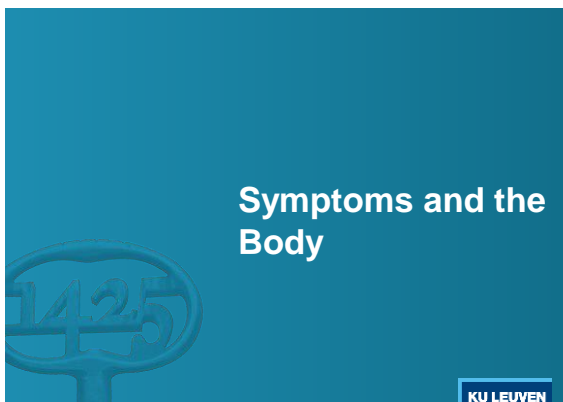




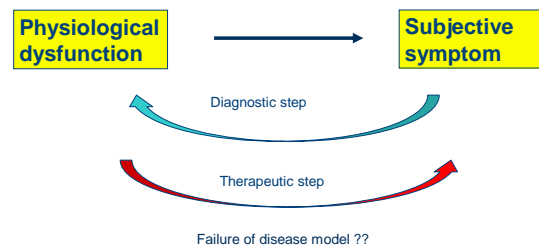
Health Psychology Lab – Leuven Psychology of aversive somatic experiences



Retreat Villers-la-Ville



Disease model



3 main challenges

- “Medically unexplained symptoms” (MUS)
 - Functional syndromes
 - incl. various pain syndromes
 - Somatization problems
- Placebo/nocebo phenomena
- Poor (and highly varying) relationship between symptoms and bodily dysfunction

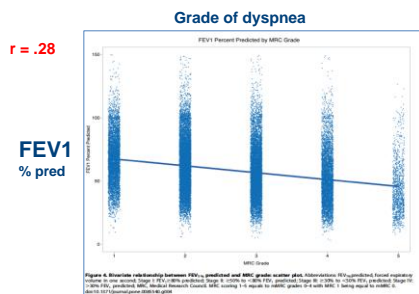
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Medically explained symptoms?

How well are self-reported complaints explained in diseases with known etiopathology?

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Relation dyspnea – FEV1 in COPD

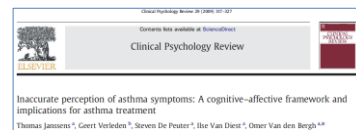


Müllerova et al., 2014; $r = 0.36$, Agustí et al., 2010

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Respiratory diseases

- $r = .30$ à $.60$ with relevant physiological disease indicators across respiratory diseases
- Asthma : $\pm 50\%$ shows poor correlation with FEV1
- Trait NA is an important moderator of asthma symptoms



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Cardiac diseases

- $r = \pm .0$ à 0.17 : self-reported complaints with objective data (function measures; 24-hour holter data; data from implanted pacemakers/defibrillators)
- 17 to 61.1% coincidence between actual and reported arrhythmia's
- 25 to 45% of patients with atrial fibrillation reported symptoms in the absence of tachyarrhythmias
- 40% of cardiac function measures for self-reported cardiac symptoms are “negative”
- (negative) emotional factors predict symptom reports better than objective measures of cardiac disease

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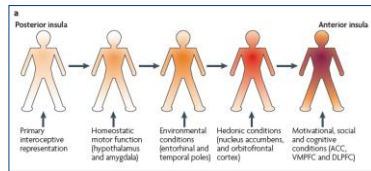
(Barsky et al., 1994; Barsky et al., 1993; Myrtek et al., 2000; Arnold et al., 2006; Sears et al., 2006; Brückner et al., 2005; Atarashi et al., 2008; Sears et al., 2005; Ludwig et al., 1999)

“We need a complaint model rather than a disease model”

Kroenke, special issue on Symptoms, Annals of Internal Medicine, 2001

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Critical role of insula



Overlapping activity in anterior insula during interoception and emotional experience
Jamil Zaki^{1,2,3}, Joshua S. Davis^{1,2}, Kevin N. Ochsner¹

Craig, 2009

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Dyspnea and emotional pictures

Loaded breathing in healthy Ss

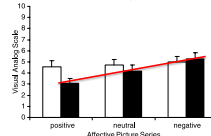


Figure 2. Mean ratings of unpleasantness (■) and intensity (□) of dyspnea during positive, neutral, and negative affective picture series. Error bars represent standard errors of the mean.

Exercise in COPD patients

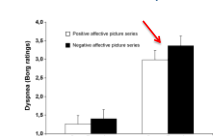


Fig. 1. Mean (SD) ratings of global dyspnea on the Borg scale before and after constant cycle ergometer exercise tests with parallel viewing of positive and negative affective picture series.

von Leupoldt et al., 2006, 2009

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Painful esophageal stimulation and music

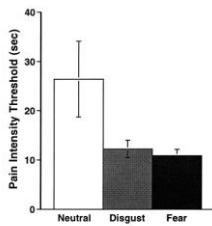


Fig. 1. Mean pain intensity thresholds for groups that viewed neutral, disgust, or fear slides immediately before the cold-pressor test. Error bars indicate SEM.

Meagher et al., 2001; Bena et al., 2010

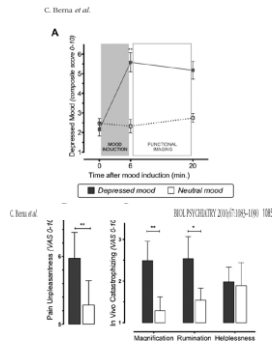


Figure 2. Psychophysical results. (A) Mean ratings of depressed mood before and after the mood inductions, as well as at the end of the experiment. Composite score 0 = not sad at all and extremely happy 10 = extremely sad and not happy at all. (B) Mean pain unpleasantness ratings in both mood conditions on VAS ranging from not unpleasant at all (0) to intensely unpleasant (10). (C) Average frequency of in vivo catastrophizing in both mood conditions for each of the three subjects on a VAS not at all (0) to all the time (10). Error bars indicate SEM. * $p < .05$, ** $p < .01$, VAS, visual analogue scale.

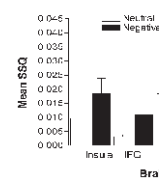


Figure 1. Comparison of brain processing of pain during negative versus neutral emotion. Analysis of variance revealed significantly more intense sensations during negative emotion in the right insula, anterior cingulate gyrus, SMA, and ACC BA32 and BA24.

DOEN ET AL. GASTROENTEROLOGY 2009;137:263-265

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(Negative) affect “invades” the perception of physical symptoms

- More pain
- More attention to pain
- More avoidance of pain

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High trait NA persons

- Over-reactive evaluative system
 - Increased activity in limbic areas when processing emotional stimuli
 - Decreased activity in parts of the ACC and PFC
- Genetic basis
- Poor executive control function
- Poor emotion regulation
 - Suppression
 - Attentional and interpretational biases towards threatening stimuli
 - Negative Repetitive Thinking

High NA
x
Somatic Events

→ Exaggerated symptom reports

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Hariri, 2009; Posner & Rothbart, 2000; Davidson, 2000; Yiend, 2010; Moberly & Watkins, 2009; De Preter et al., 2008; Gross & John, 2003.

Interoception and symptom perception

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"interoceptive perception is largely a construction of beliefs that are kept in check by the actual state of the body (rather than vice versa)".

Barrett & Simmons, Nature Reviews 2015, p. 424

PERSPECTIVES

OPINION Interceptive predictions in the brain

Lisa Feldman Barrett and W. Ryle Simmons

Human nervous systems that has relevance for every biological as well as psychological phenomenon^{1,2}, such as eating, craving and decision making. In this Opinion article, we introduce the embodied predictive interoception coding (EPIC) model as an active inference account.

Barrett & Simmons, Nature Reviews, 2015

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High NA
x
Somatic Events

Exaggerated affective responding

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Was It So Bad? The Role of Retrospective Memory in Symptom Reporting

Marta Walentynowicz, Katarina Bogdans, Ben Van Oost, Filip Raes, and Christ Van den Bergh
University of Leuven

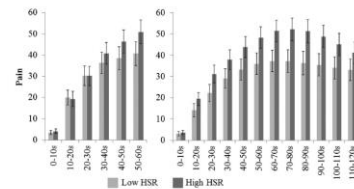
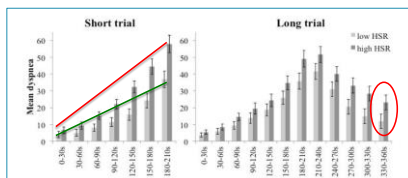


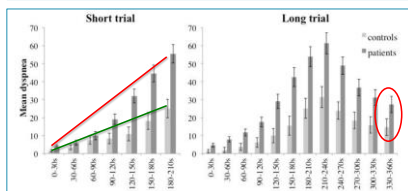
Figure 1. Mean values and standard errors of concurrent pain ratings (0–100) for high and low habitual symptom reporters (HSR) during the short (left) and the long trial (right).

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Healthy Ss
• High HSR
• Low HSR



• SSD patients
• Healthy Controls



Walentynowicz et al., 2015; 2017

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Exaggerated affective responding

- Brain imaging in different MUS groups
 - greater activation of the affective networks when processing interoceptive stimuli
 - failure to adequately activate inhibitory systems to counter-regulate unpleasantness

Abnormal Affective Modulation of Somatosensory Brain Processing Among Patients With Fibromyalgia

PIERO MONTAÑA, PhD, CAROLINA SÍLIGES, MS, MANUEL GARCÍA-HERRERA, MD, PhD, RAÚL IZQUIERDO, MD, MAGDALENA TRUYOLS, MS, NICOLE BLAY, BS, AND DOLORES COLLADO, MD

Psychosomatic Medicine 67:957-963 (2005)

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Kwan et al., 2005; Mayer et al., 2005; Wilder-Smith et al., 2004; Mayer et al., 2005; Naliboff et al., 2001; Montaña et al., 2005; Sílges et al., 2007; Van Oudenhoove et al., 2008

Central sensitization?

Central Sensitization: Explanation or Phenomenon?

Emanuel N. van den Broeke¹, Diana M. Torta^{1,2}, and Omer Van den Bergh²

¹Institute of Neuroscience, Université Catholique de Louvain, and ²Health Psychology, Faculty of Psychology and Educational Sciences, University of Leuven

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DOI: 10.1177/2075570517709006
www.psychologicalscience.org/CPS
SAGE

OPINION ARTICLE

Central sensitization and pain hypersensitivity: Some critical considerations. [version 1; referees: awaiting peer review]

Emanuel N. van den Broeke

Institute of Neuroscience, Division Systems and Cognition, Université catholique de Louvain (UCL), Brussels, 1200, Belgium

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"There is no simple, direct relationship between the wound per se and the pain experienced. The pain is in very large part determined by other factors, and of great importance here is the significance of the wound, i.e. reaction to the wound" (p. 165)

From Beecher, H.K. (1959). Measurement of subjective responses: quantitative effects of drugs. New York, NY, US: Oxford University Press.

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Interpretation/meaning matters!

Catastrophic interpretations of pain

Pain Catastrophizing Scale

When I am in pain...

- I constantly wonder whether the pain will stop.
- that is awful and I think it will never get better
- I become afraid the pain will get worse
- I wonder whether anything serious might happen

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Pain-related fear

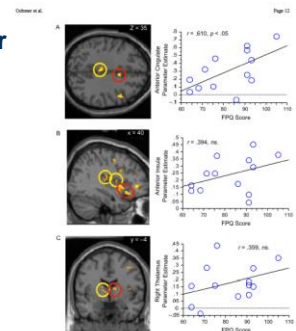


Fig. 1. Patterns of anterior and posterior cingulate cortex (ACC) activation in the anterior cingulate cortex (ACC) and posterior cingulate cortex (PCC) in the pain-related fear. Cingulate, insula, and fusiform regions, activated in this context were hypothesized to be related to pain-related fear. These highlighted in red circles showed the strongest correlations, but only with FPG scores. Scatter plots illustrate these correlations.

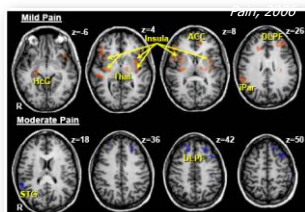
Ochsner et al., PAIN 2006

Catastrophic interpretations of pain

Cortical responses to pain in healthy individuals depends on pain catastrophizing

David A. Seminowicz, Karen D. Davis *

¹Center for Research in Neuroimaging, University Health Network, Institute of Medical Science and Department of Surgery, University of Toronto, Canada

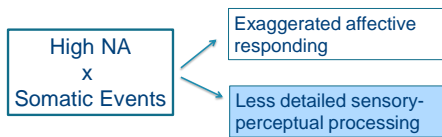


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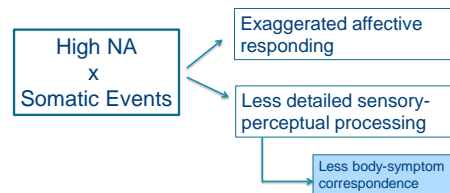
Effects of pain catastrophizing

- Predictor of future pain, even when controlling for level of medical pathology.
- Hampers the effects of distraction from pain
- Dysregulation of the endogenous opioid pain-control system.
- Increased pro-inflammatory cytokine (IL-6)
- Amplification of cortical activation in the context of pain

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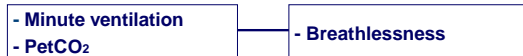


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Body – symptom correspondence

CO₂-inhalation

within-subject correlation
across a number of breathing trials



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Negative affective context

negative vs positive odor + info

Body-symptom correspondence

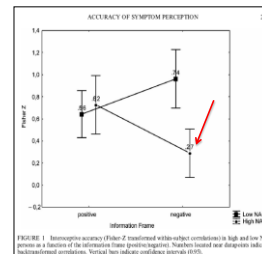


FIGURE 1 | Interoceptive accuracy (Pearson r transformed within-subject correlations) in high and low NA groups as a function of the information frame (positive/negative). Scatter (based on descriptive statistics) and transformed correlations. Vertical bars indicate confidence intervals (95%).

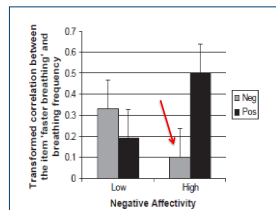


Fig. 2 | Interoceptive accuracy for faster breathing as a function of the information frame and NA of the participant.

Van den Bergh et al., 2004

Bogaerts et al., 2005

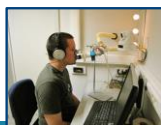
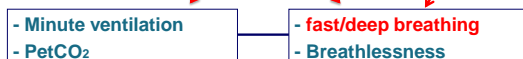
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Body-symptom correspondence

CO₂-inhalation

within-subject correlation

neutral

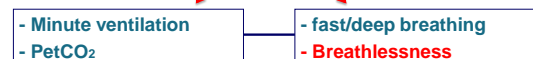


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Body-symptom correspondence

CO₂-inhalation

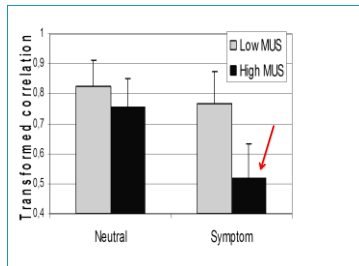
within-subject correlation



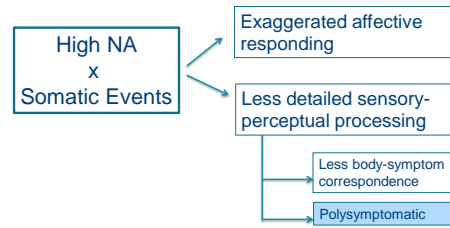
symptom

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Body-symptom correspondence

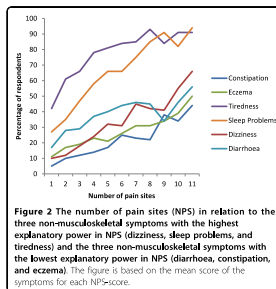


Bogaerts et al., 2008; Van den Bergh et al., 2004; Bogaerts et al., 2005



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Pain locations and nonpain symptoms

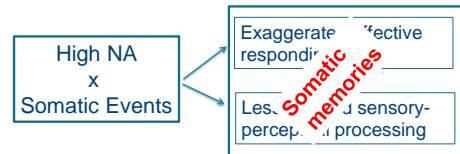


N=3,227 (general population)

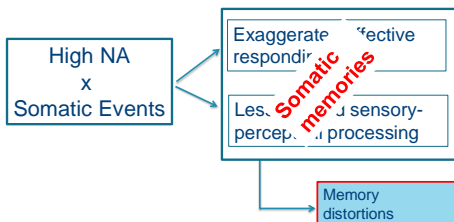
- SNQ: Standardized Nordic Quest. N pain locations
- SHC: Subjective Health Complaints 13 nonmusculoskeletal symptoms

R = .55

Tschudy-Madsen et al., 2011



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ORIGINAL ARTICLE
The Specificity of Health-Related Autobiographical Memories in Patients With Somatic Symptom Disorder
 Marta Walentynowicz, MA, Filip Raes, PhD, Ilse Van Diest, PhD, and Omer Van den Bergh, PhD

TABLE 2. Means and Standard Deviations for Indices of Autobiographical Memory Specificity by Group

Group	Patients (n = 30)		Controls (n = 24)		Statistics	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Significant Effects	F (p)
Specific memories					Group	13.63 (.001)
Total	7.13 (2.87)	9.42 (1.06)				
Positive cues	3.73 (1.51)	4.67 (0.76)				
Negative cues	3.40 (1.61)	4.75 (0.33)				
Overgeneral categorical memories					Group	7.62 (.008)
Total	0.93 (1.17)	0.21 (0.59)				
Positive cues	0.35 (0.55)	0.13 (0.45)				
Negative cues	0.60 (0.77)	0.08 (0.28)				
Overgeneral extended memories					Group	8.70 (.005)
Total	1.00 (1.23)	0.21 (0.51)				
Positive cues	0.43 (0.63)	0.13 (0.34)				
Negative cues	0.57 (0.86)	0.08 (0.28)				
Some event ^a	0.07 (0.25)	0.00 (0.00)				
No memory ^a	0.65 (1.22)	0.13 (0.34)				
Omission ^a	0.23 (0.63)	0.04 (0.20)				

^aFor the categories with low response rates, only total scores are provided.

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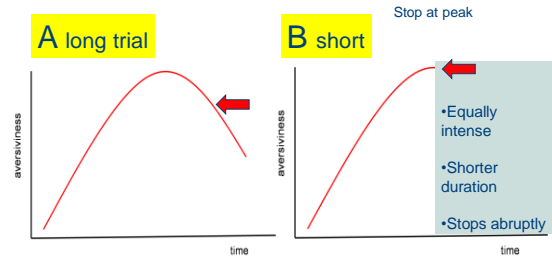
Peak-end rule

Encoding of somatic events

- in the form of transitions and critical moments
 - Segment that felt most intense (peak)
 - Sensations in the final segment (end)
- Relative duration neglect

➤ Bias requires sensory-perceptual processing of events

Which trial caused greatest discomfort?

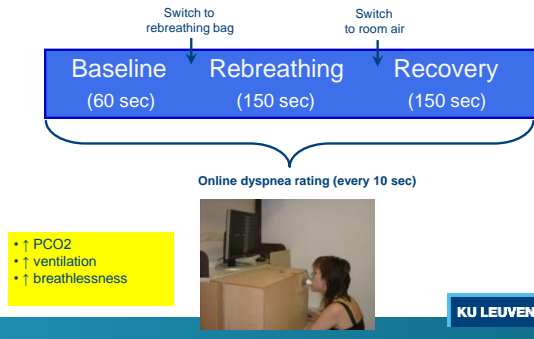


Kahneman (2000)

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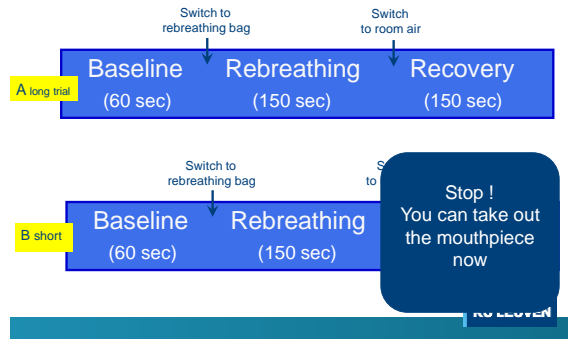
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Rebreathing test (Read, 1967)



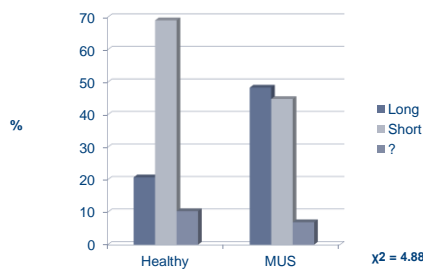
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Rebreathing test (Read, 1967)



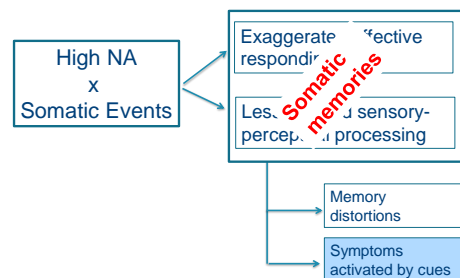
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Which trial caused greatest discomfort?



KU LEUVEN

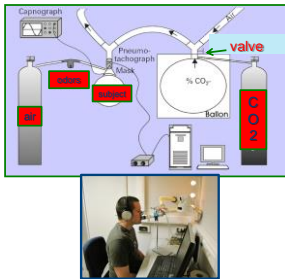
Bogaerts et al., 2012; Walentynowicz et al., 2017



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MUS in the lab

Odor-CO₂-inhalation conditioning paradigm



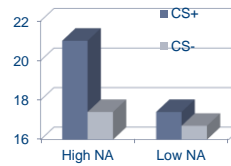
- CO₂ – enriched air
⇒ Symptoms
- Bad odor + CO₂ (CS+)
Fresh odor + air (CS-)
- Fresh odor + CO₂ (CS+)
Bad odor + air (CS-)
- Symptoms to odors only?

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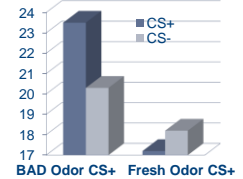
MUS in the lab

Odor-CO₂-inhalation conditioning paradigm

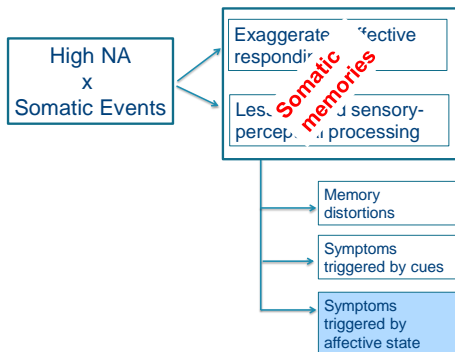
Symptoms



Symptoms



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Pictorial cues (IAPS)

Series of 20 pics, 8 sec/pic



- tightness of the chest
- pounding of the heart
- stomach or abdominal cramps
- headache
- fatigue
- not able to breathe deeply
- rapid heartbeat
- nausea
- dizziness
- muscular pain

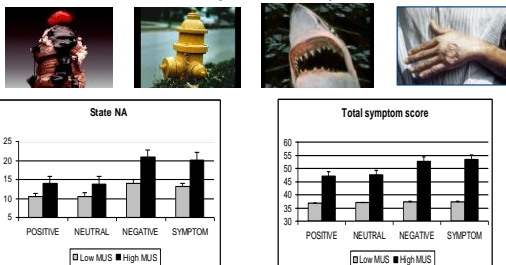
1 – 9 intensity ratings per item

Bogaerts et al., 2010

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Pictorial cues (IAPS)

Series of 20 pics, 8 sec/pic

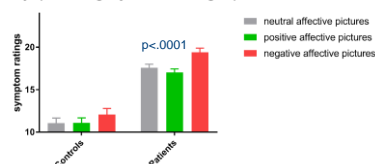


- NA acts as a moderator, not as a mediator

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Fibro and CFS (N=90)

symptom ratings by condition and group



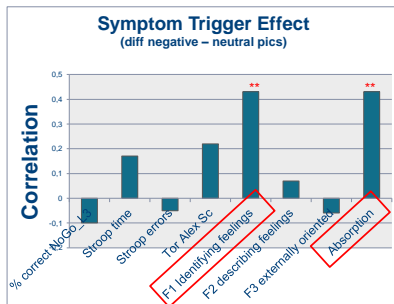
ORIGINAL ARTICLE

Inducing Somatic Symptoms in Functional Syndrome Patients: Effects of Manipulating State Negative Affect

Maaike Van Den Houte, PhD, Katrien Bogaerts, PhD, Ste Van Diest, PhD, Ingrid De Bie, MEd, Philippe Ponsens, PhD, Luk Van Cauteren, MEd, PhD, and Christ Van den Bergh, PhD

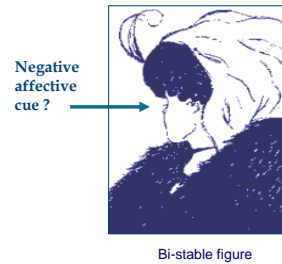
Van Den Houte et al., 2017

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Somatovisceral illusions



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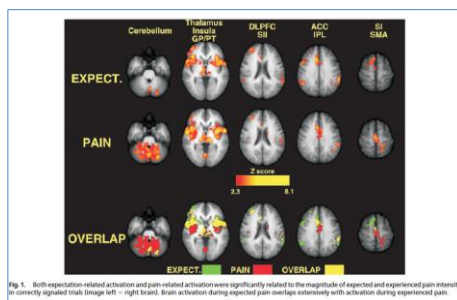
“Activating a ‘mental representation’ of an impending sensory event can significantly shape neural processes that underlie the actual sensory experience”

- Brain areas and neurotransmitters
- Peripheral (psycho-)physiology

The subjective experience of pain: Where expectations become reality

Tetsuo Koyama^a, John G. McHaffie^a, Paul J. Laurienti^b, and Robert C. Coghill^{a,b}

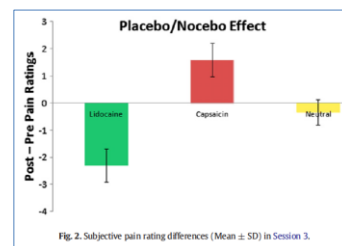
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- Nocebo correlated with changes in the thalamus, insula, prefrontal cortex, anterior cingulate cortex, and other brain regions... (Koyama et al., 2005)
- Deactivation of the dopaminergic and opioidergic systems... (Colloca, 2012)

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Heat pain



- Same heat stimulus
- Administration of “sham” Lidocaine and Capsaicin

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Freeman et al., 2015

Heat pain

Nocebo effect

- significant fMRI signal changes in the insula, orbitofrontal cortex, and periaqueductal gray

Placebo effect

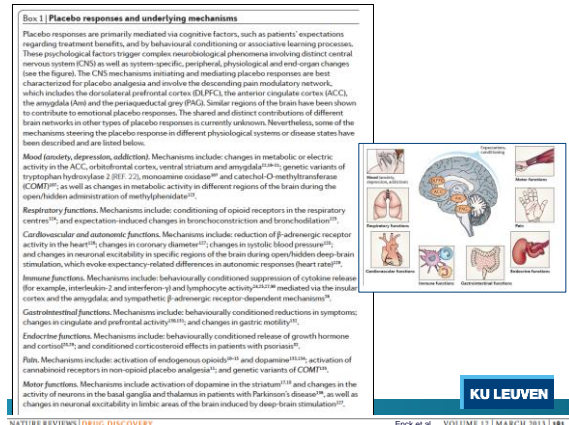
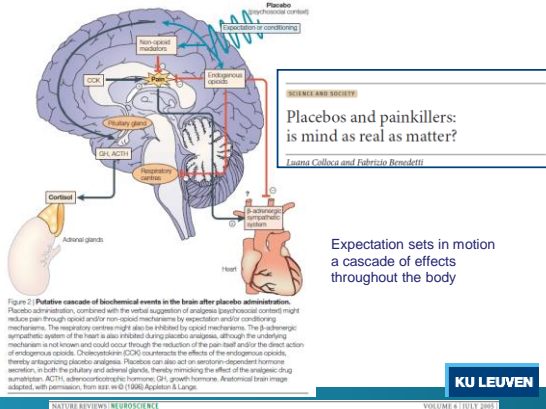
- significant fMRI signal changes in the striatum.

Positive and negative expectancies engage **different brain networks** to modulate our pain experiences caused by the same stimuli



Nocebo effect sizes - pain

- moderate to large $g = 0.62$ to 1.03 (Hedges' g)
- highly variable $g = 0.43$ to 4.05
- similar to placebo $d = 0.81$
- verbal suggestions smaller than verbal PLUS conditioning
 - Verbal alone $g = 0.64$ to 0.87
 - Verbal PLUS $g = 0.76$ to 1.17



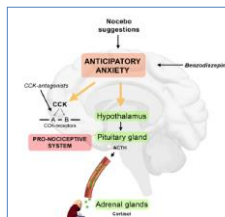
Direct Evidence for Spinal Cord Involvement in Placebo Analgesia

Falk Eippert,^{1,2} Jürgen Finsterbusch,¹ Ulrike Bingel,² Christian Büchel¹

... direct evidence that psychological factors can influence nociceptive processing at the earliest stage of the central nervous system, namely the dorsal horn of the spinal cord.

New Insights into the Placebo and Nocebo Responses

Paul Ende,^{1,2} Fabrizio Benedetti^{1,2} and Manfred Schedlowski^{1,2}



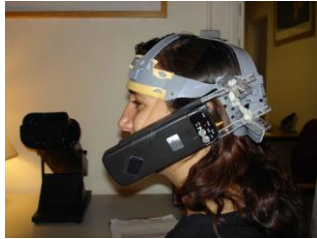
Differential blocking of nocebo effects on

- Pain (CCK-antagonist)
- Anticipatory anxiety

Figure 3. Mechanisms of the Hypothalamic Nocebo Effect
Nocebo suggestions induce anticipatory anxiety, which activates two independent pathways: the hypothalamic-pituitary-adrenal (HPA) axis on the one hand and a CCK-ergic pronociceptive system on the other hand. Benzodiazepines act on anxiety, thus blocking both the HPA-axis activity and the CCK pronociceptive system. In contrast, CCK-antagonists act on the pronociceptive system only. Placebo/nocebo studies investigating opioid (OP) receptor activity (Benedetti et al., 2005). Note the main purpose of this sketch is to focus on neural substrates of the hypothalamic nocebo effect which, in the case, takes precedence over anatomical accuracy.

Electrosensitivity and sham radiation

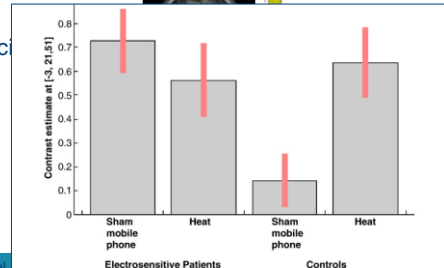
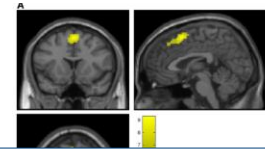
- **Subjects**
 - Patients with electrosensitivity
 - healthy controls
- **Exposure**
 - heat
 - sham radiation from mobile phones



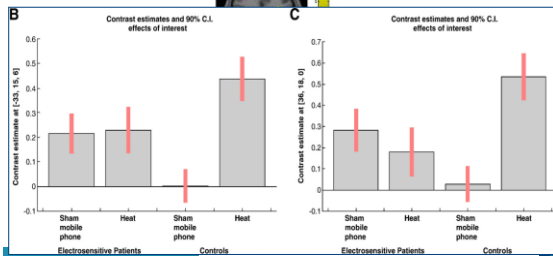
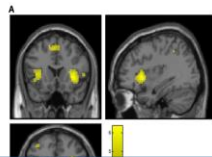
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Landgrebe et al.

Anterior cingulate cortex



Landgrebe et al.



Landgrebe et al., 2008

Explaining placebo ?

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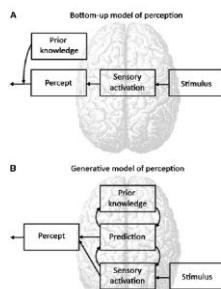
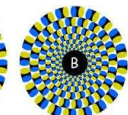
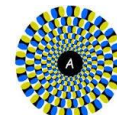
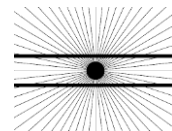
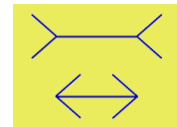
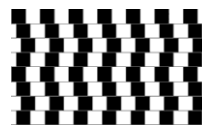


FIGURE 1. Scheme representing a traditional bottom-up (A) and the new generative model of perception that is based on predictive processing (B). Reprinted with permission from Otten et al. (7).

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Visual illusions



We see things that are not there
We don't see things that are there

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Meaningful perception

Pattern detection - categorization



- Complex inferential process
- Automatic/unconscious
- Compelling percept of reality
 - One cannot not see a chair

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Predictive Coding



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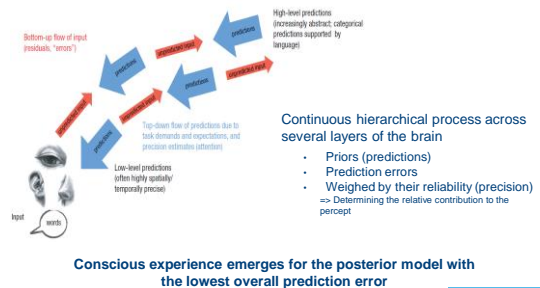
Predictive Coding

- The brain has no direct access to the distal world
 - it only has its own neural activity to make sense of
- A major task is pattern detection in its own neural activity
 - To make a causal model of the (external and internal) world
 - By "informed guessing"
 - predictions using information the system already has => Bayesian
- Criterion is adaptiveness/usefulness, not accuracy
 - An accurate model is mostly adaptive,
 - but bias can be more adaptive than accuracy (Lynn & Barrett, 2014) !!

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Friston, 2005; Clark, 2013; Hohwy, 2012; von Helmholtz, 1860; Leibniz, 1756

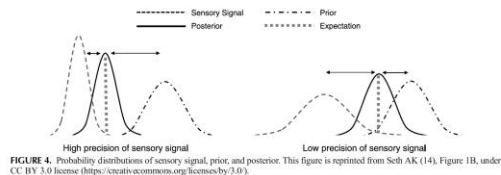
Making a causal (posterior) model



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Fig 3 from Lupyan and Clark 2015; Friston, 2005; Clark, 2013; Hohwy, 2012;

Rubber Hand Illusion



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Lorimer Moseley



KU LEUVEN

Luana Collaca



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REVIEW

Deconstructing the sensation of pain: The influence of cognitive processes on pain perception

Katie Wiech^{1,2*}

*“The concept of pain as
an actively constructed
experience...has
far-reaching implications
for pain treatment and
prevention.”*

Wiech, 2016, *Science*, 6312, p.587

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Critical questions

- How could information be designed to optimally guide expectations for maximum treatment outcome?
- How could aberrant information processing be addressed using the framework of predictive coding?
- Future research should explore the translation of research on the inferential process underlying the perception of pain into clinical practice..
 - How can processes leading interoceptive illusions be modified to make them therapeutically useful?

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Breathlessness and Pain

- **Pain**
 - Refers to tissue damage
 - Most adaptive response is behavioral escape/avoidance
- **Dyspnea**
 - refers to impending death => panicogenic !!
 - Most adaptive response is **gasping**
 - a breathing response
 - Plus behavioral escape/avoidance

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Breathlessness and Pain

- Fear of pain does not create pain
- Fear of dyspnea may create dyspnea !!
 - Mismatch ventilatory drive – actual ventilation
 - Respiratory muscles work harder
 - Reduction of PCO_2

=> Vicious circles

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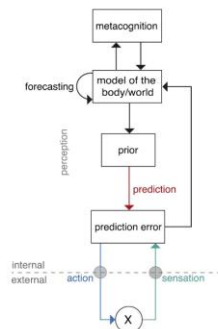


FIGURE 2. Overview of a predictive processing model of perception. This figure is reprinted from Petzschner et al. (10), Figure 1 Panel C, under CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). Color image is available only in online version (www.psychosomaticmedicine.org).

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Conscious experience of a symptom

... unrelated to physiological dysfunction

- When the posterior model of the bodily state is completely determined by strong priors
- Symptoms experienced as true, real
 - Use the same machinery as in "objectifiable" symptoms



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Therapeutic considerations

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Treatment implications?

- Treating disability
 - Avoidance behavior, catastrophizing..
 - Modest treatment effects
- Treating pain perception/symptom perception ??
- Treating both.. ?

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Fear ~ Attention

- Body Scanning
- Selective Attention
- Difficulty disengaging

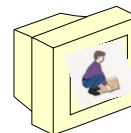


Crombez, Van Damme & Eccleston, 2005

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Fear => Safety-seeking behaviors

Task: lifting



"A strategy intended to minimize or prevent a feared catastrophe"

- Total avoidance
- Escape
- *Subtle within-situation avoidance behaviors*

Tang et al, BRAT, 2007

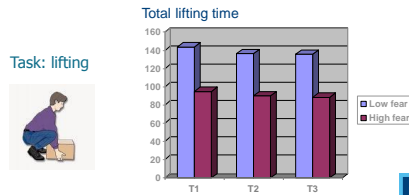
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Fear and catastrophizing ~ physical performance and disability

Acute low back pain: pain-related fear and pain catastrophizing influence physical performance and perceived disability
 The E.J. Swinkels-Meewisse^{a,b,c}, Jeffrey Reuland^a, Rob A.B. Oostendorp^{a,c},
 André L.M. Verbeek^a, Johan W.S. Vlaeyen^a

^aDepartment of Medical Clinical and Experimental Psychology, University of Groningen, Groningen, The Netherlands
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Received 1 May 2005; accepted 10 August 2005; available 10 October 2005



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Safety-seeking behaviors

Examples of safety-seeking strategies employed by chronic pain patients during the bag-carrying tasks

Description of the strategy	Rationale for the strategy
1 "Lifting and loading the bag cautiously with back kept straight"	"To prevent pain and sudden jolt. Lifting could have put me out of circulation and my back would have seized up."
2 "Standing with weight on one side"	"I can't stand still with both feet on the floor otherwise pain would have increased and I'd be in agony."
3 "Holding and pushing my back to the 'good' side"	"So that no weight will be on my 'bad' side. This is to avoid something drastic from happening... I'll panic. I'll die."
4 "Constantly rocking. Shifting weight between my legs"	"To keep muscles in back moving otherwise tension will build up in my neck leading to severe headache."

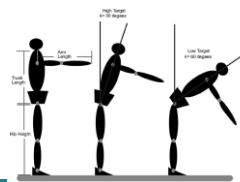
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Safety-seeking behaviors ~ poor behavioral performance

SPINE Volume 32, Number 16, pp E460-E466
 ©2007, Lippincott Williams & Wilkins, Inc.

Pain-Related Fear Is Associated With Avoidance of Spinal Motion During Recovery From Low Back Pain

James S. Thomas, PhD,^a and Christopher R. France, PhD^b



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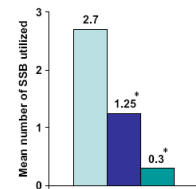
Safety-seeking behaviors

Task: lifting



Groups:

- High fearful LBP
- Low fearful LBP
- Healthy



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Tang et al, BRAT, 2007



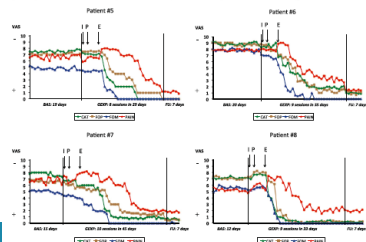
PAIN[®] xxx (2012) xxx-xxx

PAIN[®]

www.elsevier.com/locate/pain

Reduction of pain-related fear and increased function and participation in work-related upper extremity pain (WRUEP): Effects of exposure in vivo

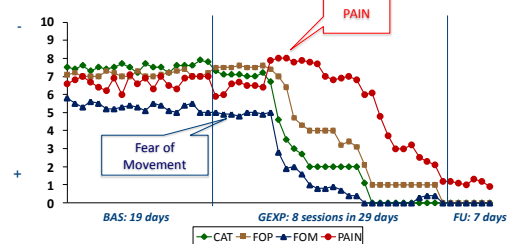
Jeroen R. de Jong^{a,*}, Johan W.S. Vlaeyen^{b,c}, Marjon van Eijnden^d, Christoph Loo^d, Patrick Onghena^a



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RSI Patient #5

VAS



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De Jong et al. PAIN, 2014

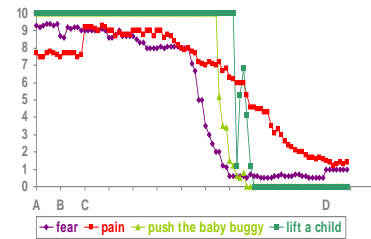
Complex Regional Pain syndrome



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Reduction of pain-related fear in complex regional pain syndrome type I: The application of graded exposure in vivo

Jeroen R. de Jong^{a,b,c,d,e}, Johan W.S. Vlaeyen^{b,d}, Patrick Onghena^e, Corine Cuypers^f, Marlies den Hollander^g, Joop Ruijgrok^h



De Jong et al Pain, 2007

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The health care provider?

"Patients' attitudes and beliefs (and thereby patients disability levels) may be derived from the projected attitudes and beliefs of health care providers"

(Rainville et al., Clin J Pain, 1995)

Pain Attitudes and Beliefs Scale for HC providers (Ostelo et al., 2003)

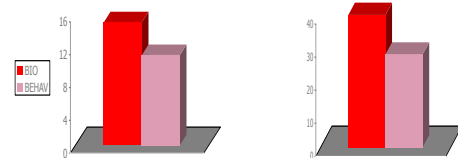
Sample item: "People would not have much back pain if there weren't something wrong with the back"

Dimensions: Biomechanical vs. Behavioral orientation

(Houben et al., EJP, 2005)

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Health care providers attitudes



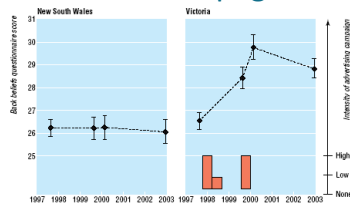
Harmfulness of daily activities

Back Pain patient vignette

Recommendation against work resumption

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Media Campaign



Mean score from the back pain beliefs questionnaire for New South Wales and Victoria for survey in August 1997, August 1999, February 2000, and December 2002 after media campaign ending in 1999. Error bars show 95% confidence interval. Bar chart shows media campaign (September 1997 to December 1999) with intensity indicated by height of bars

Buchbinder et al. (British Medical Journal, 2004)

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Interoceptive exposure



- Reduces anxiety for bodily sensations
- Increases sensory-perceptual details of somatic experiences

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Thank you



www.ppw.kuleuven.be/ogp

