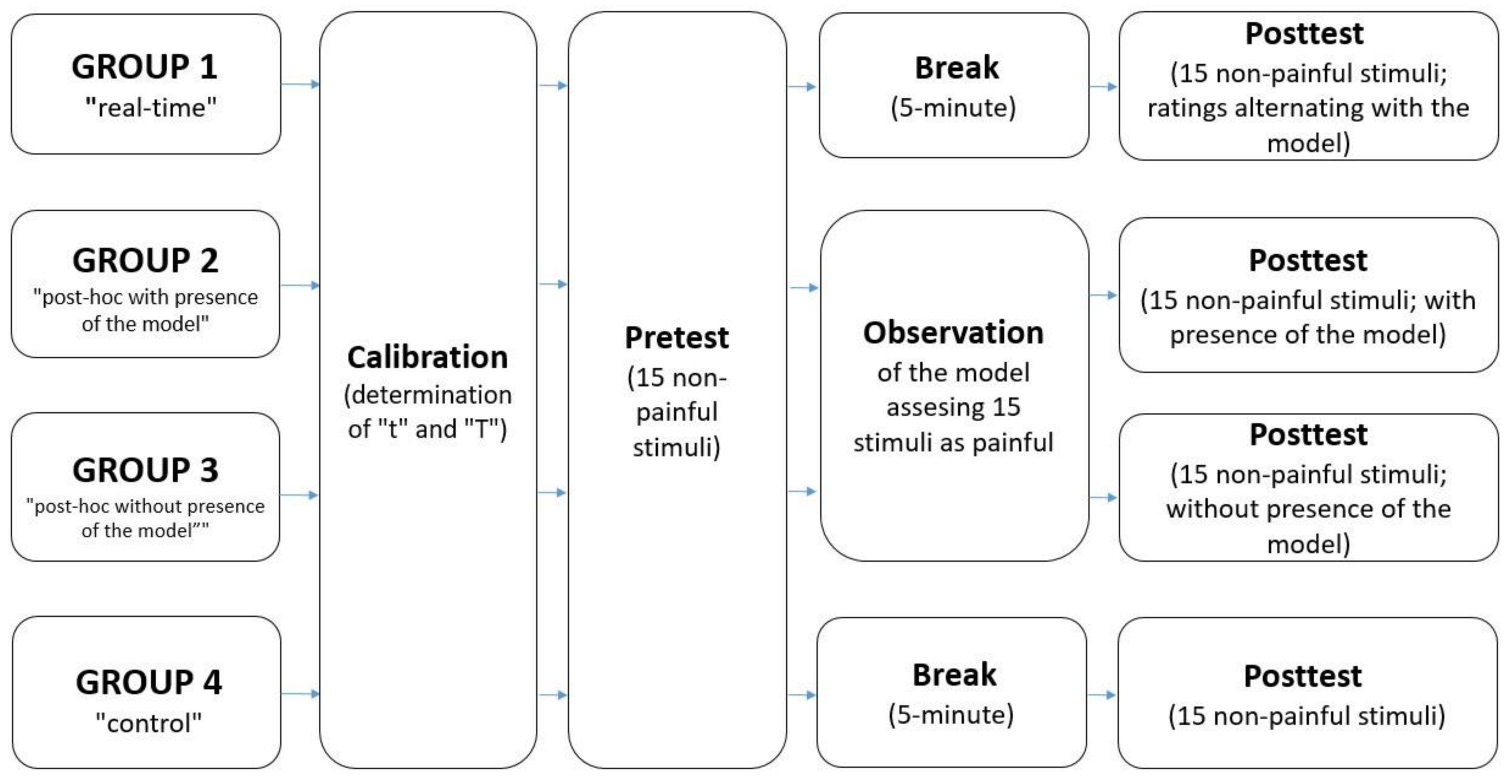


Fig. 1. Study design In each group, the participant took part in the calibration and the pretest. In the real-time group [1], the participant and the model rated the electrical stimuli alternately. In two post-hoc groups [2, 3] the participants first observed the model and then took part in the posttest. In the post-hoc group with model presence [2], the model was present during the posttest, whereas in the post-hoc group without model presence [3], the model had left before the start of the posttest. There was no observation phase in the control group [4]. Both in the pretest and in the posttest, all participants received 15 identical tactile stimuli of an intensity below their pain threshold. t - tactile threshold, T – pain threshold.

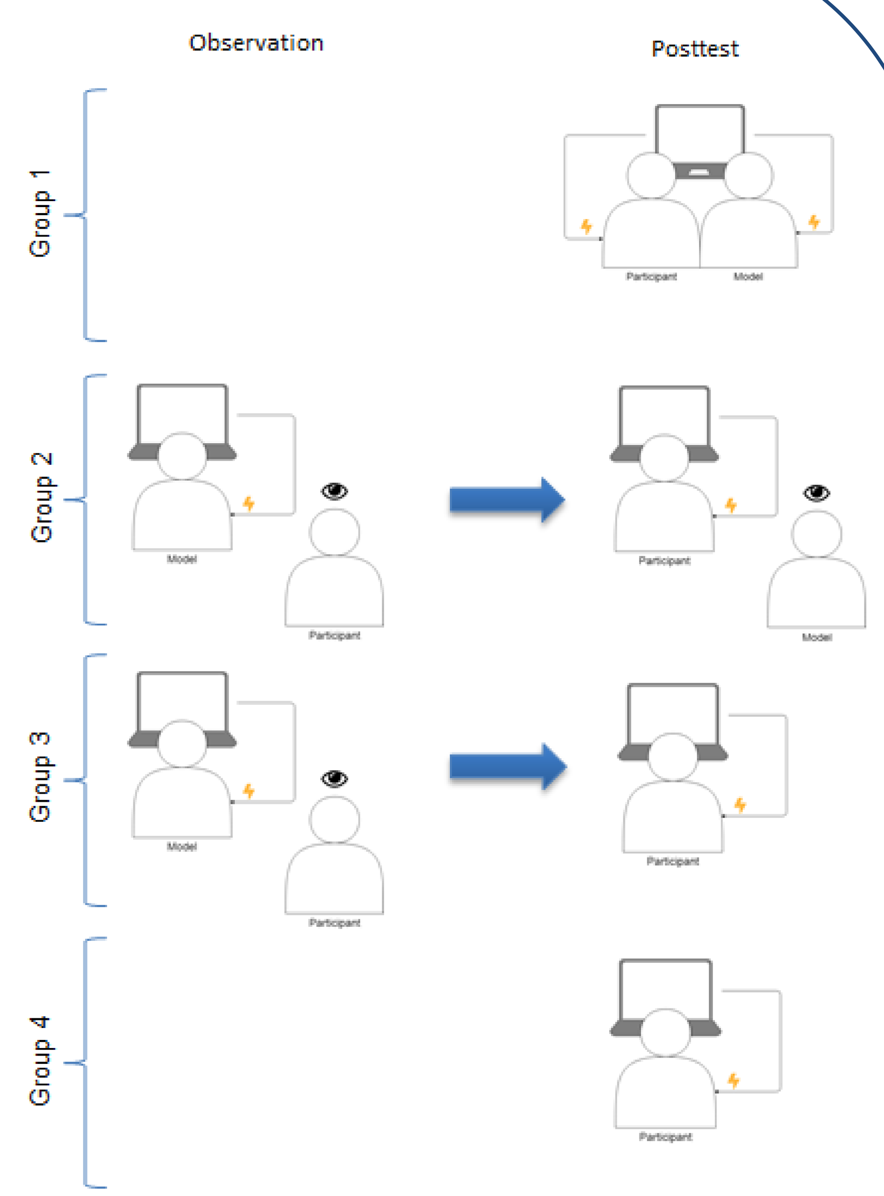


Fig. 2. Experimental setup of the observational learning. In Group 1 participant and model sit side-by-side and rate all the stimuli alternately. In Group 2 and Group 3 in observation phase, participant sits beside the model who rates the stimuli. In posttest in Group 2 model and participant switch places. In Group 3 model exit before pretest. There is no model in Group 4.

Participants:
- ✓ 88 healthy, pain-free participants (50% female; age 18-35)

Model:
- ✓ 27 year-old man
- ✓ presented to the participants as an another participant in the study
- ✓ assessed all of the stimuli on the NRS as painful (1-6) in a pseudorandomized order

Momentary measures (0-10 NRS):
- ✓ Pain intensity (0 = "no pain"; 10 = the strongest pain you can bear")
- ✓ Pain related fear (0 = "no fear of pain"; 10 = "the strongest fear of pain you can imagine"

Psychological characteristics:
- ✓ Compliance - Gudjonsson Compliance Scale (Gudjonsson, 1989)
- ✓ Need for Closure - Need for Closure Scale (Webster & Kruglansky, 1994)

Design:
- ✓ 4 groups: real-time; post-hoc with model presence; post-hoc without model presence; control (no obvservation at all) (Fig. 1.)

RESULTS

	Pretest		Posttest	
	painful stimuli	non-painful stimuli	painful stimuli	non-painful stimuli
Real-time	55	275	222	108
Post-hoc with model presence	42	288	190	140
Post-hoc without model presence	39	291	170	160
Control	48	282	58	272

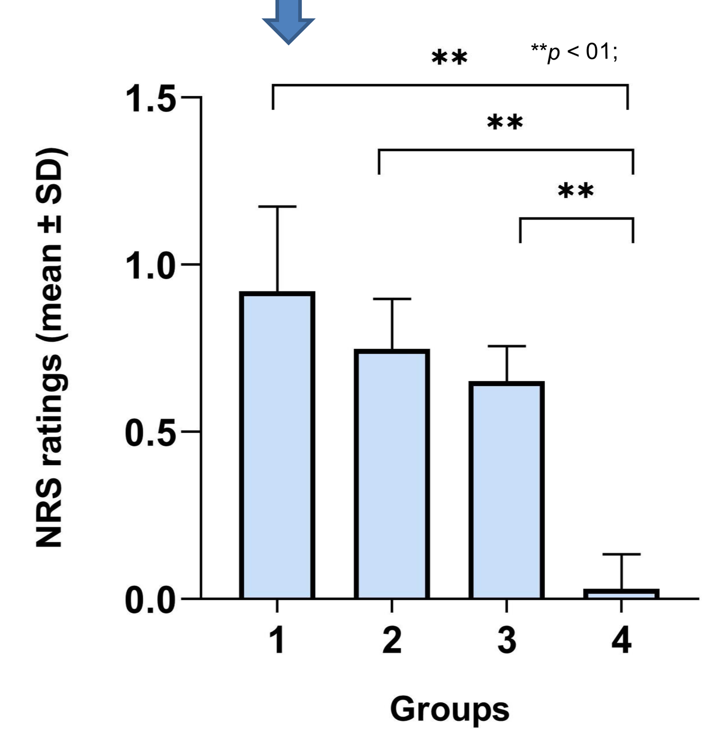
Tab.1. Number of stimuli assesed as painful and nonpainful in the pretest and posttest in three experimental groups and one control group.

Tab. 2. Relative Risk Analysis. Likelihood of pain experience in the posttest phase compared to posttest phase in remained groups.

Group	Group	Risk Ratio
Real-time	Control	RR 3.8; 95% CI 2.99-4.89***
Post-hoc with model presence	Control	RR 3.3; 95% CI 2.55-4.21***
Post-hoc without model presence	Control	RR 2.9 95% CI 2.27-3.79***
Real-time	Post-hoc with model presence	RR 1.2; 95% CI 1.04-1.32**
Real-time	Post-hoc without model presence	RR 1.3; 95% CI 1.15-1.49***
Post-hoc with model presence	Post-hoc without model presence	RR 1.1; 95% CI 0.97-1.29

**p < 01; ***p < 0,001

Fig. 3. Mean pain ratings for each of the stimuli in the pretest and posttest in three experimental groups (real-time, post-hoc with model presence and post-hoc without model presence), and in the control group. NRS - Numeric Rating Scale.



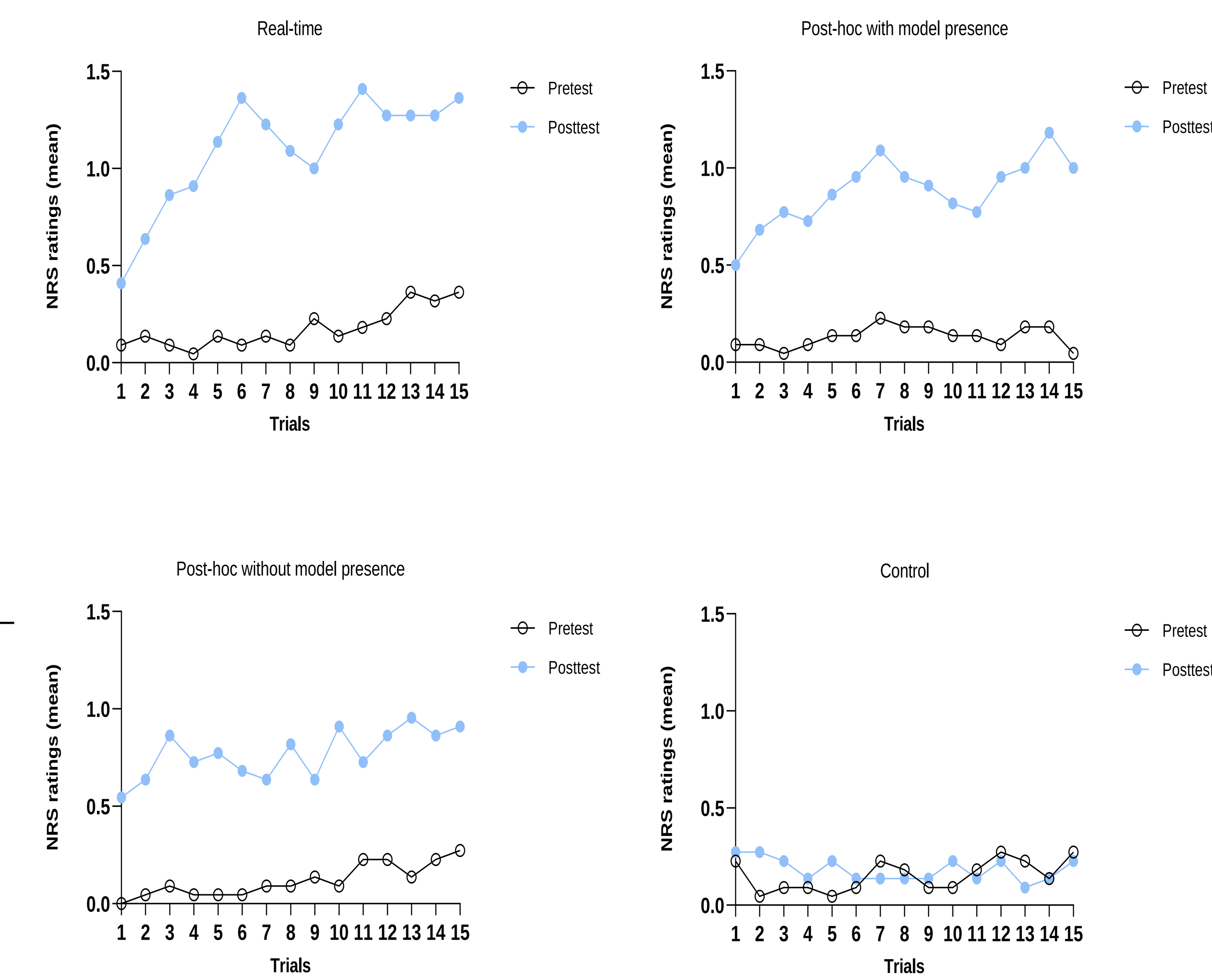


Fig. 4. Mean pain ratings. Differences in the assessment of pain intensity on the NRS scale between the pretest and the posttest in the real-time group [1], the post-hoc with model presence group [2], the post-hoc without model presence group [3], the control group [4]. NRS - Numeric Rating Scale.

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Conclusions

- ✓ Allodynia can be evoked by observational learning suggesting that pain can be contagious
- ✓ The allodynic effect is stronger when pain is experienced during the observation and rated immediately after
- ✓ Mere presence of the model has no impact on the magnitude of allodynic effect evoked by observational learning
- ✓ Psychological characteristics such as pain related fear, compliance and need for closure are not predicitve of pain induction by observational learning

Additional information

- ✓ The study was funded by the National Science Centre in Poland (grants no. 2016/23/B/HS6/03890 and 2016/23/N/HS6/00807)
- ✓ The study protocol was approved by the Research Ethics Committee at the Institute of Psychology of Jagiellonian University, Kraków, Poland.

- ✓ Contact information: Ewa Buglewicz, Jagiellonian University, Institute of Psychology, Pain Research Group, ul. Ingardena 6, 30-060 Kraków, Poland. E-mail: ewa.buglewicz@student.uj.edu.pl

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