Drop-Outs in Experimental Pain Research: Are There Differences in Psychophysiological Emotional Processing?

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Introduction

Drop-outs are a potential threat to the validity of experimental pain research. Indeed, the possibility of important differences between those who complete the study and those who do not could present a selection bias in available data. For example, group differences in emotional processing could confound the interpretation of pain outcomes, because emotion is known to modulate pain nociceptive processes. The present study examined the differences between drop-outs and completers from a study describing the relationship between emotion and nociceptive processing. Group differences in emotional processing were assessed by computer-EMG, SCR, initial HR deceleration, HR acceleration, and startle modulation.

Picture-Viewing: Emotion Induction

The International Affective Picture System (IAPS; Center for the Study of Emotion and Attention, 2006) was used to present 54 pictures, each rated as unpleasant (Unpleasant), neutral (Neutral), or pleasant (Pleasant). These 54 pictures were presented in pseudorandom order and were used to elicit emotional processing.

Data Analysis

Analyses: 3 (Picture Valence: Unpleasant, Neutral, Pleasant) x 2 (Group: Drop-out vs. Completers) repeated measures ANOVAs. Multivariate statistics (Wilk’s Lambda) examined to overcome sphericity issues. Linear and quadratic trends were assessed. Simple main effects tests of Group were conducted with Bonferroni adjusted mean comparisons when appropriate.

Participants

95 Completers and 26 Drop-Outs

Complete Characteristics: Female (57%), White non-Hispanic (72%), single (61%), employed (70%), average age = 33 yrs (SD=13.39)

Drop-out Characteristics: Female (65%), White non-Hispanic (50%), single (90%), employed (73%), average age = 34 yrs (SD=13.92)

No significant differences for demographics between groups (p>.1)

Exclusion Criteria:

• < 18 years of age
• Current acute illness
• Cardiovascular, neurological, and/or circulatory problems
• Recent use of analgesic, antidepressant, anxiolytic, or antihypertensive medication
• Recent psychological trauma
• Specific photos of snakes or spiders (due to picture-viewing)
• Chronic pain condition
• Raynaud’s disease

Procedure

5.5 hour study examining relationships among startle modulation, pain/nociceptive processing, and emotional processing

Acoustic Startle Eyeblink Response

Recording Electrodes:

2 EMG sensors placed over left orbicularis oculi muscle

Acoustic Startle Probes:

Presented during 50% of pictures (n=27) and 18 trials

Acoustic EMG: 1.4 -2.5 ms in duration

Corrugator EMG Magnitude

Recorded EMG sensors placed over left corrugator supercilii muscle

ASR Eyeblink Magnitude

Used as a physiological measure of startle response size

ASR Eyeblink Magnitude = peak of orbicularis oculi EMG minus mean of 60 ms pre-stimulus interval

Results: Acoustic Startle Reflex (ASR)

• Picture Valence main effect: F(2,118)=4.44, p=.014, η²=.09
• Linear trend: p=.005, η²=.06
• Picture Valence x Group interaction: F(2,119)=3.61, p=.027, η²=.04
• No main effect of Group: F(1,119)=.06, p=.80, η²=.004

Results: Corrugator EMG

• Picture Valence main effect: F(2,117)=18.38, p=.001, η²=.24
• Linear trend: p=.001, η²=.21
• Picture Valence x Group interaction: F(2,117)=3.61, p=.03, η²=.06
• Group differences for unpleasant and pleasant pictures

Results: Skin Conductance Response (SCR)

• Picture Valence main effect: F(2,118)=4.44, p=.002, η²=.10
• Quadratic trend: p=.001, η²=.06
• Picture Valence x Group interaction: F(2,117)=4.7, p=.03, η²=.048
• No main effect of Group: F(1,117)=.09, p=.34, η²=.008

Results: Heart Rate (HR)

• HR Deceleration
• Picture Valence main effect: F(2,118)=4.35, p=.02, η²=.04
• Linear and quadratic trends: F(2,118)=6.44, p=.002, η²=.14

Conclusions

• There were no significant differences in emotional processing between drop-outs and completers on measures of SCR, HR, and ASR
• However, corrugator EMG did show significant differences between groups, with drop-outs showing greater corrugator activity in response to unpleasant and pleasant pictures
• While the differences between groups for corrugator EMG should be studied further, these differences may reflect a greater tendency to experience displeasure and/or to communicate displeasure through facial affect
• These minor group differences are not likely to affect the validity of experimental pain research