

Physiological Psychology (University Bamberg)

Hypervigilance A Predisposing Factor for Persistent Pain

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Session 210

**PSYCHOPHYSICAL INSIGHTS REGARDING THE
MECHANISMS OF CHRONIC PAIN**



Relevance of psychological variables for pain after surgery

Huber & Lautenbacher
A&I, 2008

	Predictor for postoperative AP			Predictor for postoperative PP			Predictor for postoperative CP		
	yes	no	?	yes	no	?	yes	no	?
Psychological variables									
Expectancies:									
Specific expectancies	X					X			X
General expectancies		X				X			X
Coping:									
Coping strategies			X			X			X
Perceived social support			X			X			X
Anxiety:									
General anxiety			X			X			X
State anxiety	X					X			X
Specific anxiety	X					X			X
Anxiety sensitivity			X			X			X
Mood / Affective State:									
Depression		X				X			X
Negative affect		X				X			X
Personality factors:									
Neuroticism	X					X			X
Pain Psychophysics:									
Pain threshold		X				X		X	
Tolerance threshold	X					X			X
Rating of experimental stimuli	X					X			X

AP = acute pain, PP = persistent pain, CP = chronic pain



Definitions of Hypervigilance:

Hypervigilance reflects a perceptual style in which aversive events are amplified or in which the usual cognitive filters , which dampen the response to aversive events, are not fully engaged.

Rollman & Lautenbacher (1993)

Hypervigilance facilitates the detection of pain and pain-related information and is probably strongly related to action tendencies to escape or avoid.

Crombez (2006)

Hypervigilance is an unintentional [automatic] and efficient attentional process that emerges when the threat value of pain is high, the fear system is activated, and the individual's current concern is to escape and avoid pain.

Crombez, van Damme, Eccleston (2005)



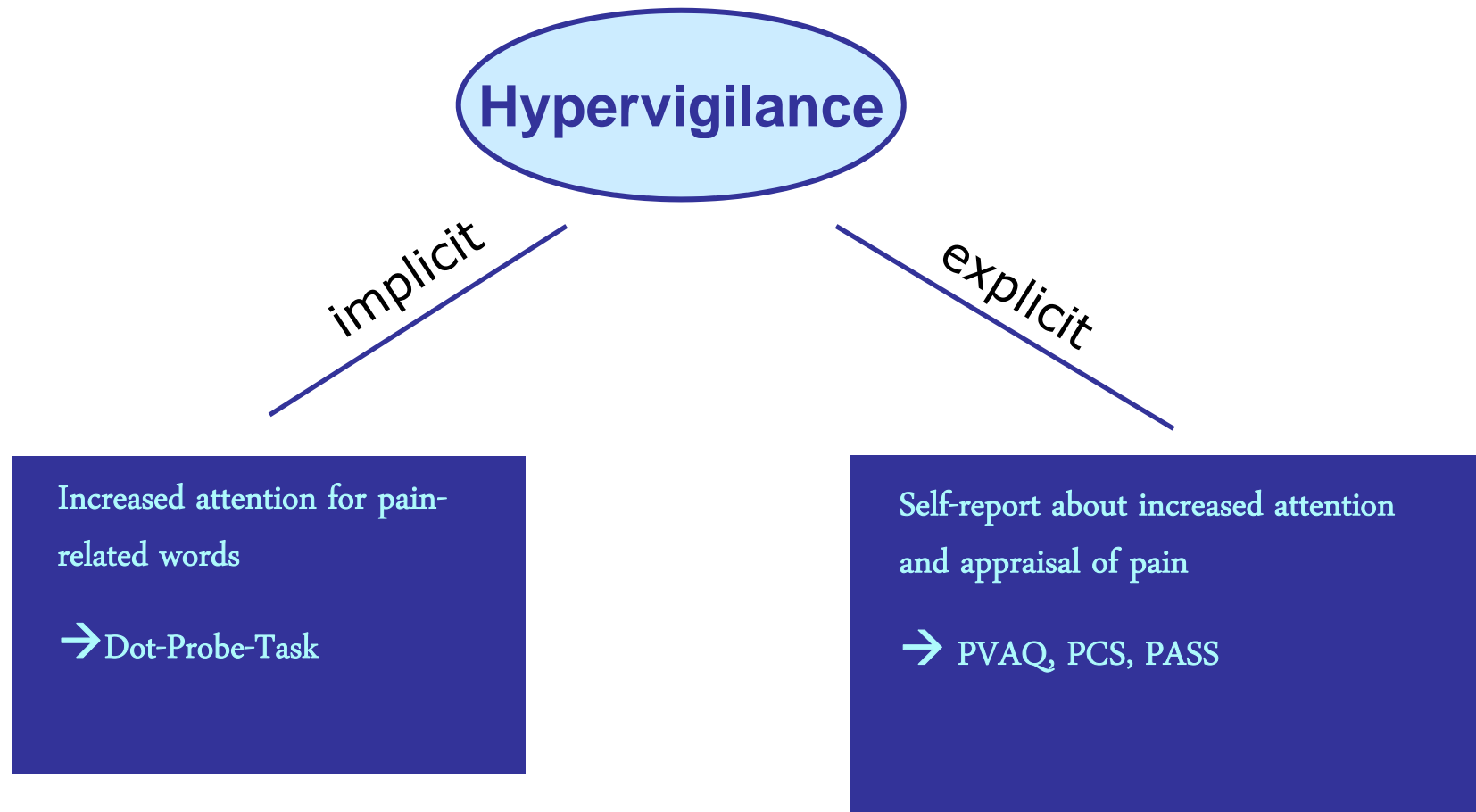
Our Definition of Hypervigilance:

Hypervigilance is used here as an umbrella term to describe individuals, who are cognitively and emotionally absorbed by pain-related stimuli and events. This tendency of being dominated by pain and its cues can be assessed

- by self-report as far as individuals can be aware of it (explicit form)
- by behavioral tests, which track the biased but mainly unconscious processing of pain-related information (implicit form).



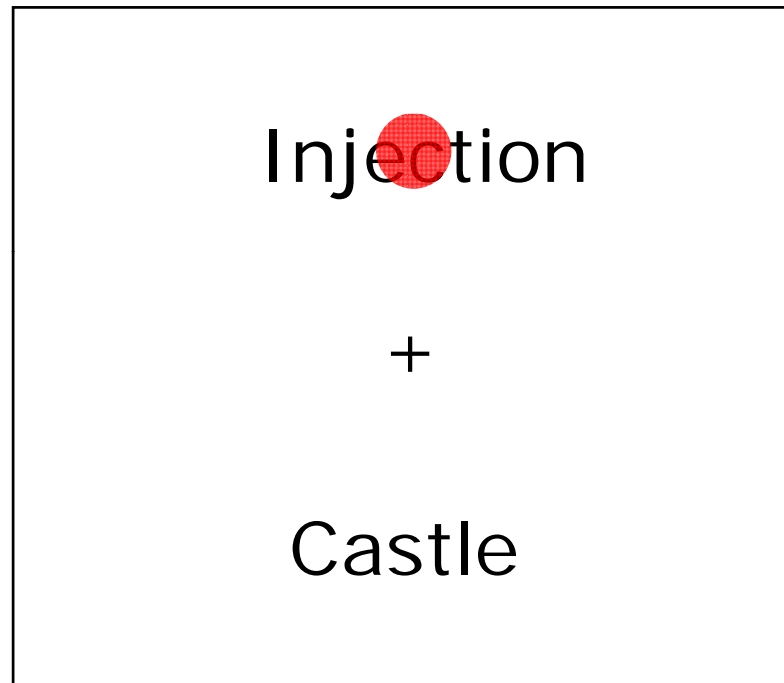
Our Operationalization of Hypervigilance



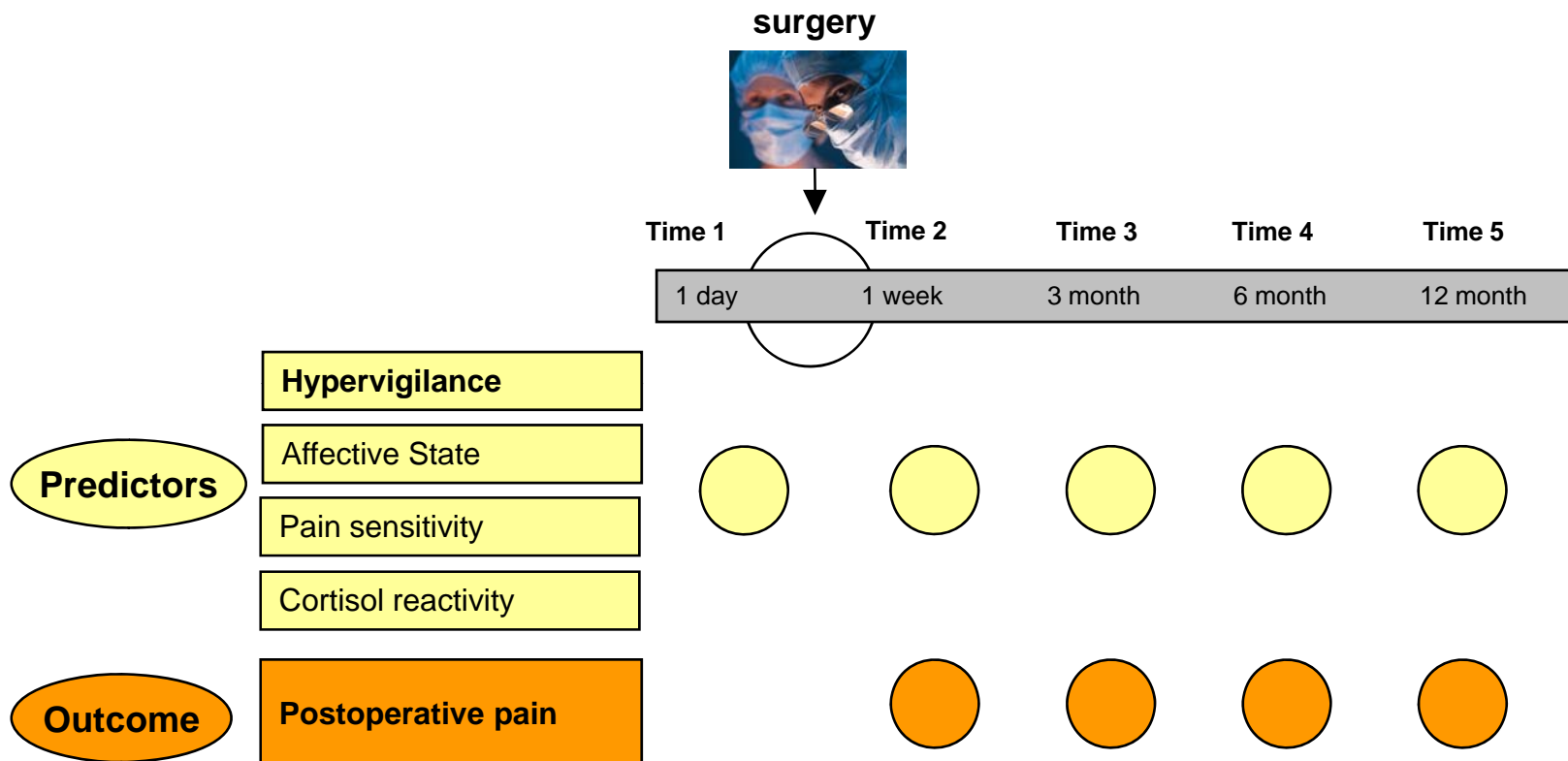
How do we assess Hypervigilance?

Biased attention for pain-related words

→ Dot-Probe-Task



Study Design



5 x 100 male patients, age 13-35

1 x 160 controls, age 13-60



Model intervention: funnel chest → reasons:

- Almost no pain before surgery
- Almost no comorbidities
- Standardized surgery
- Standardized analgesia
- Regular controls



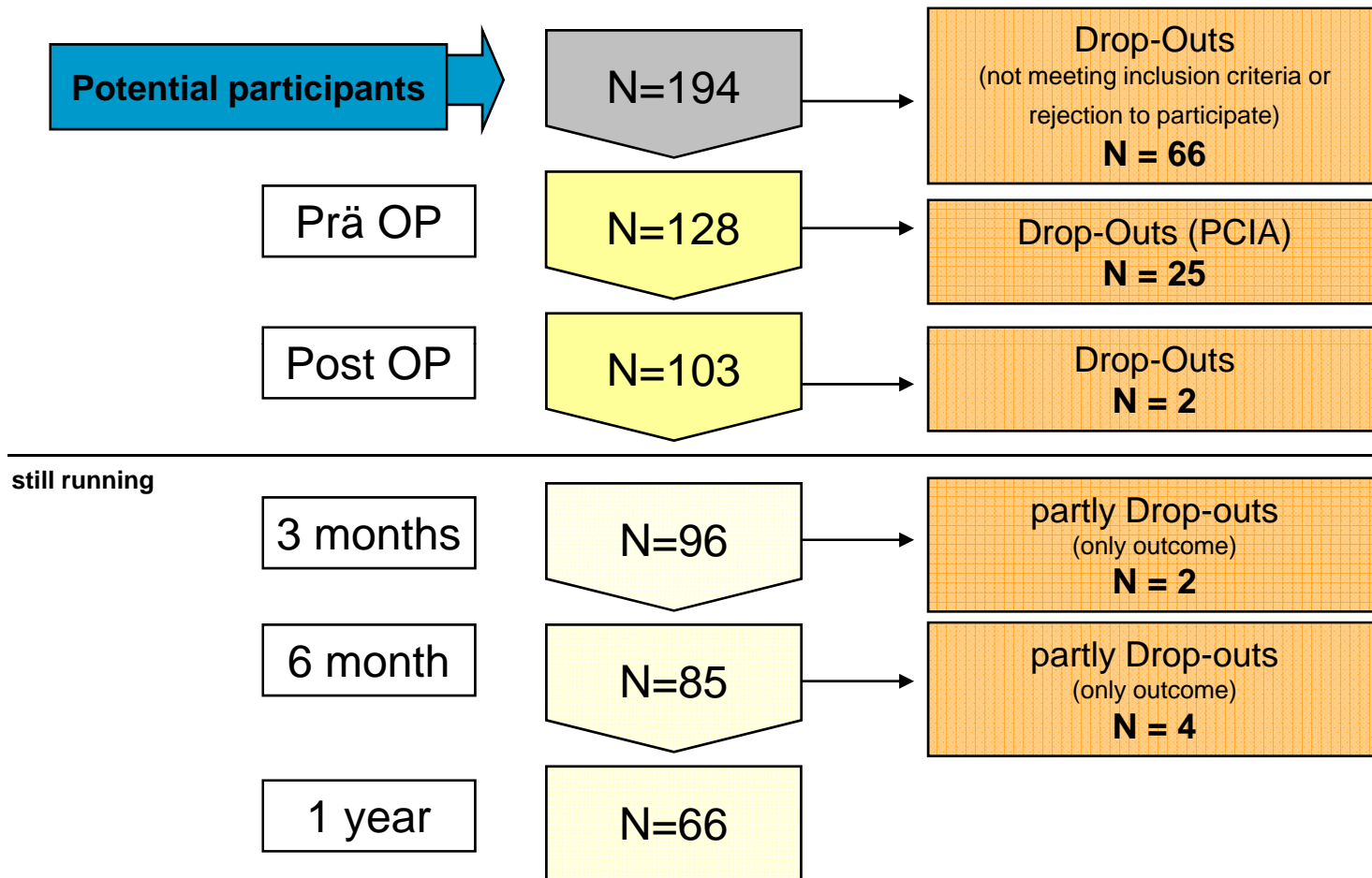
The outcome variables:

Pain intensity, disability and PCEA

- **Pain intensity** after surgery, assessed by numerical rating scales during rest and while breathing deeply
- **Pain disability** after surgery, assessed by a seven-item questionnaire
- **Use of analgesics**
patient controlled epidural analgesia (PCEA)

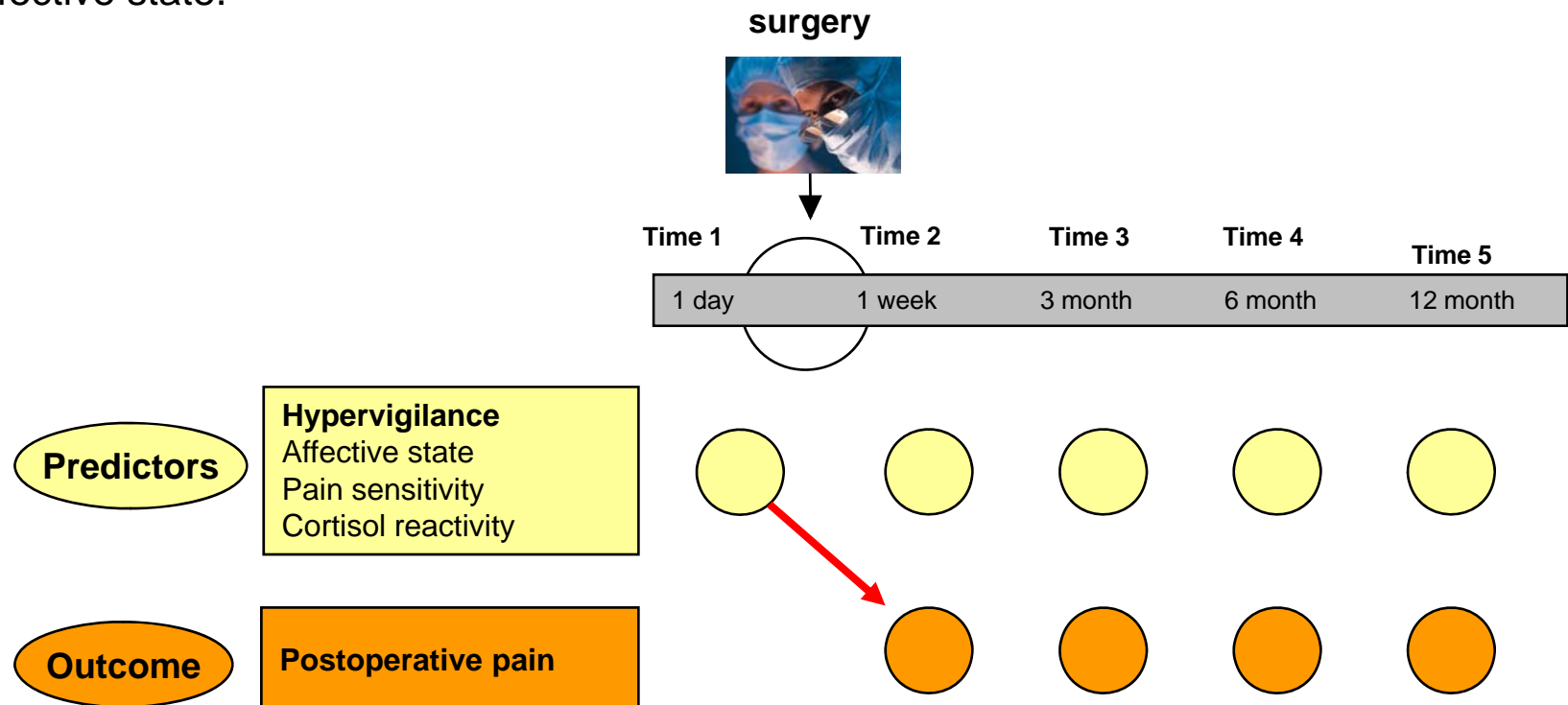


Samples



Design: Prediction of acute pain

Lautenbacher et al (2009). Hypervigilance as predictor of postoperative acute pain: Its predictive potency compared to experimental pain sensitivity, cortisol reactivity and affective state.



Results: Pain intensity, PCEA - AP

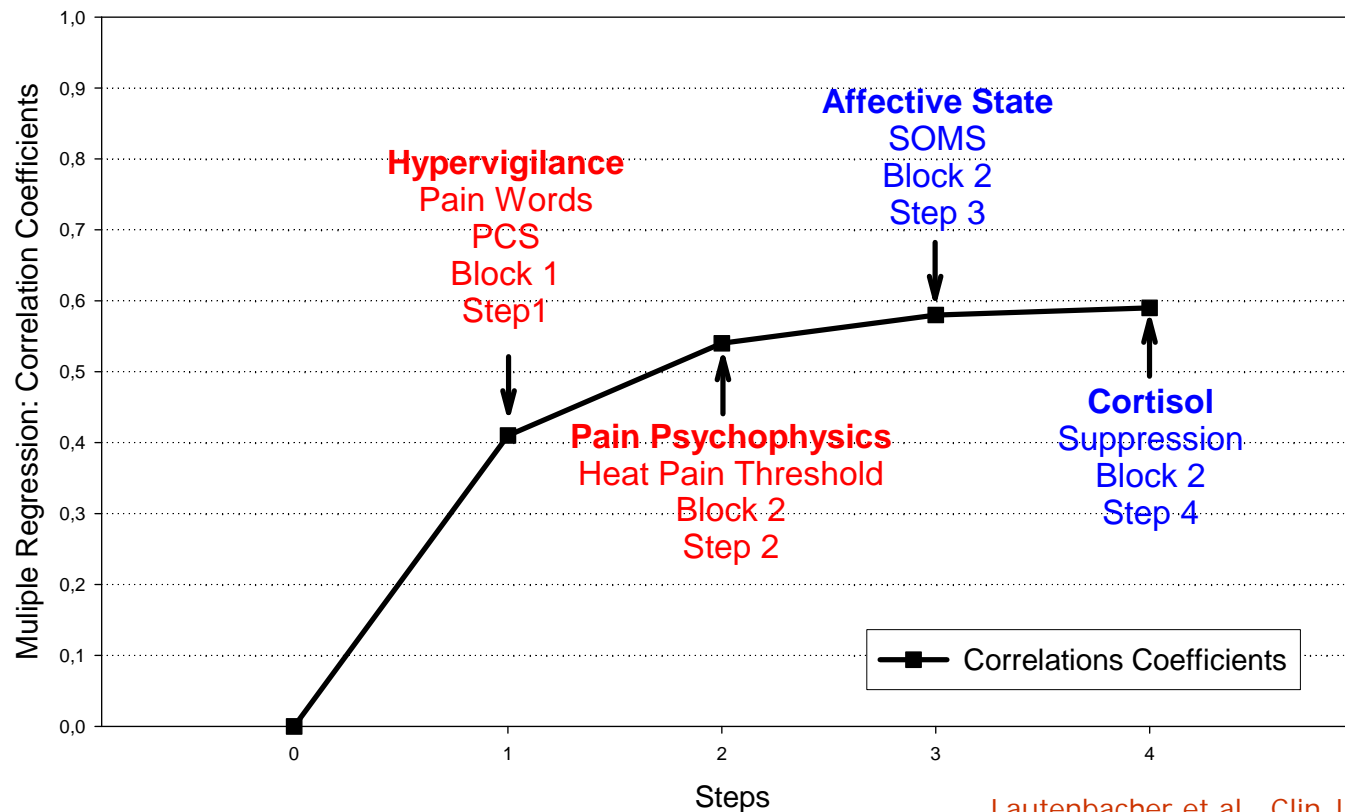
Hypervigilance implicit	Rating of AP	Single Predictors	PCEA	Single Predictors
Dot-probe task	0.31	Pain-related words	0.39	Pain-related words
		Social threat words		Social threat words
		Positive words		Positive words
Hypervigilance explicit				
Questionnaires	0.38	PCS	0.23	PCS
		PASS		PASS
		PVAQ		PVAQ
Pain Psychophysics				
Threshold/summation	0.33	Pressure pain thres.	0.26	Pressure pain thres.
		Cold pain thres.		Cold pain thres.
		Heat pain thres.		Heat pain thres.
		Heat pain summ.		Heat pain summ.
Affective State				
Questionnaires	0.47	SOMS	0.13	SOMS
		STAI-X1		STAI-X1
		CES-D		CES-D
Cortisol Reactivity				
Response parameters	0.29	Morning cortisol	0.39	Morning cortisol
		Cortisol suppression		Cortisol suppression
Mean	0.36		0.28	

Lautenbacher et al., Clin J Pain, 2009



Results: Pain intensity - AP

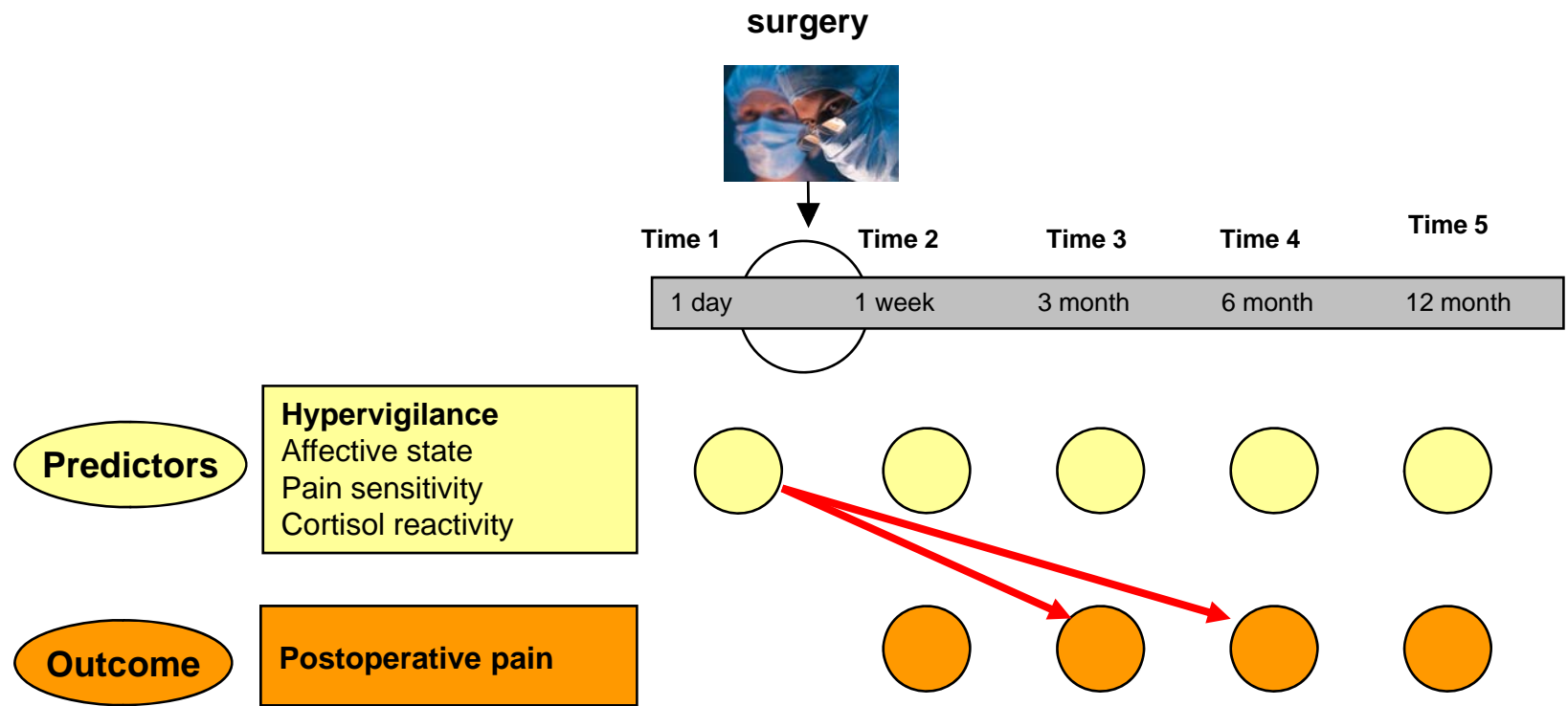
Prediction of ratings of acute postoperative pain



Lautenbacher et al., Clin J Pain, 2009

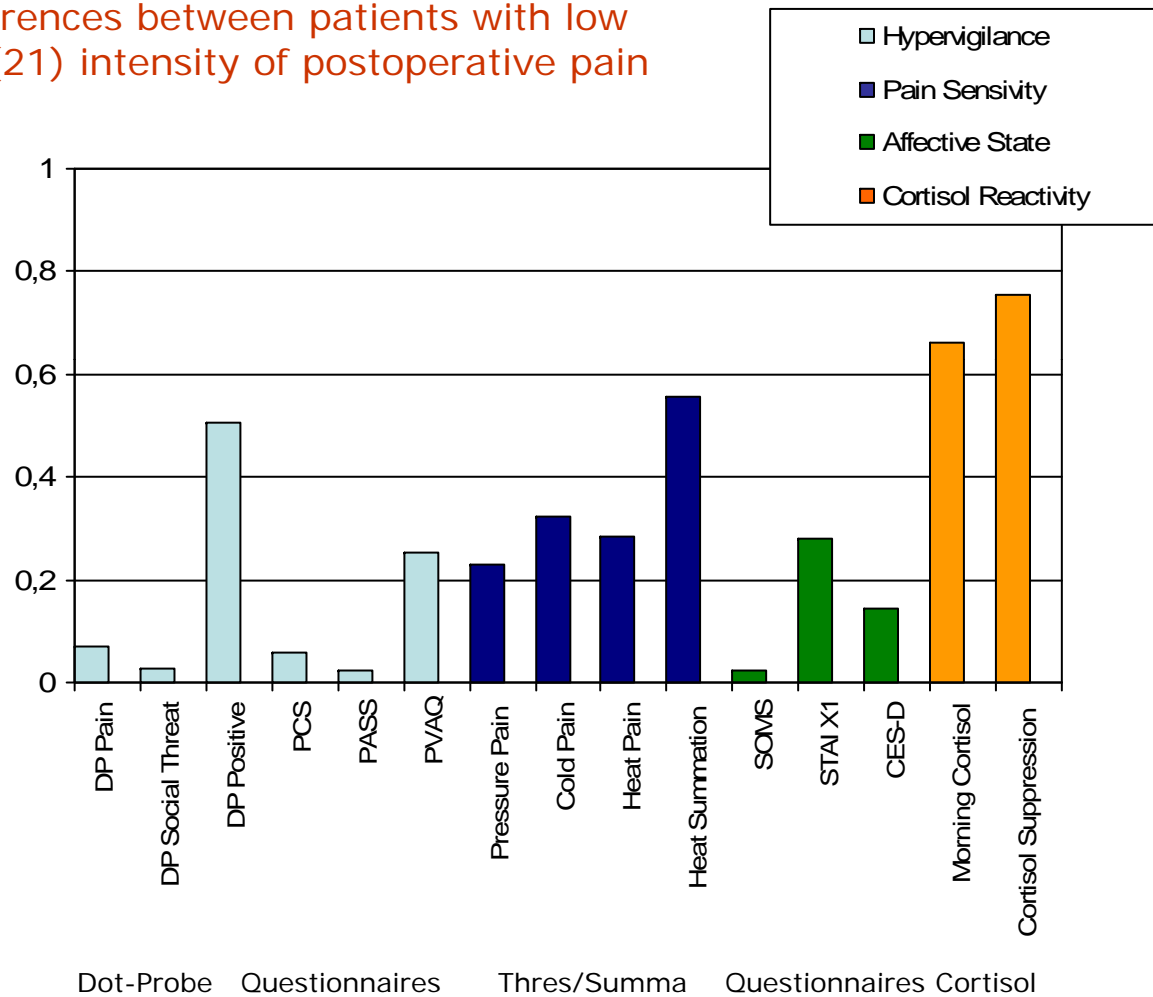
Design: Prediction of acute pain

Lautenbacher et al (in prep.). Hypervigilance as predictor of postoperative persistent and chronic pain: Its predictive power as a single factor and in combination with experimental pain sensitivity, cortisol reactivity and affective state.



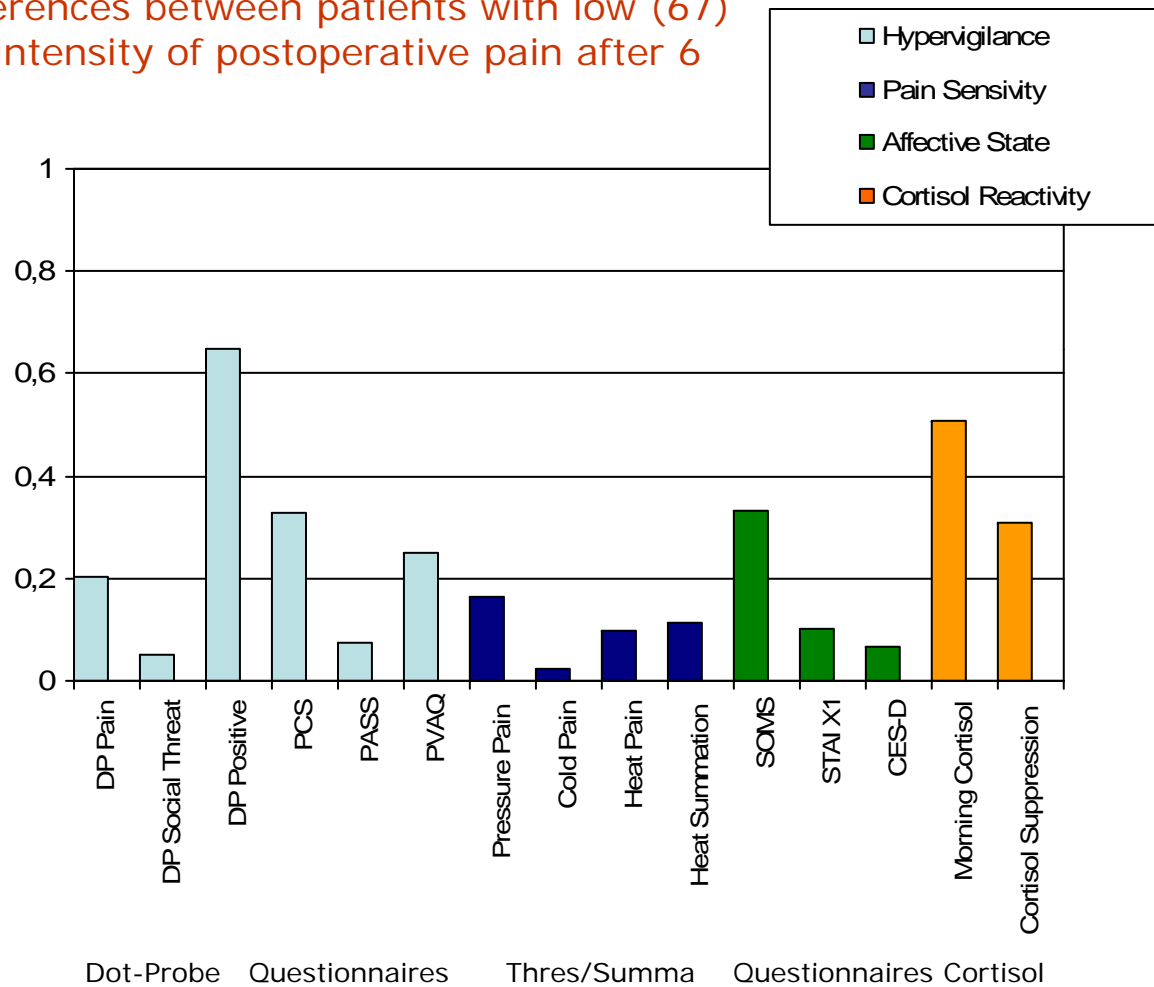
Results: Pain intensity - PP

Effect size differences between patients with low (63) and high (21) intensity of postoperative pain after 3 months



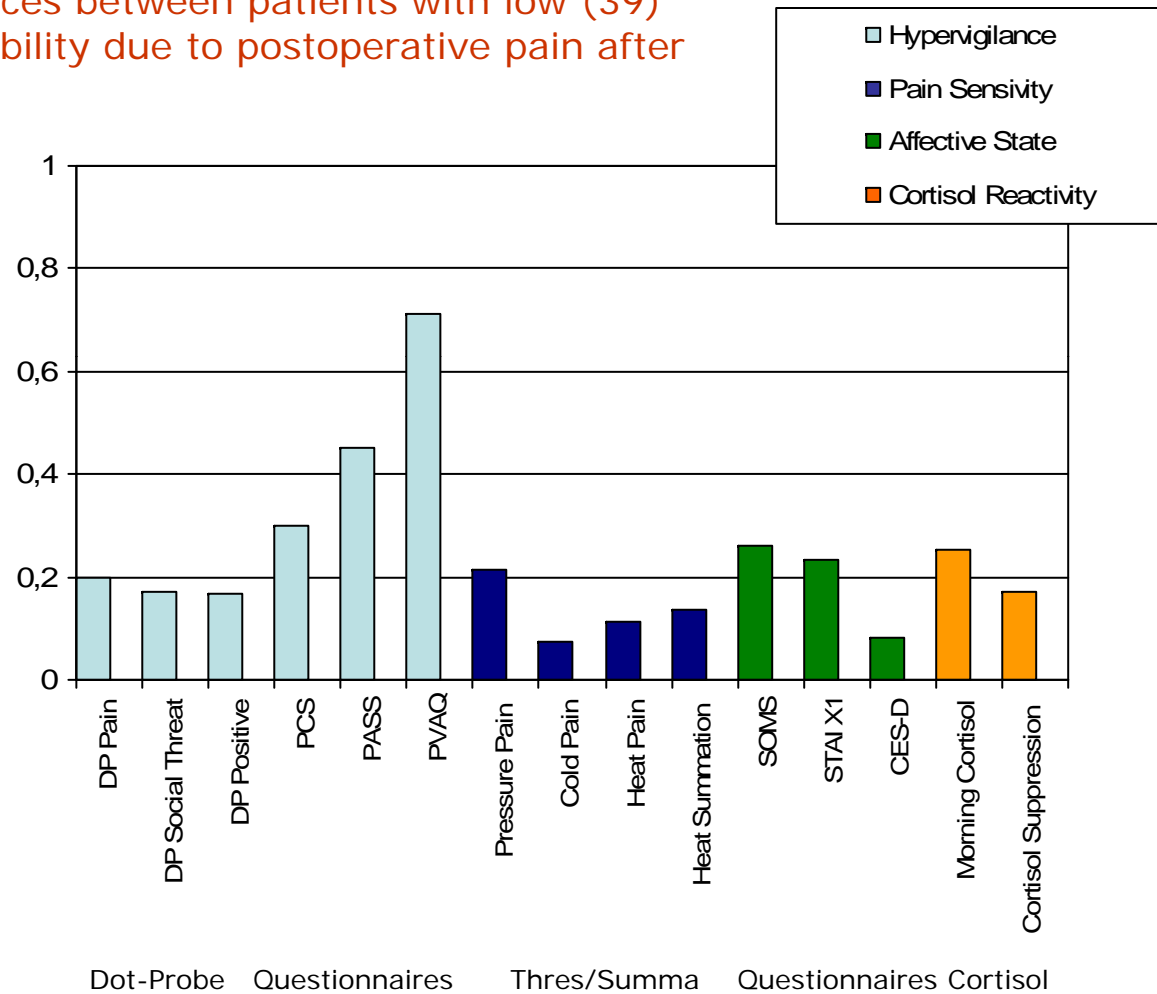
Results: Pain intensity - CP

Effect size differences between patients with low (67) and high (11) intensity of postoperative pain after 6 months



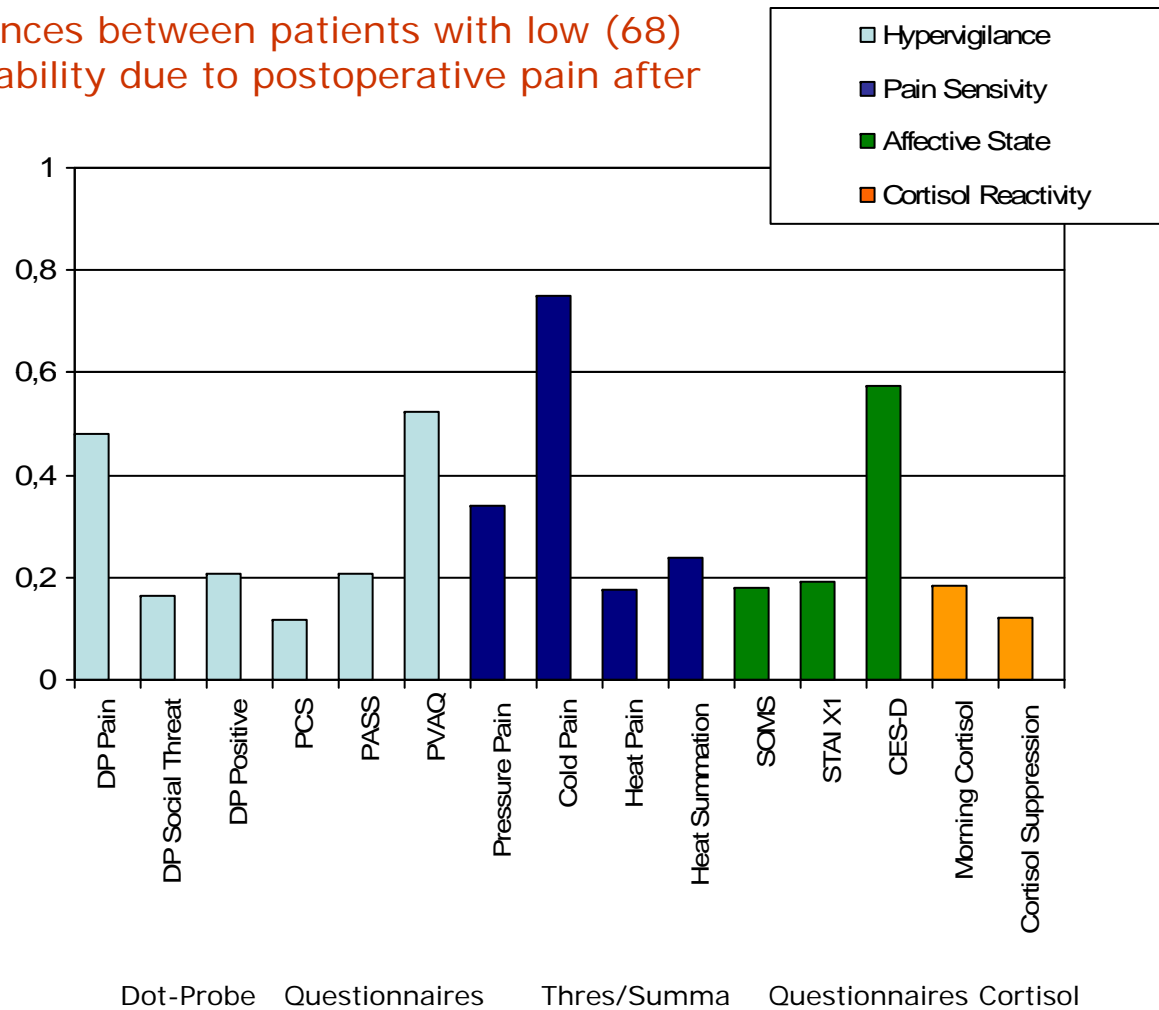
Results: Pain disability - PP

Effect size differences between patients with low (39) and high (45) disability due to postoperative pain after 3 months



Results: Pain disability - CP

Effect Size differences between patients with low (68) and high (10) disability due to postoperative pain after 6 months

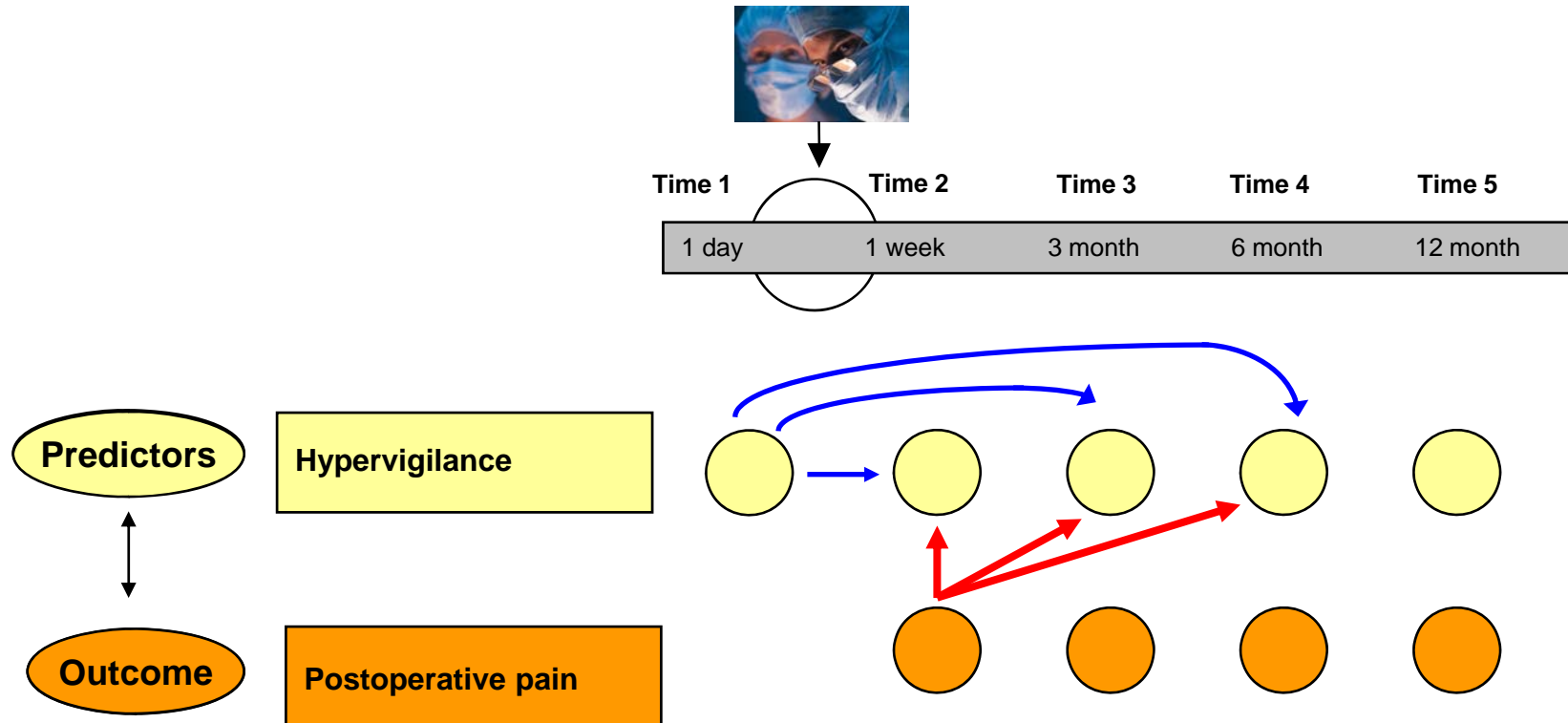


Results: Summary – PP, CP

Hypervigilance implicit		Pain intensity, 3 mo	Pain intensity, 6 mo	Pain disability, 3 mo	Pain disability, 6 mo
Dot-probe task	Pain				
	Social threat				
	Positive	✓	✓		
Hypervigilance explicit					
Questionnaires	PCS				
	PASS				
	PVAQ			✓	✓
Pain psychophysics					
	Pressure thr.				
	Cold thr.				✓
	Heat thr.				
	Heat summ.	✓			
Affective state					
	SOMS				
	STAI-X1				
	CES-D				✓
Cortisol					
	Morning	✓	✓		
	Suppression	✓			



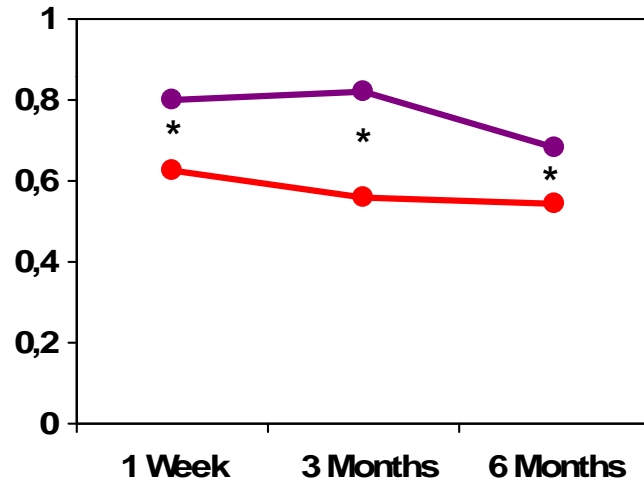
Postoperative pain as predictor of hypervigilance?



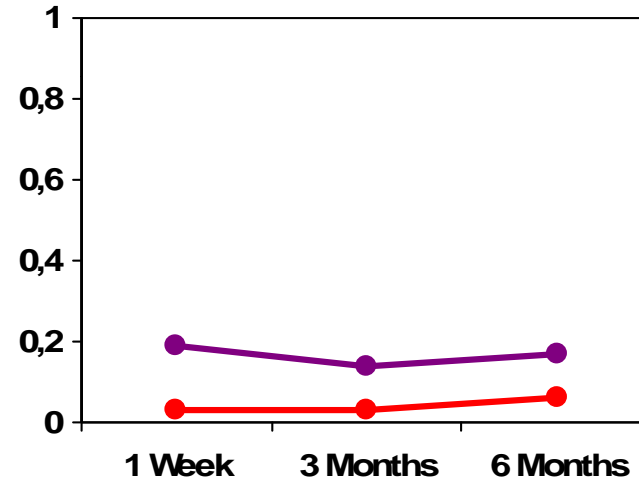
Preliminary results

Influence of acute postoperative pain on hypervigilance for pain 1 week, 3 month and 6 months after surgery

Prediction of explicit hypervigilance:
PCS, PVAQ, PASS



Prediction of implicit hypervigilance:
Dot Probe Bias "Pain"



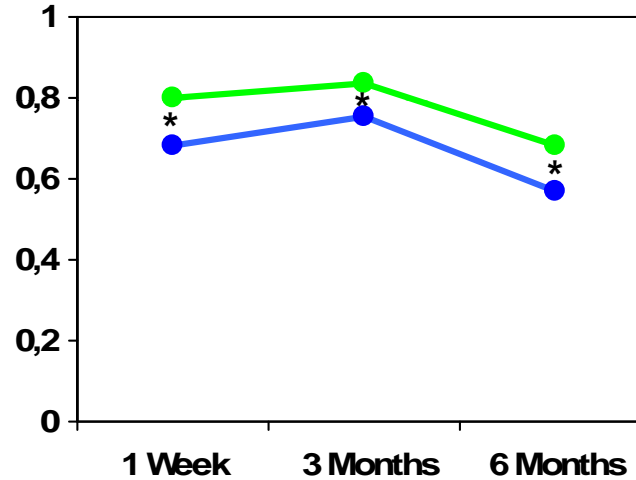
- Postoperative pain
- Postoperative pain and preoperative hypervigilance

N = 62

Preliminary results

Influence of acute postoperative pain on hypervigilance for pain 1 week, 3 month and 6 months after surgery

Prediction of explicit hypervigilance:
PCS, PVAQ, PASS

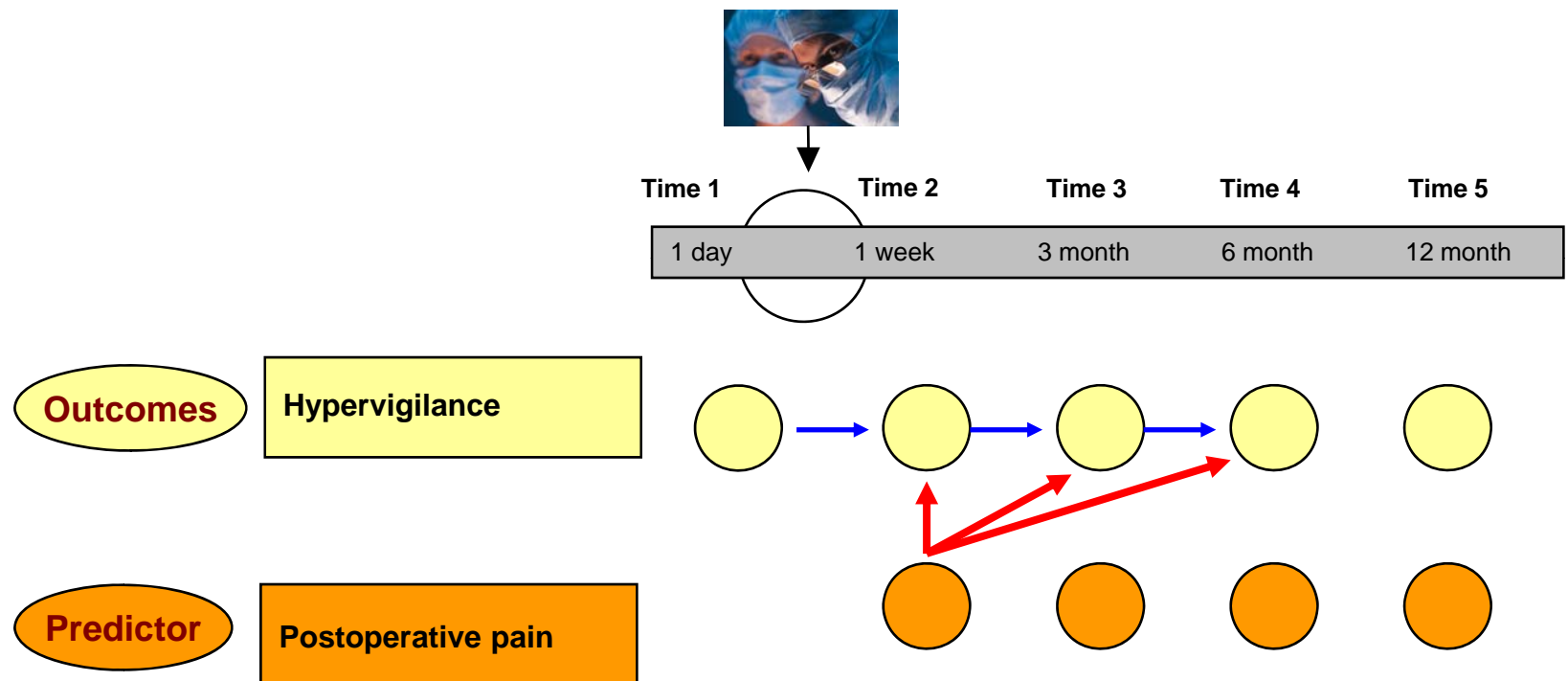


- Preoperative hypervigilance
- Preoperative hypervigilance and postoperative pain

N = 62



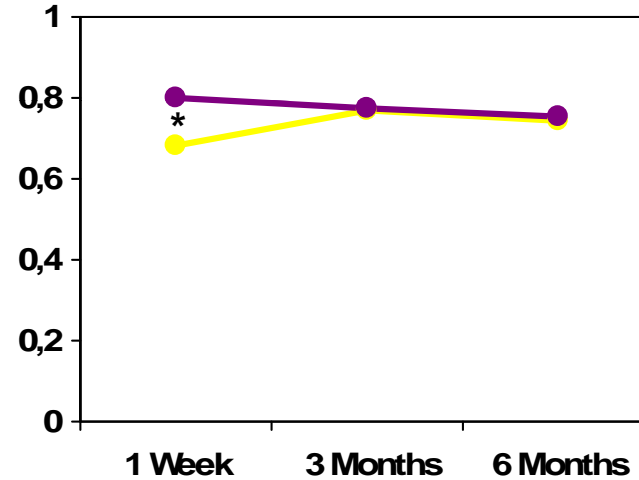
Design: Prediction of hypervigilance



Preliminary results

Influence of acute postoperative pain on hypervigilance for pain 1 week, 3 month and 6 months after surgery

Prediction of explicit hypervigilance:
PCS, PVAQ, PASS



●—● hypervigilance (last session)

●—● Hypervigilance (last session) and postoperative pain

N = 62

Summary I

- Psychological variables vary as regards their predictive value for postoperative pain dependent on the time since surgery.
- Hypervigilance competes well with other psychological predictors of postoperative pain.
- Explicit (awareness of being cognitively and emotionally absorbed by pain-related information) and implicit forms (automatic prioritisation of pain-related information in situations with competing informations) of hypervigilance prove to be independent predictors of postoperative pain.



Summary II

- Those individuals, who prefer unconsciously stimuli with positive valence and avoid stimuli with negative valence, seem to be more vulnerable to postoperative pain.
- Tests of explicit (self-reported) hypervigilance are helpful to predict ratings of acute postoperative pain (PCS) and ratings of pain-related disability in the phase of chronification (PVAQ).
- Preoperative affective state variables predict acute subjective pain (SOMS) and chronic disability due to pain (CES-D).



Summary III

- Pain psychophysics produce varying results but might be useful predictors too.
- Cortisol reactivity is a predictor of interest for predicting persistent subjective pain after surgery.
- In reverse, acute postoperative pain appears to influence postoperative hypervigilance but only in its explicit form. The effect is likely immediate and not lagged.



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