16th Annual Meeting
28th Symposium on Respiratory Psychophysiology

October 25 to 27, 2009

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Campus Charité Mitte (CCM)

In collaboration with the Department of Psychosomatic Medicine and Psychotherapy
Head: Prof. Dr. Christian Deter, Campus Benjamin Franklin, Charité, Berlin
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ACKNOWLEDGEMENTS

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Boehringer Ingelheim
The purpose of The International Society for the Advancement of Respiratory Psychophysiology is to promote and advance knowledge of the interrelationships between psychological and physiological aspects of respiration in research and application. The annual meetings bring together an international panel of researchers and clinicians to communicate and discuss findings from basic research and clinical investigation relevant to a broad range of topics in respiratory psychophysiology and to develop new strategies for future research.

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Please visit the ISARP website at http://www.ohio.edu/isarp/
14:30-17:30 Pre-Conference Workshops (in parallel)

Clinical Workshop
JAN VAN DIXHOORN
*Clinical strategies for breath modification*

Methodological Workshop
PAUL W. DAVENPORT, ANDREAS VON LEUPOLDT, PEI-YING SARAH CHAN, MARTIN PAULUS
*Respiratory-related evoked potential (RREP) and respiratory measurement methodologies*

Tea/coffee at 16:00

18:00 Official opening

18:10–19:00 Invited Address

FRANK H. WILHELM
*Respiratory dysregulation in panic patients: defining feature or laboratory artifact?*

19:00–20:00 Welcome Reception
8:45-10:15 Symposium 1: Perception of Dyspnea
Chair: Andreas von Leupoldt

SIBYLLTE PETERSEN, THOMAS RITZ
Self-awareness as determinant of report bias in the detection of external respiratory loads in healthy individual

BERNHARD DAHME, KARIN TAUBE, MAREN HENKHUS, HELGO MAGNUSSEN, ANDREAS VON LEUPOLDT
The influence of emotion on exercise-induced dyspnea in patients with COPD

PEI-YING SARAH CHAN, PAUL W. DAVENPORT
The role of nicotine on Respiratory Sensory Gating measured by Respiratory Related Evoked Potentials

STEVEN DE PEUTER, THOMAS JANSSENS, ILSE VAN DIEST, OMER VAN DEN BERGH
A comparison between cold pressor pain and CO\textsubscript{2}-induced dyspnea: the match/mismatch model

10:15-10:45 Coffee Break

10:45–12:15 Symposium 2: Symptom Perception in Adult Asthma
Chair: Paul Lehrer

THOMAS JANSSENS, GEERT VERLEDEN, OMER VAN DEN BERGH
Perception of asthma symptoms and the outcome of asthma treatment

SARAH KEGAT, HANS JÖRG BAUMANN, HANS KLOSE, STEVEN DE PEUTER, BERNHARD DAHME, ANDREAS VON LEUPOLDT
Differential influences of the sensory and affective dimension of dyspnea on global dyspnea measurement, health related quality of life and anxiety in patients with asthma

ANJA FRITZSCHE, BERNHARD DAHME, IAN H. GOTLIB, JUTTA JOORMANN, HELGO MAGNUSSEN, HENRIK WATZ, DETLEV O. NUTZINGER, ANDREAS VON LEUPOLDT
Depression-specific information processing bias and potential relationship with dyspnea perception in patients with asthma

ANDREAS VON LEUPOLDT, TOBIAS SOMMER, FALK EIPPERT, SARAH KEGAT, HANS JÖRG BAUMANN, HANS KLOSE, BERNHARD DAHME, CHRISTIAN BÜCHEL
Reduced responses of the insular cortex to dyspnea and pain in patients with asthma
12:15–13:30  Lunch (on your own)

13:30–14:30  Invited Address

JORGE GALLEGO
Ontogenesis of breathing behavior: lessons from newborn mice

14:30–16:30  Interactive Poster Session
with tea/coffee from 15:30 on

MANUELA G. ALIUS, CHRISTIANE A. MELZIG, ANDREAS VON LEUPOLDT, ALFONS O. HAMM
Subjective and physiological responses to the sensation of dyspnea in high anxiety sensitive individuals – a pilot study

KATLEEN BOGAERTS, STIEN FANNES, OMER VAN DEN BERGH, & ILSE VAN DIEST
Feedforward regulation of breathing: Do anticipatory changes in inspiratory motor drive occur when an increased respiratory resistance is expected?

ERIK CEUNEN, MEIKE PAPPENS, OMER VAN DEN BERGH, ILSE VAN DIEST
Respiratory gating of the acoustic startle reflex: Preliminary evidence

PEI-YING SARAH CHAN, MARK HOTCHKISS, SHERRY ADAMS, PAUL W. DAVENPORT
Respiratory related evoked potentials measure of respiratory mechanosensory activation of the SI cortex in rats

MARIEL GRASSMANN, ILSE VAN DIEST, OMER VAN DEN BERGH, STEVEN DE PEUTER
COPD patients’ beliefs about the harmfulness of dyspnea and activity avoidance: the Dutch version of the Breathlessness Beliefs Questionnaire

MEIKE PAPPENS, DEB VANSTEENWEGEN, STEVEN DE PEUTER, CASPER WUYTS, OMER VAN DEN BERGH, ILSE VAN DIEST
Interoceptive stimuli and prepulse inhibition

SIBYLLA PETERSEN, THOMAS RITZ
Dependency of illness evaluation on the social comparison context: Findings with implicit measures of affective evaluation of asthma

ELYN SMETS, LAURENCE CLAES, DAVINA DECREMER, LORI MAES, ILSE VAN DIEST
Validation of the Dutch Claustrophobia Questionnaire

MAXIMILIANE THÖNE, CARINA KUHN, KERSTIN KÜHL, KLAUS KENN, WINFRIED RIEF
Psychiatric disorders in patients with chronic obstructive pulmonary disease (COPD) – What about the symptom overlap?
OMER VAN DEN BERGH, BARBARA VERBEECK, MITCHELL SILVA, ILSE VAN DIEST, LIEVEN DUPONT
Do patients with idiopathic cough have different psychological characteristics than patients with medically explained cough?

ANDREAS VON LEUPOLDT, ANDREA VOVK, MARGARET M. BRADLEY, ANDREAS KEIL, PETER J. LANG, PAUL W. DAVENPORT
The impact of emotion on respiratory-related evoked potentials in healthy volunteers

16:30–18:00 Symposium 3: Managing Pediatric Asthma
Chair: Elizabeth L. McQuaid

BARBARA JANDASEK, JACK H. NASSAU, MARIANNE Z. WAMBOLDT, ANTHONY MANSELL, ELIZABETH L. MCQUAID, DALE STEELE, GREGORY K. FRITZ
Psychological correlates of symptom perception in critical adolescent asthma

MARIELLA M. LANE
A case study introducing breathing awareness training: An intervention to improve perceptual accuracy in pediatric asthma

DAPHNE KOINIS-MITCHELL, ELIZABETH L. MCQUAID, SHERYL KOPEL, ROBERT KLEIN, GLORISA CANINO, GREGORY K. FRITZ
Using the asthma risk grid to classify children into symptom perception categories

RONALD SEIFER, ARIS GARRO, ELIZABETH L. MCQUAID, SHERYL KOPEL, GLORISA CANINO, GREGORY K. FRITZ
Variability in pulmonary function and symptom perception in children with asthma: How many days of sampling is required?

ELIZABETH L. MCQUAID, ARIS GARRO, RONALD SEIFER, CYNTHIA A. ESTEBAN, SHERYL KOPEL, DAPHNE KOINIS MITCHELL, GLORISA CANINO, GREGORY K. FRITZ
Clinician, parent, and child ratings of asthma severity and pulmonary function variability

19:00 Social Dinner
8:30–10:00  **Symposium 4: Breathing Behavior and Defensive Activation**
Chair: Omer Van den Bergh

PAUL LEHRER, EVGENY VASCHILLO, BRONYA VASCHILLO, TOMOKO UDO SCHALLER, EUN-YOUNG MUN, SUCHISMITA RAY, JENNIFER BUCKMAN
*Psychological correlates of respiratory responses and their relationship to anxiety and drug/alcohol risk*

ILSE VAN DIEST, JEF VANDECRUYS, GOEDELE VANDERSLOTEN
*Ventilatory response to resistive loads and fear of suffocation*

REGINA STUDER, HORST HILDEBRANDT, MARC ARIAL, BRIGITTA DANUSER, PATRICK GOMEZ
*Music Performance Anxiety (MPA): Cardiorespiratory activity in high- and low-anxious professional music students in a performance situation*

ELKE VLEMINCX, JOACHIM TAEMLAN, STEVEN DE PEUTER, ILSE VAN DIEST, OMER VAN DEN BERGH
*The relief effect of spontaneous sighs as opposed to imposed sighs*

10:00–10:30  **Coffee/tea break**

10:30–12:00  **Symposium 5: Dysfunctional Breathing**
Chair: Jan van Dixhoorn

ROSALBA COURTNEY, KENNETH M. GREENWOOD, MARC COHEN
*The relationship of breathing pattern to measures of breathing functionality as used in breathing therapy*

BENG HEAN LIM, MARTIN HOFHEINZ, MICHAEL MIBS, JAN VAN DIXHOORN
*Falls efficacy and dysfunctional breathing among community-dwelling older persons*

JAN VAN DIXHOORN, ROSALBA COURTNEY, E. ANTHONISSEN
*Treatment of dysfunctional breathing: MARM and Nijmegen Questionnaire compared*

JENNIE WAKKER, JAN VAN DIXHOORN, RUUD BOSSCHER
*The clinical effectiveness of breathing and relaxation therapy: Results in routine practice*

12:00–13:00  **Lunch** (on your own)
13:00–13:50 President’s address

ANDREAS VON LEUPOLDT
Emotions, Brain and Breathlessness

Chair: Paul Grossman

CHRISTIANE A. MELZIG, KATHARINA HOLTZ, ALFONS O. HAMM
Increased defensive activation during anticipation and provocation of interoceptive threat in panic disorder patients and persons at risk for pathological anxiety

PAUL M. LEHRER, MARIA KARAVIDAS, MICHAEL GARA, ANU KOTAY, JANE MAYER, JENNIFER SAWAYA, NASYA BREACH, ALEJANDRO GONZALEZ-RESTREPO, REGINA LIU, JAVIER ESCOBAR
Exploratory pilot study, randomized controlled blinded trial on Medically Unexplained Physical Symptoms (MUPS)

OMER VAN DEN BERGH, ELKE VAN DER STAPPEN, MITCHELL SILVA, ILSE VAN DIEST, PAUL DAVENPORT, LIEVEN DUPONT
Associative learning of coughing and the urge-to-cough: An explorative study

NICHOLAS GIARDINO, ANTHONY KING, JEFFREY CURTIS, ISRAEL LIBERZON
Posttraumatic stress disorder is associated with altered modulation of respiratory sinus arrhythmia by respiration rate and volume

15:20–16:10 Student’s Awards & ISARP Business Meeting

17:00–19:00 Sightseeing Tour
WORKSHOPS

CLINICAL WORKSHOP

Jan van Dixhoorn
Clinical strategies for breath modification

METHODOLOGICAL WORKSHOP

Paul W. Davenport, Andreas von Leupoldt, Pei-Ying Sarah Chan, Martin Paulus
Respiratory-related evoked potential (RREP) and respiratory measurement methodologies
Breathing techniques are often described as ‘simple’. Their formulation is mostly very simple indeed: breathe slower, more shallow, deeper, more abdominally, etc. Such words refer to the objective, third person changes one wants to achieve in respiration and one leaves it up to the subject to translate them to first-person strategies that would result in those changes. The few studies that measure what actually happens during execution of such instructions show disappointing results (Conrad et al., 2007).

In this workshop several strategies will be discussed and practiced that are worded in first person terms. They use both direct and also indirect approaches to breathing, the latter taking the complexity of the regulatory system into account, by changing primarily the determinants of breathing. The strategies are aimed to result in pleasant experiences of greater ease and freedom of breathing than one is used to, which tends to stabilize the temporary respiratory changes.

The strategies consist of several domains of breathing:
- Time and ventilation domain
- Distribution and direction in breathing in relation to posture
- Fluency and effort of breathing
- Imagery and cognitions regarding breathing
METHODOLOGICAL WORKSHOP

Respiratory-Related Evoked Potential (RREP) and respiratory measurement methodologies

Paul W. Davenport¹, Andreas von Leupoldt¹,², Pei-Ying Sarah Chan¹ and Martin Paulus³

¹Department of Physiological Sciences, University of Florida, Gainesville, FL
²University of Hamburg, Hamburg, Germany
³Department of Psychiatry, University of California San Diego, LaJolla, CA

This is a workshop on the methods used for mechanically stimulating the respiratory system and neural responses to breathing against increased mechanical loads. Dr. Davenport will review respiratory loading methodologies. He will provide a basis for evaluating breathing pattern with and without load, airflow targeting, the types of loads, loaded breathing circuits, background loads, load calibration, magnitude estimation, detection of loads and the effect of loads on alveolar ventilation. He will also address the differences between single breath vs. sustained loads, the afferents mediating load sensory processing, load elicited evoked potentials RREP and measurement of respiratory drive (P0.1). Dr. Chan will review RREP recording methods. She will present the methodology for computer and signal triggering, load stimulus synchronization, the 0-point for RREP peak latency analysis, electrode placements, RREP artifacts (eyeblink, swallow, loss of electrodes, mouth pressure, breathing patterns, triggering time, electrical noise) and RREP reference electrode considerations. She will provide a basis for RREP ensemble averaging, number of stimuli to average, the balance between breathing pattern and signal-to-noise. She will present the current understanding of RREP peaks Nf, P1, N1, P2, and P3 including source localization studies and respiratory sensory gating. Dr. von Leupoldt will review the relationship between loads and: 1) the thresholds for eliciting the RREP, 2) the magnitude of the RREP as a function of stimulus magnitude, 3) the effect on the RREP of background loads, CO2 and double lung transplantation, 4) the effect on the RREP of background states such as attention and emotions, and 5) the cross modality relationship between non-respiratory modality modulation of respiratory evoked potentials. Dr. Paulus will provide a review of new studies on load induced fMRI changes, affective brain areas activated by loads, threat of load and affective responses to loads. He will present information on respiratory perception as a result of the physical awareness (what is sensed), and affective judgment (how it feels). He will integrate load sensation into the general area of aversive visceral stimulation. He will show how inspiratory breathing restriction results in a parametric decrease in “pleasantness” and increase in “unpleasantness”. In addition he will examine whether anticipation of an aversive interoceptive stimulus (non-hypercapnic inspiratory breathing restriction) activates the insula. He will demonstrate that using respiratory loads, we can (1) experimentally induce an aversive state and (2) measure the effect of both anticipation and stimulation in the anterior insular cortex.
Frank H. Wilhelm
*Respiratory dysregulation in panic patients: defining feature or laboratory artifact?*

Jorge Gallego
*Ontogenesis of breathing behavior: lessons from newborn mice*
Respiratory dysregulation in panic patients: defining feature or laboratory artifact?

Frank H. Wilhelm

Department of Clinical Psychology and Psychotherapy, Faculty for Psychology, University of Basel, Switzerland

Panic disorder (PD) has frequently been associated with reduced pCO$_2$ and respiratory pattern abnormalities such as increased tidal volume, minute ventilation, respiratory variability, and sighing during laboratory panic provocations and baselines. These findings have been interpreted as support for an abnormality in respiratory regulation during panic attacks, but also as indicating a more general trait characteristic of the disorder that constitutes vulnerability for panic. However, astonishingly few attempts have been made to provide external validation of these laboratory findings by investigating how panic patients breathe in the real world. Laboratory assessment of respiration in PD has potentially biasing effects. For example, the unfamiliar situation of being in a hospital or laboratory and the fact that baseline measurement is typically done in conjunction with other more stressful procedures are both likely to elevate anxiety. In addition, both the awareness of one’s respiration being recorded and common measurement systems can alter natural breathing. Most importantly, laboratory studies typically rely on single short measurement periods, which calls into question their representativeness and the validity of conclusions regarding persistent respiratory alterations. Only naturalistic studies employing ambulatory monitoring techniques can definitively address this essential issue. However, this is seldom attempted, probably because of perceived pitfalls and challenges. For example, participants are unsupervised and move freely, producing metabolically related changes easily confused with pathophysiologic alterations in breathing. This lecture will critically discuss the evidence for and against respiratory dysregulation in PD and present recent results from respiratory monitoring in PD patients’ daily life that shed light on the ecological validity of laboratory findings and the idea of chronic abnormalities in breathing regulation.
In human newborns, hypoxia elicits increased ventilation and arousal from sleep, followed by defensive movements and alerting cries. An inability to initiate an arousal response to hypoxia is associated with apnea of prematurity, sudden infant death syndrome, and rare genetic disorders of respiratory control. Despite intensive research, the mechanisms of this response are poorly understood. Mutant mouse models can provide valuable information on the pathogenesis of genetically determined disorders affecting arousal to hypoxia, although data remain sparse. The sequence of ventilatory and behavioral responses to hypoxia in newborn mice closely resembles that in human infants. In mice, the arousal response to hypoxia emerges immediately after birth, when the ventilatory response to hypoxia is still immature. Habituation of the arousal response occurs after repeated hypoxic episodes. Newborn mice can learn to associate novel odors to hypoxia and to respond to those odors by producing alerting responses, suggesting that the arousal response to hypoxia may be shaped by learning processes.
Chair: Andreas von Leupoldt

Sibylle Petersen, Thomas Ritz
*Self-awareness as determinant of report bias in the detection of external respiratory loads in healthy individual*

Bernhard Dahme, Karin Taube, Maren Henkhus, Helgo Magnussen, Andreas von Leupoldt
*The influence of emotion on exercise-induced dyspnea in patients with COPD*

Pei-Ying Sarah Chan, Paul W. Davenport
*The role of nicotine on Respiratory Sensory Gating measured by Respiratory Related Evoked Potentials*

Steven De Peuter, Thomas Janssens, Ilse Van Diest, Omer Van den Bergh
*A comparison between cold pressor pain and CO₂-induced dyspnea: the match/mismatch model*
Self-awareness as determinant of report bias in the detection of external respiratory loads in healthy individual

Sibylle Petersen¹, Thomas Ritz²

¹Department of Psychology, University of Hamburg, Germany
²Department of Psychology, Southern Methodist University

Background: Gating models of the perception of sensory information such as breathlessness propose that self-awareness is a precondition for processing internal information. Even if no distraction by external stimuli takes place, a lack of attention towards the self should lead to less online processing of sensory information, more heuristic decision making and more report bias. However, a direct test of the influence of self-awareness on the report of changes in breathing in the absence of distracting stimuli is missing.

Aim: We explored, whether shifts in self-awareness would change the detection threshold for external inspiratory loads.

Methods: Thirty healthy participants completed two tasks to identify the detection threshold for inspiratory loads on two appointments. In these sessions, situational self-awareness was manipulated and directed either to the self or to the surroundings.

Results: Sensation report was significantly biased towards over perception under external focus compared to internal focus with a reduced 50% detection threshold and an increase in report of dyspnea intensity.

Conclusion: Changes in self-awareness can alter report bias in healthy individuals. Results encourage research on heuristic versus online decision processes in symptom perception in respiratory disease.
The influence of emotion on exercise-induced dyspnea in patients with COPD

Bernhard Dahme¹, Karin Taube², Maren Henkhus¹, Helgo Magnussen³, Andreas von Leupoldt¹,⁴

¹Department of Psychology, University of Hamburg, Hamburg, Germany  
²Atem-Reha GmbH, Hamburg, Germany  
³Pulmonary Research Institute at Hospital Grosshansdorf, Grosshansdorf, Germany  
⁴Department of Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Germany

Background: Dyspnea is the impairing and frightening cardinal symptom of chronic obstructive pulmonary disease (COPD). Emotions can profoundly influence the perception of dyspnea, however, little is known about this relationship from studies in patients with COPD.

Method: The present study, therefore, examined the impact of viewing pleasant versus unpleasant affective picture series of 3 min duration on perceived dyspnea during two cycle ergometer exercise tests (CEET) in 30 patients with mild-to-severe COPD.

Results: Whereas cardiopulmonary measures indicated comparable levels of exercise intensity during both CEETs, parallel viewing of unpleasant affective pictures resulted in increased dyspnea ratings compared to parallel viewing of pleasant affective pictures. Additional multiple linear regression analyses demonstrated that increases in the affective unpleasantness of dyspnea, but not in the sensory intensity of dyspnea, during CEETs were predictive of greater dyspnea during activities of everyday life (baseline dyspnea index, BDI) and reduced health-related quality of life (St. George Respiratory Questionnaire).

Conclusions: The present results suggest that a negative emotional state is associated with increased levels of perceived dyspnea in patients with mild-to-severe COPD, which underlines the importance of targeting the emotion-dyspnea-relationship in this patient group.
The role of nicotine on Respiratory Sensory Gating measured by Respiratory Related Evoked Potentials

Pei-Ying Sarah Chan & Paul W. Davenport

Physiological Sciences, University of Florida, Gainesville

Changes in breathing elicit cognitive awareness of breathing. However, respiratory stimuli are not sensed during eupneic breathing. This suggests that respiratory stimuli are gated in and out of higher brain centers. Sensory gating is evidenced by decreased amplitude of the respiratory related evoked potentials (RREP) N1 peak for the second occlusion (S2) when two 200-millisecond (msec) occlusions are presented with a 500-msec interval during the inspiration. The N1 peak amplitude ratio of the S2 and first occlusion (S1), S2/S1, is less than 0.5 and due to central neural sensory gating. We hypothesized that withdrawal from nicotine is anxiogenic and reduces respiratory gating in smokers. The RREP was recorded in smokers with 12-hour withdrawal from nicotine and non-smokers using a paired occlusion protocol. In smokers, the RREP was initially measured after nicotine withdrawal, then they were provided with either nicotine or placebo gum followed by the second RREP trial. Non-smokers received only placebo gum. There was a significant interaction between groups (non-smokers vs. smokers with nicotine vs. smokers with placebo) and test (pre- vs. post- treatment) in N1 peak amplitude S2/S1 ratio. The S2/S1 ratios in the smokers were larger than the ratios in the non-smokers before treatment. After gum treatment, the smoker-with-placebo group had a significantly larger S2/S1 ratio than the other two groups. In addition, the S2/S1 ratio was significantly decreased after the administration of nicotine gum in smokers due to significantly decreased S2 amplitudes. The S2/S1 ratios for the RREP Nf and P1 peaks were unaffected by treatment. These results demonstrated that respiratory sensory gating was decreased in smokers after 12 hours of nicotine withdrawal. Nicotine increased respiratory sensory gating in smokers with a S2/S1 ratio similar to the non-smokers. Nicotine did not change respiratory sensory information arrival, but secondary information processing in respiratory sensation.
A comparison between cold pressor pain and CO\textsubscript{2}-induced dyspnea: the match/mismatch model.

Steven De Peuter, Thomas Janssens, Ilse Van Diest & Omer Van den Bergh
Research Group on Health Psychology, Department of Psychology, University of Leuven, Belgium

Background: Similarities between pain and dyspnea – from the subjective level to the neural representation – have been described. To investigate similarities and differences between these aversive subjective sensations further, we compared the perceived intensity and unpleasantness of cold pressor pain and \textit{CO\textsubscript{2}}-induced dyspnea. In addition, we investigated how (in)correct predictions about intensity/unpleasantness were corrected in a second trial.

Method: 80 healthy participants completed two trials of aversive stimulation. Pain was induced by immersion of the non-dominant hand in 2°C water for 1 minute; dyspnea was induced by 1-minute 10% \textit{CO\textsubscript{2}}-enriched air inhalation. Depending on the condition, participants experienced the same sensation twice (pain-pain (n=20); dyspnea-dyspnea (n=20)) or both sensations once (pain-dyspnea (n=20); dyspnea-pain (n=20)). Before each trial, participants predicted the level of intensity and unpleasantness they expected to experience. During each trial, they rated the intensity and unpleasantness of their sensations every 20 seconds.

Results: Ratings of intensity and unpleasantness were almost identical within trials and the only significant difference was between pain and dyspnea (experienced intensity and unpleasantness higher for pain). Consistent with previous findings in the field of pain, incorrect predictions regarding dyspnea were corrected in the second trial, supporting the match/mismatch model for dyspnea.

Discussion: The absence of significant differences between ratings of intensity and unpleasantness is remarkable in the light of previous findings. On the other hand, our findings regarding the correction of incorrect predictions offer further support for the similarity between pain and dyspnea.
SYMPOSIUM 2: SYMPTOM PERCEPTION IN ADULT ASTHMA

Chair: Paul Lehrer

Thomas Janssens, Geert Verleden, Omer Van den Bergh
Perception of asthma symptoms and the outcome of asthma treatment

Sarah Kegat, Hans Jörg Baumann, Hans Klose, Steven De Peuter, Bernhard Dahme, Andreas von Leupoldt
Differential influences of the sensory and affective dimension of dyspnea on global dyspnea measurement, health related quality of life and anxiety in patients with asthma

Anja Fritzsche, Bernhard Dahme, Ian H. Gotlib, Jutta Joormann, Helgo Magnussen, Henrik Watz, Detlev O. Nutzinger, Andreas von Leupoldt
Depression-specific information processing bias and potential relationship with dyspnea perception in patients with asthma

Andreas von Leupoldt, Tobias Sommer, Falk Eippert, Sarah Kegat, Hans Jörg Baumann, Hans Klose, Bernhard Dahme, Christian Büchel
Reduced responses of the insular cortex to dyspnea and pain in patients with asthma
Perception of asthma symptoms and the outcome of asthma treatment

Thomas Janssens\textsuperscript{1}, Geert Verleden\textsuperscript{2}, Omer Van den Bergh\textsuperscript{1}

\textsuperscript{1}Research Group on Health Psychology, Department of Psychology, University of Leuven, Belgium
\textsuperscript{2}Pulmonology Section, Faculty of Medicine, University of Leuven, Belgium

\textbf{Background:} Despite clear treatment guidelines, low asthma control remains a major problem in persons with asthma. Inaccurate perception of asthma symptoms may account for part of these problems. In this study, we tested whether a modified version of the standard histamine challenge test was able to predict the outcome of asthma treatment three months later.

\textbf{Methods:} Participants (n = 32) were patients referred for a histamine challenge test to confirm asthma diagnosis. At baseline, they completed questionnaires (asthma symptoms, negative affectivity (NA), catastrophic thinking) and underwent the histamine challenge test. Only participants with a positive histamine challenge test were included. Three months after the histamine challenge test, participants completed a new set of questionnaires (asthma symptoms, asthma control, asthma-related quality of life, medication use).

\textbf{Results:} More symptoms during the histamine challenge test predicted lower asthma control and quality of life three months later. The predictive value was higher for symptom levels during early (low intensity) challenges and during recovery. Personality variables (NA, catastrophic thinking) also predicted asthma control and quality of life after three months. The effects remained significant when controlling for objective markers for asthma severity (PC20, baseline FEV1).

\textbf{Conclusion:} Higher symptom levels at the start of the standard histamine challenge test and during recovery may reflect context dependency of asthma symptom perception, and may serve as an early marker of potential problems with asthma treatment, such as suboptimal asthma control and low asthma-related quality of life.
Differential influences of the sensory and affective dimension of dyspnea on global dyspnea measurement, health related quality of life and anxiety in patients with asthma

Sarah Kegat, Hans Jörg Baumann, Hans Klose, Steven De Peuter, Bernhard Dahme, Andreas von Leupoldt

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4Department of Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Hamburg, Germany

Background: Previous studies demonstrated that the sensory (intensity) and affective (unpleasantness) dimension of dyspnea can be differentiated and that these dimensions differentially influence global ratings of dyspnea. However, these effects have rarely been investigated in patients with respiratory disease. Therefore, we studied the differential influence of intensity and unpleasantness of dyspnea on global dyspnea ratings in asthma patients during a methacholine (Mch) challenge test. In addition, the relationships between these two dimensions of dyspnea and health related quality of life (HRQL) as well as anxiety were examined.

Method: Seventeen participants (mean age=25.8 years) with mild-to-moderate asthma underwent an eight step Mch-challenge test. After each step the experienced intensity and unpleasantness of dyspnea were rated on separate visual analog scales (VAS) and the global sensation of dyspnea on the modified Borg scale. The St. George Respiratory Questionnaire (SGRQ) and the State-Trait-Anxiety-Inventory (STAI) were used to assess HRQL and state anxiety, respectively. Sensitivity and magnitude scores for intensity, unpleasantness, and Borg ratings of dyspnea were calculated and used for further multiple linear regression analyses.

Results: Sensitivity of perceived intensity during the Mch-challenge significantly predicted the sensitivity of Borg ratings ($p<.05$). However, during the maximum Mch-challenge step, the perceived magnitude of unpleasantness, but not intensity, served as predictor of Borg ratings ($p<.05$). Moreover, high sensitivity of unpleasantness predicted low HRQL ($p<.05$) and high state anxiety ($p<.05$), while high sensitivity of intensity predicted high HRQL ($p<.05$) and low state anxiety.

Conclusions: The present findings suggest that the sensory and affective dimension of perceived dyspnea have a differential influence on global ratings of dyspnea in patients with asthma. Furthermore, these dimensions are differentially associated with HRQL and state anxiety and, therefore, seem to provide more detailed information than global ratings of dyspnea.
Depression-specific information processing bias and potential relationship with dyspnea perception in patients with asthma

Anja Fritzsche¹, Bernhard Dahme¹, Ian H. Gotlib², Jutta Joormann³, Helgo Magnussen⁴, Henrik Watz⁴, Detlev O. Nutzinger⁵, Andreas von Leupoldt¹,6

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Background: Depression is one of the most common psychological comorbidities in patients with asthma and associated with a worse course of disease. Moreover, negative mood is related to increased perception of asthma symptoms. Assuming that depression-specific information processing, which is well documented in currently depressed individuals, might underlie the high prevalence of depression in asthma, we examined cognitive information-processing in 20 never depressed asthmatics, 20 currently and 20 remitted depressed participants without asthma and 20 healthy controls. In addition, the relationship between information processing and perception of dyspnea was studied in asthmatics and healthy controls.

Methods: We used three computer-based tasks measuring different aspects of cognitive information processing: selective attention, memory and interference effects. Moreover, we examined the correlations between perceived unpleasantness and intensity of resistive load induced dyspnea and information processing biases in asthmatics and healthy controls.

Results: In contrast to our expectations, no depression-specific bias in information processing was observed in asthmatics and no correlations between indices of information processing and dyspnea perception were obtained. However, depression-specific biases were not only observed in currently depressive participants, but also evident in individuals that were recovered from depression.

Conclusions: The results suggest that depression-specific biases in information processing are evident even after recovery from acute depressive episodes which might represent an important vulnerability factor for the development and recurrence of depression. However, the present data argue against a similar depression-like type of cognitive processing in asthma which could underlie the high prevalence of depression in asthma or explain the relationship between negative mood and increased perception of dyspnea in asthma.
Reduced responses of the insular cortex to dyspnea and pain in patients with asthma

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Background: Dyspnea is a frightening cardinal symptom of asthma, which patients repeatedly perceive in the course of disease. Previous studies demonstrated that habituation processes might lead to reduced perception of dyspnea. However, the brain mechanisms that underlay the perception of dyspnea are not well understood. Respective neuroimaging studies in asthma patients are absent. By using functional magnetic resonance imaging (fMRI), we studied whether asthma patients show distinct brain activations during perceived dyspnea when compared to healthy controls. These brain activations were compared with brain responses during perceived pain to study neuronal generalisation processes to another unpleasant bodily sensation, which shares several characteristics with dyspnea.

Method: Fourteen patients with mild-to-moderate asthma and 14 matched healthy controls repeatedly underwent conditions of mild and severe resistive load induced dyspnea and mild and severe heat pain while lying in a 3 Tesla MR-scanner. Mild and severe levels of dyspnea and pain were individually matched for intensity levels.

Results: Ratings of perceived sensory intensity of dyspnea and pain were similar for patients and controls, but ratings of perceived affective unpleasantness of both sensations were lower in patients. Compared to controls, asthma patients showed reduced insular cortex activity, but increased activity in the periaqueductal grey (PAG) during increasing levels of dyspnea and pain. Reduced insular responses during dyspnea were correlated with asthma disease duration. Connectivity analyses demonstrated that reduced insular cortex responses during dyspnea and pain in asthma patients were moderated by increased PAG activation.

Conclusions: The findings suggest a down regulation of insular cortex activity by the antinociceptive PAG in asthma patients during perceived dyspnea, but also during perceived pain. This might represent a neuronal habituation mechanism reducing the affective unpleasantness of dyspnea in asthma, which generalizes to other unpleasant bodily sensations such as pain.
Chair: Elizabeth L. McQuaid

Barbara Jandasek, Jack H. Nassau, Marianne Z. Wamboldt, Anthony Mansell, Elizabeth L. McQuaid, Dale Steele, Gregory K. Fritz
*Psychological correlates of symptom perception in critical adolescent asthma*

Mariella M. Lane
*A case study introducing breathing awareness training: An intervention to improve perceptual accuracy in pediatric asthma*

Daphne Koinis-Mitchell, Elizabeth L. McQuaid, Sheryl Kopel, Robert Klein, Glorisa Canino, Gregory K. Fritz
*Using the asthma risk grid to classify children into symptom perception categories*

Ronald Seifer, Aris Garro, Elizabeth L. McQuaid, Sheryl Kopel, Glorisa Canino, Gregory K. Fritz
*Variability in pulmonary function and symptom perception in children with asthma: How many days of sampling is required?*

Elizabeth L. Mcquaid, Aris Garro, Ronald Seifer, Cynthia A. Esteban, Sheryl Kopel, Daphne Koinis Mitchell, Glorisa Canino, Gregory K. Fritz
*Clinician, parent, and child ratings of asthma severity and pulmonary function variability*
Psychological correlates of symptom perception in critical adolescent asthma

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Background: Inadequate recognition of airway obstruction may lead to serious asthma exacerbation. Anxiety may predict increased sensitivity to somatic symptoms. Attention difficulties may interfere with accurate perception. This study investigates associations between current asthma symptoms, psychological variables, and lung function perception (LFP) in youth with and without a history of acute severe asthma (ASA).

Method: LFP protocols (methacholine bronchial provocation, MBP; magnitude estimation, ME) were conducted with youth (12-18 years old) with physician-diagnosed asthma. Participants included 2 groups: those with a history of ASA (n=77) and those without such a history (AC; n=105). Samples were recruited across 3 sites and matched on age, gender, and ethnicity. ASA was defined as having a serious asthma episode after 5 years of age involving intubation, or seizure or loss of consciousness caused by asthma, or continuous albuterol nebulization for > 24 hours, or admission to the ICU. Current asthma symptoms and psychological variables, including youth report of depression and anxiety and parent report of attention problems, were assessed using standardized instruments.

Results: Groups did not differ in psychological functioning. ASA reported more current asthma symptoms than AC (F=10.02, p<.01). ASA demonstrated a smaller change in BORG score during MBP than AC (F=5.26, p<.05). Using ME, ASA displayed marginally higher perceptual sensitivity than AC (F=3.64, p=.06). LFP, psychological functioning, and current asthma symptoms were unrelated for ASA. For AC, LFP, assessed by MBP, predicted attention problems (r=-.24, p<.05), and current asthma symptoms were related to anxiety (r=.25, p<.05) and depression (r=.22, p<.05).

Conclusions: For youth with asthma who have not experienced an acute episode, discrete aspects of psychological functioning may differentially predict lung function and symptom perception. Inattention may lead to blunted perception of actual changes in lung function, while anxiety and depression may be associated with increased reporting of asthma symptoms.
A case study introducing breathing awareness training: An intervention to improve perceptual accuracy in pediatric asthma

Mariella M. Lane

Baylor College of Medicine/Texas Children’s Hospital

Background: This case study represents part of a pilot intervention designed to improve perceptual accuracy in pediatric asthma by identifying patients’ individually predictive symptoms of reduced pulmonary functioning and educating them about their symptom pattern.

Study Method: The participant was a 12 year-old African American female diagnosed with severe asthma. At the initial study visit the participant received education about peak expiratory flow rate (PEFR) and was trained in use of an electronic peak flow meter with diary (AM2+). During the pre-intervention baseline assessment the participant used the AM2+ to rate nine symptoms, predict PEFR, and measure PEFR over successive trials. Pre-intervention perceptual accuracy was analyzed using the asthma risk grid, and a signal detection paradigm was used to identify the participant’s individually predictive symptoms of reduced pulmonary functioning. The participant then attended a Breathing Awareness Training (BAT) intervention visit to receive education about her baseline perceptual accuracy and her individualized symptom profile, including specific symptoms most consistently occurring with reductions in PEFR. After the BAT session, the participant again used the AM2+ to rate symptoms, predict PEFR, and measure PEFR for the post-intervention period.

Results: Baseline asthma risk grid results indicated that 72% of the participant’s peak flow predictions were in the Accurate Zone, 3% in the Danger Zone, and 25% in the Symptom Magnification Zone. Signal detection analysis of symptom endorsement data identified 2 primary warning symptoms of low peak flow, three additional possible warning symptoms, and four symptoms that rarely occurred for this child. After the BAT intervention, 91% of the participant’s peak flow estimates were in the Accurate Zone, 1% in the Danger Zone, and 8% in the Symptom Magnification Zone.

Discussion: Assessment of perceptual accuracy following BAT evidenced increased accuracy in estimating peak flow, suggesting that further evaluation and refinement of the program is warranted.
Using the Asthma Risk Grid to classify children into symptom perception categories

Daphne Koinis Mitchell, Sheryl Kopel, Elisabeth L. McQuaid, Ronald Seifer, Robert Klein, Glorisa Canino, & Gregory Fritz

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Background: The Asthma Risk Grid has been used in our previous work to assess children’s asthma symptom perception ability by comparing subjective and objective lung function measurements. Children provide repeated assessments of pulmonary function in which they estimate their degree of compromise, using a handheld spirometer. Subjective and objective peak flow values over a period of time are summarized into accurate, symptom magnification and danger zone scores, reflecting the extent to which children’s perception of the severity of asthma symptoms are actually accurate.

Method: This study applies procedures using an alternative approach; one that classifies the children themselves (vs. examining associations between scores and variables of interest across a sample) into Asthma Risk Grid Categories based on the percentage of spirometric blows generated during a particular time frame. Once classified into an Asthma Risk Grid category, salient characteristics thematic across each group of children will be identified (ethnicity, IQ, attention). Data were collected as part of the Rhode Island Puerto Rico Asthma Center (RIPRAC) study, which investigated factors contributing to asthma disparities among Latino children in Rhode Island (RI) and Puerto Rico (PR), and non-Latino white children in RI. Children used a portable spirometry device for five weeks. Asthma severity was classified by study clinicians using a range of indicators.

Results: Using a data driven approach, children were categorized into “low”, “medium”, and “high” groups based on the percentage of blows that were generated in the symptom magnification and danger zones. Children with the highest percentage of blows in the symptom magnification zone tended to be at greater risk for visiting the ED because of asthma.

Discussion and Conclusion: Results describe the characteristics of children who tend to be over or under perceivers, which may highlight profiles of children at particular risk for poor asthma outcomes.
Variability in pulmonary function and symptom perception in children with asthma: How many days of sampling is required?

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Background: Assessing pulmonary function in children with asthma is useful for understanding day-to-day course of illness as well as a precursor for full understanding of whether children can accurately perceive such changes in pulmonary function. The current report includes data from the Rhode Island Puerto Rico Asthma Center (RIPRAC) study, which examined Latino children in Rhode Island (RI) and Puerto Rico (PR), as well as non-Latino White children in RI. We addressed questions of the number of days required to achieve high stability in the assessment of pulmonary function measures and of symptom perception.

Study Method: As part of the larger RIPRAC protocol, children were instructed to use the AM2 portable spirometry device twice daily (morning and evening), as well as any time they were having difficulty breathing. We identified 269 children who had a sequence of at least 14 days with breaks in the sequence of no more than a single day. Variability indexes (SD, min, max) and symptom perception indexes (accurate, danger, symptom magnification) were aggregated over varying number of days ranging from 5 to 14. Correlations among these estimates were examined.

Results: For the sample as a whole, aggregates of 9 days or more yielded correlations above .90 for all indexes. Correlations between .80 and .90 were observed when fewer days were examined. These results held true with subgroups of PR, RI Non-Latino, and RI Latino, although the RI Latino had slightly lower correlations (10 days were required to maintain correlations above .90).

Discussion and Conclusion: These data suggest that 10-14 days is a reasonable monitoring period to identify stable estimates of pulmonary function and symptom perception. These estimates may be slightly optimistic in that they were derived from those children who were most adherent to the protocol (few missed days of pulmonary function testing).
Clinician, parent, and child ratings of asthma severity and pulmonary function variability

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Background: Although standardized guidelines for assessing asthma disease severity exist, it is rare for clinicians to capture information regarding day-to-day variability in pulmonary function when assessing disease severity. We evaluated associations among children’s pulmonary function over time and four measures of disease severity: 1) child-self-assessment, 2) parent assessment, 3) history of prior acute events (e.g., steroid burst, ED visit), and 4) clinician “gold standard” rating of asthma severity.

Study Method: Data collection occurred as part of the Rhode Island Puerto Rico Asthma Center (RIPRAC) study, which evaluated asthma disparities among Latino children in Rhode Island (RI) and Puerto Rico (PR), as well as non-Latino White children in RI. The severity of participants’ asthma was assessed by a study clinician using standard procedures (medical history, physical exam, and office-based spirometry). Parents and children each provided a five-point rating of asthma severity. Children used a portable spirometry device for approximately five weeks. Participants with a sequence of at least 14 days with breaks in the sequence of no more than a single day were included (n = 269). Variability indexes (SD, min, max) for PEFR and FEV1 were computed. Correlations between severity ratings and variability indices were examined.

Results: Parental estimates of disease severity, and an index of prior acute events, were more consistently associated with pulmonary function variability than either child estimates of disease severity or the clinical rating of severity. Variability indices that were individually adjusted (i.e., SD % predicted or SD % personal best) had stronger associations than variability indices of the raw spirometry values.

Discussion and Conclusion: Parents’ perception of disease severity and history of prior acute events may be better predictors of day-to-day variability than “gold standard” clinician ratings of severity derived in an office visit.
SYMPOSIUM 4: BREATHING BEHAVIOR AND DEFENSIVE ACTIVATION

Chair: Omer Van den Bergh


*Psychological correlates of respiratory responses and their relationship to anxiety and drug/alcohol risk*

Ilse Van Diest, Jef Vandecruys, Goedele Vandersloten

*Ventilatory response to resistive loads and fear of suffocation*

Regina Studer, Horst Hildebrandt, Marc Arial, Brigitta Danuser, Patrick Gomez

*Music Performance Anxiety (MPA): Cardiorespiratory activity in high- and low-anxious professional music students in a performance situation*

Elke Vlemincx, Joachim Taelman, Steven De Peuter, Ilse Van Diest, Omer Van den Bergh

*The relief effect of spontaneous sighs as opposed to imposed sighs*
Psychological correlates of respiratory responses and their relationship to anxiety and drug/alcohol risk

Paul Lehrer¹, Evgeny Vaschillo², Bronya Vaschillo², Daniel J. Fisher³, Tomoko Udo², Eun-Young Mun², Suchismita Ray², Jennifer Buckman², Robert Pandina², Marsha E. Bates²

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The present study aimed to investigate whether ventilatory and emotional reactivity relates to anxiety/depression scores, to alcohol dependence and/or to family history of alcohol or drug problems. Young adults (N = 122, 27 inpatients from a drug/alcohol rehabilitation center and 95 college students) were exposed to five 5-minute exposures to picture slides previously found to evoke positive, negative, or neutral emotion, and to slides depicting alcohol and alcohol consumption. Slides were presented every 10 seconds. We also exposed participants to a 5-min ‘plain vanilla’ baseline task and to a 5-min task involving breathing six times/minute. We measured various respiratory parameters from piezoelectric sensors attached around the chest. Participants also completed questionnaires related to emotional state, alcohol and drug consumption and dependence, and family history of alcohol and drug dependence. We computed correlation coefficients between respiratory variables and drug/emotional variables. Questionnaire measures were factor analyzed to yield distinct factors for anxiety/depression and alcohol consumption/dependence. Results indicated that anxiety/depression, alcohol dependence, and negative affect were related to greater ventilation and emotional ventilatory reactivity. A family history of alcohol problems was related to greater ventilation. A family history of drug problems was related to decreased ventilation and emotional ventilatory reactivity and to baseline thoracic breathing.
Ventilatory response to resistive loads and fear of suffocation
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Research Group on Health Psychology, University of Leuven, Belgium

Background: Fear of suffocation has been found to be an underlying dimension of Claustrophobia (Rachman & Taylor, 1993). The present study aimed to explore respiratory and affective responses to sustained inspiratory resistive loads (IRL) in relation to interindividual differences in Fear of suffocation.

Method: Healthy participants (N = 30) completed the Fear of Suffocation Scale twice on two separate occasions. Each participant also underwent 16 trials of 40 s each: 8 trials with an IRL of 15 cmH₂O/l/s (R15) and 8 trials with an IRL of 40 cmH₂O/l/s (R40) were presented in a randomized order. Each trial was followed by an unloaded intertrial interval of 40 s. Inspiratory motor drive (P100), volume and timing components of the breathing cycle were measured continuously. Participants rated both IRLs on pleasantness, arousal and dominance at three time points: before the first, following the 8th and following the 16th trial.

Results: Higher Fear of suffocation was related to higher unpleasantness and arousal ratings for both IRLs. Minute ventilation was decreased during loaded breathing, especially for R40. However, this drop in minute ventilation in response to R40 was less pronounced for participants scoring high on Fear of suffocation, compared to those scoring low.

Also, the decrease in minute ventilation during R40 could be well predicted by subjective fear experienced during R40: the more R40 was experienced as unpleasant and the less participants felt in control during R40, the better they maintained their minute ventilation during R40.

Conclusion: Our results suggest that low fearful participants lower their ventilation to cope with flow-dependent resistive loads, thereby probably minimizing respiratory aversive sensations. In contrast, high fearful participants tend to defend their ventilation during flow-dependent resistive loaded breathing, and may thereby enhance the respiratory sensations they are afraid of.
Music Performance Anxiety (MPA): Cardiorespiratory activity in high- and low-anxious professional music students in a performance situation

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Questionnaire surveys indicate that high-anxious musicians may suffer from hyperventilation symptoms before and/or during a public performance. Reported symptoms include shortness of breath, fast/deep breathing, dizziness and thumping heart. However, no study has yet tested if these self-reported symptoms reflect actual cardiorespiratory changes. The main goal of this study was to determine if MPA is manifested physiologically in specific correlates of cardiorespiratory activity associated with hyperventilation. We studied a total of 74 professional music students of Swiss Music Universities. We compared the most anxious students (high-anxious; upper tertile; n=21) with the least anxious students (low-anxious; lower tertile; n=24) based on their self-reported MPA. The students were tested in three distinct situations: baseline, performance without audience, performance with audience. We measured breathing patterns, end-tidal carbon dioxide (EtCO₂, a good non-invasive estimator for hyperventilation) and cardiac activation with the LifeShirt system and a Microcap capnometer, as well as the self-perceived physiological activation and the affective experience of MPA. Preliminary analyses indicate that high- compared to low-anxious students showed a significant drop in EtCO₂ (p<.01) before the public concert compared to the private concert. The mean drop in high-anxious students was −0.8 (SD 1.4) mmHg vs. a mean rise of +0.4 (SD 1.7) mmHg in low-anxious students. Further, high-anxious students showed larger increases in self-reported anxiety, self-perceived palpitations and breathing difficulties. In contrast, changes in heart rate, respiratory rate and respiratory volume estimates did not differ significantly between the groups. The results of this study indicate that low- and high-anxious music students differ in the considered self-perceived symptoms and the self-reported anxiety before a public performance, whereas on the physiological level, only EtCO₂ changes differed between the two groups. This difference in EtCO₂ supports the hypothesis that MPA may be associated with a tendency to hyperventilate in high-anxious music students.
The relief effect of spontaneous sighs as opposed to imposed sighs

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Spontaneous sighing is related to relief of dyspnea and perceived restlessness, relief of negative affect and craving during smoking withdrawal, and relief of stress. Physiologically, this relief effect could be associated with the remediation of atelectasis, the restoration of reduced lung compliance and gas exchange efficiency, and the resetting of correlated breathing variability. However, imposing a sigh may have the opposite effect as it may disturb breathing when a sigh is physiologically or psychologically inappropriate.

The present study examined respiratory variability and muscle tension preceding and following imposed and spontaneous sighs. Each participant (N=43) went through a 6-min baseline period, followed by three 6-min. tasks (presented in randomized order) separated by 6-min recovery phases. The three tasks were two mental arithmetic tasks (MAT, involving 3-digit number calculations) and one control task (indicating the largest number in a series with a mouse). One of two MAT was followed by the instruction to sigh. The coefficient of variation (CV) and autocorrelation (AR) of minute ventilation (MV) were calculated as measures of total respiratory variability and correlated respiratory variability, respectively. EMG of the M. Trapezius was assessed. Whereas a spontaneous sigh resets correlated respiratory variability, an imposed sigh following MAT resulted in a significant increase in CV and no change in AR. Muscle tension gradually increases before a spontaneous sigh and decreases following a spontaneous sigh. In contrast, an imposed sigh resulted in an inhibition of a reduction in muscle tension during recovery from MAT. These results suggest that spontaneous sighs relieve, whereas imposed sighs inhibit relief. Thus instructing to take a single deep breath, as is done in relaxation training, requires caution as it may be less beneficial as assumed.
SYMPOSIUM 5: DYSFUNCTIONAL BREATHING

Chair: Jan van Dixhoorn

Rosalba Courtney
The relationship of breathing pattern to measures of breathing functionality used in breathing therapy

Beng Hean Lim, Martin Hofheinz, Michael Mibs, Jan van Dixhoorn
Falls efficacy and dysfunctional breathing among community-dwelling older persons

Jan van Dixhoorn, Rosalba Courtney, Els Anthonissen
Treatment of dysfunctional breathing: MARM and Nijmegen Questionnaire compared

Jennie Wakker, Jan van Dixhoorn, Ruud Bosscher
The clinical effectiveness of breathing and relaxation therapy: Results in routine practice
The relationship of breathing pattern to measures of breathing functionality used in breathing therapy.

Rosalba Courtney

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**Introduction**: High thoracic breathing, accompanied by limited lower rib cage expansion during inspiration when inappropriate or inefficient is dysfunctional. This type of breathing pattern can be reliably evaluated using a Manual Assessment of Respiratory Motion (MARM). Dysfunctional breathing patterns of this type can have consequences for respiratory resistance, posture and motor control, respiratory control, dyspnea symptoms and hemodynamic fluctuations required for homeostatic reflexes. It may also affect response to breathing therapy. This study investigates how measures of breathing pattern correspond to other measures of breathing functionality known to respond to breathing therapy.

**Method**: The relationship of the MARM along with other measures of breathing functionality was investigated in 83 individuals whose breathing functionality was assessed using a range of measures.

**Results**: The MARM was significantly correlated with measures used to evaluate response to breathing therapy i.e. Dr. Buteyko’s breath holding time test, and response to heart rate variability biofeedback.

**Conclusion**: It is plausible that breathing pattern moderates the response to breathing therapy. It corresponds to outcome measures of breathing therapy such as Buteyko’s breath holding time test and predicts responders to heart rate variability biofeedback.
Falls efficacy and dysfunctional breathing among community-dwelling older persons

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Background: The prevalence of fear of falling (FOF) has been reported to range from 20% to 85% among older persons. Anxiety, balance and postural impairments are known conditions which are involved in developing FOF and dysfunctional breathing (DB). Therefore it is postulated that there is an association between FOF and DB. No prior study has looked into the association between FOF and DB. This study aimed to explore the association between falls efficacy, altered breathing pattern and functional respiratory symptoms among community-dwelling older persons.

Study method: Community-dwelling older persons were recruited through volunteer sampling for a validation study of Timed Up & Go Test. 84 participants were included for this study. Each evaluation consisted of Mini Mental State Examination, self-administered questionnaires, physical balance tests and observation of breathing pattern. Fear of falling was measured by Falls Efficacy Scale-International (FES-I). Dysfunctional breathing was measured by the presence of functional respiratory symptoms (Nijmegen Questionnaire-NQ) and altered breathing pattern.

Result: The mean age of the participants was 71.5 (SD = 7) years. The percentage of female gender was 81%. The median of FES-I score was 20 (range =16-39) and the median of NQ was 9 (range = 0-46). The adjusted R² accounted by the common predictors of falls efficacy was 35%. Inclusion of NQ and the presence of upper chest breathing pattern in the model explained 48% of the total variance of falls efficacy. The respiratory components explained an additional 13% of total variance.

Discussion: Upper chest breathing pattern and functional respiratory symptoms were independently associated with falls efficacy after accounting for its commonly known predictors. The possible underlying mechanisms explaining this significant association include hypopcapnia, tension, impairments in sensory systems and musculoskeletal structures involved in ventilation. Further studies in this area are recommended.
Introduction: Characteristics of dysfunctional breathing (DB) include 1) increased symptom scores and 2) changes in breathing pattern including imbalance in the distribution of breathing motion. Increased symptoms can be measured by the Nijmegen Questionnaire (NQ) and imbalance in the distribution of breathing motion can be quantified by the manual assessment of breathing motion (MARM). These two aspects of DB may differ in their response to treatment.

Treatment with breathing and relaxation therapy (‘Whole Body Breathing’) is used to investigate: 1) do MARM and NQ respond to treatment, 2) are improvements in NQ scores related to the extent of imbalance in breathing motion (high MARM values).

Patients and methods: Patients are part of an ongoing internet based survey of treatment outcome of the method of Whole Body Breathing. From 62 patients MARM data were included in the survey, in 40 of them the subscores of NQ were available. They were 16 men and 42 women, aged on average 39 (±16) years and treated for 5,9 (± 1,5) individual sessions of one hour.

Results: Average MARM values were elevated before treatment and decreased significantly. Initially 44 patients had highly elevated MARM scores (> 105, indicating thoracic breathing), afterwards only 2. The values of NQ decreased from elevated scores to a normal average score. NQ scores were higher and decrease was greater for thoracic breathers (p<.05). This was due to the respiratory subscore ‘dyspnea’ only. The other subscores did not differ between highly thoracic and less thoracic breathers.

Conclusion: Both MARM and NQ respond favorably to treatment that is aimed to normalize breathing. The two measures are only marginally related. However, the four items of NQ that measure dyspnea are related to distribution of breathing movement. Changes in dyspnea scores of the NQ are associated with improved breathing pattern.
The clinical effectiveness of breathing and relaxation therapy: Results in routine practice

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Introduction: The present study investigated the effect of breathing and relaxation therapy (BRT) in clinical practice using Jacobson’s analysis of clinical significance. The purpose is to establish the proportion of patients who reliably improve and those who improve enough to be classified as ‘recovered’, that is: changed to normalcy.

Methods: This study took place in a primary care practice offering BRT to patients with a wide range of complaints. A total of 146 patients were included who completed the Nijmegen Questionnaire (Doorn, Colla & Folgering, 1983) to measure the results of the therapy.

Results: Most frequently occurring complaints were stress, hyperventilation, inadequate sleeping and anxiety-related problems. The analysis of clinical significance showed that 70\% of the patients reliably improved and 60\% improved enough to be recovered. The proportions improved and recovered were significantly different between groups. Patients with hyperventilation complaints had higher improvement and recovery rates compared to patients with sleeping and anxiety-related problems.

Conclusion: BRT seems to be an effective treatment for complaints that are the consequences of excess tension. Treatment was most effective for patients with hyperventilation complaints.
Chair: Paul Grossman

Christiane A. Melzig, Katharina Holtz, Alfons O. Hamm
*Increased defensive activation during anticipation and provocation of interoceptive threat in panic disorder patients and persons at risk for pathological anxiety*

Paul M. Lehrer, Maria Karavidas, Michael Gara, Anu Kotay, Jane Mayers, Jennifer Sawaya, Nasya Breach, Alejandro Gonzalez-Restrepo, Regina Liu, Javier Escobar
*Exploratory pilot study, randomized controlled blinded trial on Medically Unexplained Physical Symptoms (MUPS)*

Omer Van den Bergh, Elke Van der Stappen, Mitchell Silva, Ilse Van Diest, Paul W. Davenport, Lieven Dupont
*Associative learning of coughing and the urge-to-cough: An explorative study*

Nicholas Giardino, Anthony King, Jeffrey Curtis, Israel Liberzon
*Posttraumatic stress disorder is associated with altered modulation of respiratory sinus arrhythmia by respiration rate and volume.*
Increased defensive activation during anticipation and provocation of interoceptive threat in panic disorder patients and persons at risk for pathological anxiety

Christiane A. Melzig, Katharina Holtz, Alfons O. Hamm

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Modern learning theories propose a significant role of fear and anxiety experienced during anticipation or confrontation with interoceptive cues in the etiology of panic disorder. For most patients, respiratory or cardiovascular sensations, e.g., heart racing, dyspnea and breathlessness, that are usually associated with panic attacks, seem to be of specific relevance. It has been proposed that the defensive networks that regulate fear and anxiety are sensitized in panic disorder patients as well as persons at risk for developing pathological anxiety (high anxiety sensitive persons). In a series of laboratory studies we therefore investigated whether indicators of an increased defensive activation can be observed in these populations. Study participants (26 risk group students, 15 panic disorder patients, 22 student controls) were monitored during anticipation of interoceptive threat (symptom provocation using hyperventilation) and a safe comparison condition (normal breathing). Moreover, physiological responses (startle eyeblink response, skin conductance level, heart rate and respiration) during and after a guided hyperventilation challenge were recorded. During anticipation of symptom provocation only panic disorder patients and the high-risk subjects but not the controls showed a marked defensive activation as indicated by a potentiation of the startle eyeblink response, increased heart rate and skin conductance level. Furthermore, these two critical groups demonstrated an augmented startle reflex and a slowed autonomic recovery (heart rate, respiratory rate) immediately after the hyperventilation challenge, suggesting that perception of the induced symptoms increased anxiety. Taken together, the data indicate that panic disorder and the risk for developing pathological anxiety are associated with an increased sensitivity of defensive networks toward interoceptive cues.
Exploratory pilot study, randomized controlled blinded trial on Medically Unexplained Physical Symptoms (MUPS)

Paul M. Lehrer¹, Maria Karavidas¹, Michael Gara¹, Anu Kotay¹, Jane Mayers¹, Jennifer Sawaya², Nasya Breach², Alejandro Gonzalez-Restrepo¹, Regina Liu², Javier Escobar¹

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We studied 37 patients with MUPS. Eighteen patients were randomized to a treatment group, 19 to a control group. We administered 10 sessions of a psychophysiological treatment that included training to increase heart rate variability, decrease muscle tension, increase hand temperature, and increase end-tidal carbon dioxide (among patients who were found to hyperventilate). After approximately 10 weeks of treatment, significantly greater improvement was found in the treatment than control group on the primary outcome measure of general somatic symptomatology (an adapted version of the Clinical Global Impression Scale, CGI, Guy, 1976). Clinically significant differences were noted ($p=0.0094$) on this measure. At baseline, participants in both groups, met a CGI rating of 4=moderate somatization (exceeds abridged criteria, frequent complaints or some functional impairment) but this decreased in the treatment group to 2=borderline signs of somatization (few somatic complaints, below threshold for the abridged criteria). Statistical analyses were based on the changes from the initial assessment to the third assessment. A fixed effects model with repeated measurement for each patient was applied to estimate the group-specific mean changes from baseline to the final assessment (after session 10), followed by t-tests for group paired comparisons. There were statistically significant group differences (treatment vs. wait-list control) on the CGI ($t=-2.730, p=.009$), the BDI-II ($t=-2.231, p=.033$), and the SF-36 ($t=3.292, p=.002$). The odds ratio of patients who are labeled “improved” in terms of HAM-D in the treatment group was 9.6 times of that of the control group. The improvement in the treatment group was clinically significant, 59%, $\chi^2 (2, N=24)=5.89, p=0.0152$. In addition, significant effect sizes were noted for the primary outcome measure, CGI Scale ($d=1$); for depression, BDI-II ($d=0.7$), and for functioning/quality of life, SF-36 ($d=1.24$). These data provide preliminary evidence that a combination of psychophysiological methods can comprise an effective treatment for patients with multiple unexplained medical symptoms.
Associative learning of coughing and the urge-to-cough: An explorative study

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Background: Coughing and the urge-to-cough is assumed to depend on the integration of respiratory afferent activity, respiratory motor drive, and top-down processes related to attention, affective state, experience and learning. The present study aimed to investigate whether cough and the urge-to-cough can be induced by associative learning.

Methods: On Day 1, healthy participants (N=26, 17 men, age 21-30 yr) underwent standard spirometry and a ramped up set of dosimeter-controlled single breath provocations with citric acid (10, 30, 100, 300 and 1000 mM) to determine their C3 criterion (3 consecutive reflex coughs). On Day 2, participants received semi-randomized order of 5 citric acid inhalations with the C3 concentration (unconditioned stimulus, US) and 5 control inhalations with saline. Two differently colored mouth pieces served as conditioned stimuli (CS+ for citric acid, CS- for saline trials). This learning phase was followed by 1. a first test phase (two saline trials, 1 with CS+, 1 with the CS- mouth piece), 2. a second acquisition phase (3 CS+, 3 CS- trials); 3. a second test phase (2 CS+, 2 CS- trials, all saline). Urge-to-cough was rated on a Borg-like scale (0-100, absent–irresistable). Cough sounds were recorded with a microphone connected to a laptop equipped with Adobe Audition (sampling rate 44.1 kHz).

Results: Cough frequency on Day 2 in response to the C3 concentration selected on Day 1 was much lower (M=.97). Cough frequency in response to CS+ and CS- test trials did not differ, whereas the urge-to-cough was significantly higher in CS+ compared to CS- test trials (p<.05). The difference between CS+ and CS- urges correlated significantly (r=.41) with self-reported experiences with prior cough episodes.

Conclusion: The urge-to-cough is amenable to associative learning and the sensitivity to learning appears to depend on previous experiences with coughing.
Posttraumatic stress disorder is associated with altered modulation of respiratory sinus arrhythmia by respiration rate and volume

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Posttraumatic stress disorder (PTSD) has been associated with autonomic nervous system dysregulation, cardio-respiratory and other somatic symptoms, and increased risk for cardiopulmonary disease. We examined differences in the sensitivity of cardiopulmonary coupling in combat veterans with PTSD and matched healthy controls. Fifteen subjects with PTSD and 14 healthy controls underwent a baseline paced breathing procedure (8, 11, 13.5 and 15 breaths per minute). Sensitivity of cardiopulmonary coupling was indexed by the modulation of respiratory sinus arrhythmia (RSA) by respiration rate and volume, calculated as the slope of the within-individual regression equation of RSA normalized by tidal volume ($V_T$) upon respiratory cycle length ($T_{TOT}$). Subjects with PTSD showed significant differences in the regression slope and intercept compared to healthy controls. These differences suggest both a decreased sensitivity in cardiopulmonary coupling and a lower vagal tone in PTSD, which may contribute to increased risk for cardiopulmonary illness in this population.
Manuela G. Alius, Christiane A. Melzig, Andreas von Leupoldt, Alfons O. Hamm
Subjective and physiological responses to the sensation of dyspnea in high anxiety sensitive individuals – a pilot study

Katieleen Bogaerts, Stien Fannes, Omer Van den Bergh, Ilse Van Diest
Feedforward regulation of breathing: Do anticipatory changes in inspiratory motor drive occur when an increased respiratory resistance is expected?

Erik Ceunen, Meike Pappens, Omer Van den Bergh, Ilse Van Diest
Respiratory gating of the acoustic startle reflex: Preliminary evidence

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Respiratory related evoked potentials measure of respiratory mechanosensory activation of the SI cortex in rats

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COPD patients’ beliefs about the harmfulness of dyspnea and activity avoidance: the Dutch version of the Breathlessness Beliefs Questionnaire

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Do patients with idiopathic cough have different psychological characteristics than patients with medically explained cough?

Andreas von Leupoldt, Andrea Vovk, Margaret M. Bradley, Andreas Keil, Peter J. Lang, Paul W. Davenport
The impact of emotion on respiratory-related evoked potentials in healthy volunteers
Subjective and physiological responses to the sensation of dyspnea in high anxiety sensitive individuals – a pilot study

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Inspiratory resistive loads can be applied to induce respiratory sensations, including dyspnea. Although these respiratory sensations are of high relevance to etiological models of anxiety, responses of anxious populations to resistive load challenges have rarely been studied so far. We, therefore, compared physiological and subjective responses to the sensation of dyspnea induced via inspiratory resistive loads in seven persons characterized by high fear of somatic sensations (high anxiety sensitivity) and eight control participants (low anxiety sensitivity). In a first step, participants individually rated the unpleasantness of inspiratory loads differing in resistance. Then, the participants were exposed to those loads that they previously rated as highly unpleasant and maximally tolerable. Exposure periods lasted for 3 minutes and were followed by a 3 min recovery phase. To assess defensive activation, a number of physiological parameters (e.g. tidal volume, minute ventilation and skin conductance level SCL) were recorded. Additionally, participants rated the intensity and unpleasantness of dyspnea as well as a number of respiratory and anxiety symptoms. Although both experimental groups experienced similar unpleasantness levels of dyspnea, high anxiety sensitive persons reported more anxiety and more respiratory sensations during the exposure period. This greater level of anxiety was reflected in an increased SCL as well as an increased tidal volume and minute ventilation. Based on the present data, we assume that high anxiety sensitive individuals experience resistive loads as more frightening than low anxiety sensitive individuals, presumably due to complex interactions of physiological changes and the cognitive evaluation of these changes.
Feedforward regulation of breathing: Do anticipatory changes in inspiratory motor drive occur when an increased respiratory resistance is expected?

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**Background**: The development of behavioral control of breathing can easily be understood from an associative learning framework, or, classical conditioning. In the present study we investigated conditioning of the inspiratory motor drive as measured by inspiratory occlusion pressure (P100), a measure of the ‘central respiratory drive’, reflecting the momentary output of the respiratory controller to the breathing muscles.

**Method**: A classical conditioning paradigm was applied in healthy participants. During acquisition, the experimental group (n = 13) received 24 trials in which a low-intensity resistive load (5 cmH₂O/l/s, CS or Conditioned Stimulus, applied for three consecutive inspirations) preceded a load of a stronger intensity (20 cmH₂O/l/s, US or Unconditioned Stimulus, for three subsequent inspirations). The control group (n = 11) received the low-intensity load for 6 consecutive inspirations. The test phase was similar for both groups: it consisted of 16 trials in which the low-intensity CS-load was applied for 6 consecutive inspirations. During each trial, P100 was measured during the first and the fourth, or during the third and the sixth breath.

**Results**: Responses to the CS-load did not differ between groups at any moment. An unconditional increase in P100 in response to the loads was observed initially, but habituated gradually across the experiment.

**Discussion**: Our results suggest that the disruption caused by adding low to moderate resistive loads to three consecutive inspirations is too benign to engage anticipatory increases in inspiratory motor drive.
Respiratory gating of the acoustic startle reflex: Preliminary evidence

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Background: ‘Respiratory Gating’ (RG) refers to the respiratory rhythm’s covariation with vagal and sympathetic outflow, with increased sympathetic activity at the start of inspiration and increased vagal outflow to the heart at the start of expiration (Eckberg, 2003). The present study aimed to explore whether RG affects the magnitude of the acoustic startle reflex and its affective modulation.

Method: Respiratory and startle blink EMG data came from two fear conditioning studies that applied a high intensity resistive load as the unconditional stimulus in the acquisition phase (6 trials). A neutral picture served as conditional stimulus (CS) in one study, whereas the other study applied another resistive load of a low intensity as the CS. In the extinction phase (6 trials), only CSs were applied. To study the effect of RG on affective startle blink modulation, startle probes during CSs, USs and intertrial intervals (ITI) were scored according to whether they fell during inspiration or expiration. Startle responses (magnitude of the startle blink) triggered during inspirations were compared with those triggered during expiration for each experimental condition.

Results: For both experiments, within subject comparisons showed that startle responses were enhanced when startle probes were presented during expiration as compared to during inspiration. However, this was only true for the extinction parts of both experiments, where no resistive loads of strong intensity were applied anymore.

Conclusions: The results support the idea that the acoustic startle reflex is influenced by central gating of autonomic outflow that co-occur with respiratory rhythms.
Respiratory related evoked potentials measure of respiratory mechanosensory activation of the SI cortex in rats

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Respiratory-related evoked potentials (RREP) elicited by inspiratory mechanical loads have been demonstrated in humans and lambs. Studies associated with source localization suggested that the early RREP P1 peak was generated by activation of neurons in the somatosensory (SI) cortex in humans. The lamb cortical RREP P1 peak similar to human RREP and recording electrodes were found in the caudal-lateral area of the somatosensory (SI) cortex. However, it was unknown if occlusion paradigm can also elicit a RREP in rodents. In the present study, a rat model was developed to test this hypothesis in chronically instrumented, awake, spontaneously breathing male Sprague-Dawley rats. During surgery, an inflatable balloon cuff was implanted around the trachea and the actuating tube was routed subcutaneously and externalized. In addition, a midline incision was made to the rostral skull. Four burr holes were made 2.5 mm lateral to the bregma and either 2.5 mm anterior or posterior bilaterally. A wire electrode was inserted through each hole onto the SI cortex. The cranial holes were sealed with dental acrylic and the scalp incision was then sutured. The animal was allowed recovery 4-7 days. On the day of recording, the animal was placed into a minimally restrictive restraint apparatus and the electrocorticogram (ECoG) was recorded. A control period of 2.5 minutes was recorded prior to the occlusion period. During the occlusion period of 10 to 18 minutes, the balloon occluder cuff was inflated to completely obstruct the trachea. The occlusions lasted for 3 to 5 breaths and were presented approximately every 30 seconds. Occlusion-elicited evoked potentials were obtained by computer-signal averaging the ECoG activity. A short-latency peak was observed in the averaged occlusion-elicited evoked potentials in all animals. The result demonstrated that inspiratory occlusion elicits an evoked potential in the SI somatosensory cortex in awake, spontaneously breathing rats.
**COPD patients’ beliefs about the harmfulness of dyspnea and activity avoidance: the dutch version of the breathlessness beliefs questionnaire**

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**Background:** Catastrophic beliefs about asthma have been shown to influence patients with asthma’s symptom reports, which is consistent with the profound impact of catastrophizing on pain patients’ symptom experience. Although the illness-specificity of the Catastrophizing about Asthma Scale may have advantages, a generic measure of catastrophic thinking about dyspnea – the cardinal symptom of respiratory disease – may have broader applications.

**Method:** The Breathlessness Beliefs Questionnaire (BBQ) is a 17-item questionnaire adapted from the Tampa Scale for Kinesiophobia (TSK), the latter being a measure of how harmful pain patients think their pain is and to what extent they think activity should be avoided. 187 patients with respiratory disease completed the BBQ, together with measures of negative affectivity (PANAS), anxiety and depression (HADS) and health-related quality of life (PFSDQ; CRDQ).

**Results:** Exploration of the structure of the BBQ suggested that a reduced 11-item questionnaire had a reliable internal structure: a 2-factor solution converged with the structure of the TSK. The first factor focused on the harmfulness of the sensation of dyspnea and the disease causing it (‘somatic focus’), the second factor focused on beliefs that activity should be avoided (‘activity avoidance’). Correlational analyses with other questionnaires supported the external validity of the BBQ.

**Discussion:** The present findings suggest that the BBQ is a valid, short, and useful instrument to assess respiratory patients’ beliefs about the harmfulness of their disease and physical activities. Further research is needed to document to what extent BBQ scores are related to daily life activities and symptoms.
**Interoceptive stimuli and prepulse inhibition**

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**Background:** Prepulse inhibition (PPI) occurs when a relatively weak sensory event (the prepulse) is presented 30–500 ms before a strong startle inducing stimulus, thereby reducing the magnitude of the startle response. PPI is generally interpreted as a measure of sensorimotor gating. In humans, PPI occurs in a robust, predictable manner when the prepulse and startling stimuli occur in either the same or different modalities. Until now mainly visual, acoustic and cutaneous stimuli have been used in PPI paradigms. We investigated whether interoceptive prepulses (inspiratory resistive loads, IRL) evoke similar inhibition as exteroceptive prepulses.

**Method:** Participants (N = 32) received 15 randomized presentations of each of the following: a light (5cmH$_2$O/l/s) or a moderate (20cmH$_2$O/l/s) IRL (each presented during one inspiration), aversive pictures (8 s), or no stimulus. An acoustic startle probe was presented in 66% of the trials 500 or 1500 ms following stimulus onset. Measurements included reaction times to the startle probes, electrodermal activity, startle blink responses and subjective fear.

**Results:** Results show that, opposed to the pictures, the interoceptive stimuli do not show PPI compared to the no stimulus condition when probing 500ms after IRL onset. Startle potentiation does not differ between the 500 and the 1500ms probe for the IRL whereas it does for the pictures. Reaction times show a mirror image of the startle data.

**Conclusion:** These results suggest that early attentional processing of interoceptive stimuli has different functional characteristics than that of exteroceptive stimuli.
Dependency of illness evaluation on the social comparison context: findings with implicit measures of affective evaluation of asthma

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Background: The affective dimension of illness representation plays an important role in asthma self-management. However, little is known about the stability of this affective representation across contexts. We explored the role of social comparison in this affective evaluation.

Methods: Participants included 20 individuals reporting an asthma diagnosis and 33 healthy controls. To measure asthma attitudes, we used three different versions of the Implicit Association Test (IAT), a Single Target IAT (ST-IAT) and two IATs with different social comparison standards for asthma evaluation: (1) HIV as downward social comparison standard and (2) diabetes as comparison standard on a similar level. Reaction times to pair asthma with positive or negative word stimuli in the three IATs were compared in a repeated measure ANOVA. Furthermore, the relationship between affective evaluation, self-reported asthma specific coping, and negative affect was explored.

Results: Individuals reporting an asthma diagnosis showed a stronger negative evaluation of asthma than healthy individuals in the ST-IAT. This negative evaluation was related to the self-report of dysfunctional coping strategies. However, in the IAT introducing a downward social comparison with HIV, evaluation of asthma was less negative and no longer related to the report of coping strategies.

Conclusion: Downward social comparison can buffer against negative affective evaluation of asthma. The context dependency of illness-related attitudes, however, requires attention in future research and asthma management practice.
Validation of the Dutch Claustrophobia Questionnaire

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Background: The Claustrophobia Questionnaire (CLQ) of Radomsky et al. (2001) assesses two factors underlying claustrophobic fear: fear of restriction and fear of suffocation. The present study aimed to validate a Dutch version of this CLQ.

Method: In a first phase, undergraduate students (N = 363) completed the 26 item Dutch CLQ. Next, 23 of these respondents were exposed individually to nine claustrophobic situations that differed with respect to restriction of movement and perceived risk of suffocation. Participants rated their subjective distress in each of the nine situations.

Results: A principal component analysis with oblique rotation confirmed the two factor structure of the Dutch CLQ: fear of suffocation and fear of restriction. Both the restriction and suffocation scales had Cronbach’s $\alpha > .80$. The Dutch CLQ correlated strongly with other questionnaires assessing claustrophobic fear, but only moderately with questionnaires assessing other specific fears, and with general measures of anxiety and/or depression. Participants’ scores on the Dutch CLQ significantly predicted their self-reported fear during actual claustrophobic exposure. The suffocation scale of the Dutch CLQ predicted fear during situations with risk of suffocation, but not in situations that were characterized only by movement restriction without risk of suffocation. However, the restriction scale did not predict fear in restriction situations, while it did predict fear in suffocation situations.

Discussion: Similar to the original CLQ of Radomsky et al. (2001), the Dutch CLQ consists of two scales assessing the two major components of claustrophobia: fear of suffocation and fear of restriction. The Dutch CLQ has a good internal consistency, a good convergent and divergent validity and an acceptable predictive validity.

Conclusion: The Dutch CLQ is a reliable and valid instrument to assess the claustrophobic fears of restriction and suffocation.
Psychiatric disorders in patients with chronic obstructive pulmonary disease (COPD) – What about the symptom overlap?

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Background: Recent research has demonstrated a high prevalence of psychiatric disorders in patients with COPD. It is suggested that co-occurrence of psychiatric disorders and COPD may be the result of a symptom overlap as well as biochemical abnormalities due to COPD. This study has been done with the aim of evaluating the extend of psychiatric disorders - especially anxiety disorders - in patients with COPD by using different diagnostic instruments. Moreover, symptom profiles of anxiety and panic were analysed.

Study Method: N = 96 inpatients of a pulmonary rehabilitation clinic with severe to very severe COPD were interviewed using the Structured Clinical Interview (SCID) for DSM-IV. Additionally, different questionnaires concerning anxiety- and depressive symptoms were answered (e.g. Patient Health Questionnaire [PHQ-D], Hospital Anxiety and Depression Scale [HADS]).

Results: Regarding the prevalence of a psychiatric disorders, almost 50% of the patients got at least one SCID-I-diagnosis, a quarter of them got even more than one diagnosis. Anxiety disorders (40%) were frequent, followed by mood disorders (13%).

According to the results of the HADS, the prevalence of valid cases was 26% for depression and 23% for anxiety.

Discussion: In everyday clinical practice psychiatric disorders are rarely diagnosed in COPD-patients as a discrete disorder, they are often attributed to medical appearance due to the symptom overlap. Results of the HADS suggest that this attribution is sometimes failing: Although the inventory excluded somatic symptoms as indicators of psychological well-being, about one third of the COPD patients shows conspicuous values in at least one of the two scales (depression and anxiety). Specific symptom profiles are discussed, as well as the question of how health professionals could handle the diagnostic challenge in order to ensure specific therapeutic treatment for COPD-Patients with accompanying psychiatric symptoms.

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Do patients with idiopathic cough have different psychological characteristics than patients with medically explained cough?

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Background: Cough is a significant clinical problem. Whereas clear medical causes can be identified in most of the cases, a substantial number of patients is classified as having idiopathic cough (without clear biomedical cause). This study compares psychological characteristics of patients with idiopathic (IC) and non-idiopathic cough (NIC).

Method: Of 104 invited patients, consulting with the Cough Clinic (University Hospital Gasthuisberg, Leuven), 70 (64% women, mean age 58±14) filled in a complete of questionnaires. After the diagnostic protocol, 31% were classified as IC, the NIC met a variety of diagnostic categories, the largest groups being asthmatics (22%) and gastro-oesophageal reflux patients (21%). The questionnaires measured general neuroticism (Positive and Negative Affect Schedule), specific psychopathology (Brief Symptom Inventory), catastrophizing (ad hoc Catastrophizing about Cough Scale, derived from the Asthma Catastrophizing Scale), quality of life with cough (the Leicester Cough Questionnaire), sensitivity for body sensations (Body Awareness Questionnaire) and included an ad hoc scale assessing cough triggers (derived from Asthma Trigger Inventory) and a checklist with verbal labels to qualify cough.

Results: No significant differences were found between the IC and NIC groups for any of the questionnaires, except that IC patients experienced lower social quality of life.

Conclusion: IC patients do not differ psychologically from NIC patients. IC patients likely do not pertain to a broad category of patients with medically unexplained symptoms who typically show elevated levels of negative affectivity, interoceptive hypervigilance and catastrophizing about somatic sensations.
The impact of emotion on respiratory-related evoked potentials in healthy volunteers

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Background: Psychological factors such as emotion can impact the perception of respiratory sensations. However, the neural mechanisms underlying this modulation are not well understood.

Method: We studied the impact of viewing pleasant, neutral, and unpleasant affective picture series on the respiratory-related evoked potential (RREP) elicited by short inspiratory occlusions in fourteen healthy volunteers. In addition, skin conductance responses (SCR), late positive potentials to picture onset (LPP), respiratory motor drive (P0.1) and ratings of hedonic valence and arousal were measured.

Results: Results for SCR, LPP, P0.1 and ratings of hedonic valence and arousal suggested successful manipulation of emotional engagement by picture viewing. We found reduced P3 amplitudes of the RREP for inspiratory occlusions presented during viewing pleasant or unpleasant picture series, when compared to those presented during the neutral series. Earlier RREP components, such as Nf, P1, N1, and P2, showed no difference between affective picture series.

Conclusions: The present results suggest that emotion impacts the perception of respiratory sensations by reducing the attentional resources available for processing afferent respiratory sensory signals.
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