Disordered Breathing in Low Back Pain: Fact or Fallacy?

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AUSTRALIAN PHYSIOTHERAPY ASSOCIATION

physiotherapy inmotion

Integrating breathing and movement

"The muscles that support respiration are the same muscles that support postural control; therefore, we can not look at posture, movement and balance without looking at breathing."

Fact or Fallacy?

The Story to Date

What have we heard so far?

The Story to Date

The diaphragm plays an important role in managing
i) Respiratory demand

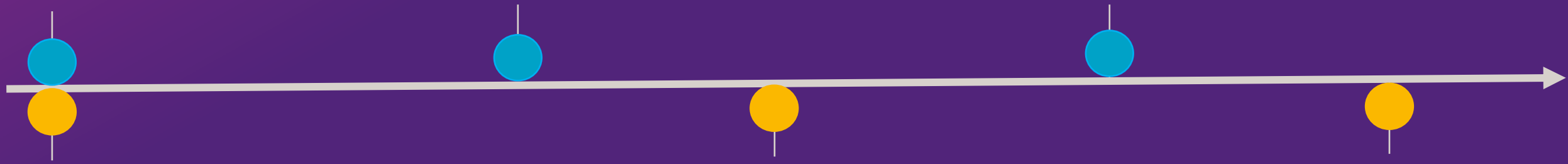
(Hodges et al., 2000, 2001)

i) Disordered breathing is a risk factor for developing low back pain

(Smith et al., 2006, 2009, 2014)

i) Respiratory conditions have a heterogeneous effect on low back pain

(Beeckmans et al, 2016; Rasmussen-Barr, 2019)



The diaphragm plays an important role in managing
ii) Postural perturbation

(Hodges et al., 2000, 2001)

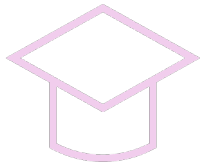
ii) The biomechanics of the diaphragm are altered in patients with chronic low back pain versus healthy controls

(Kolar et al, 2012)

ii) Interventional breathing exercises are effective in reducing low back pain

(Usman et al, 2023)

Fact or Fallacy?



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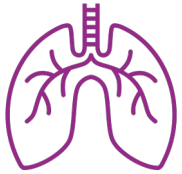


Plausible Mechanisms

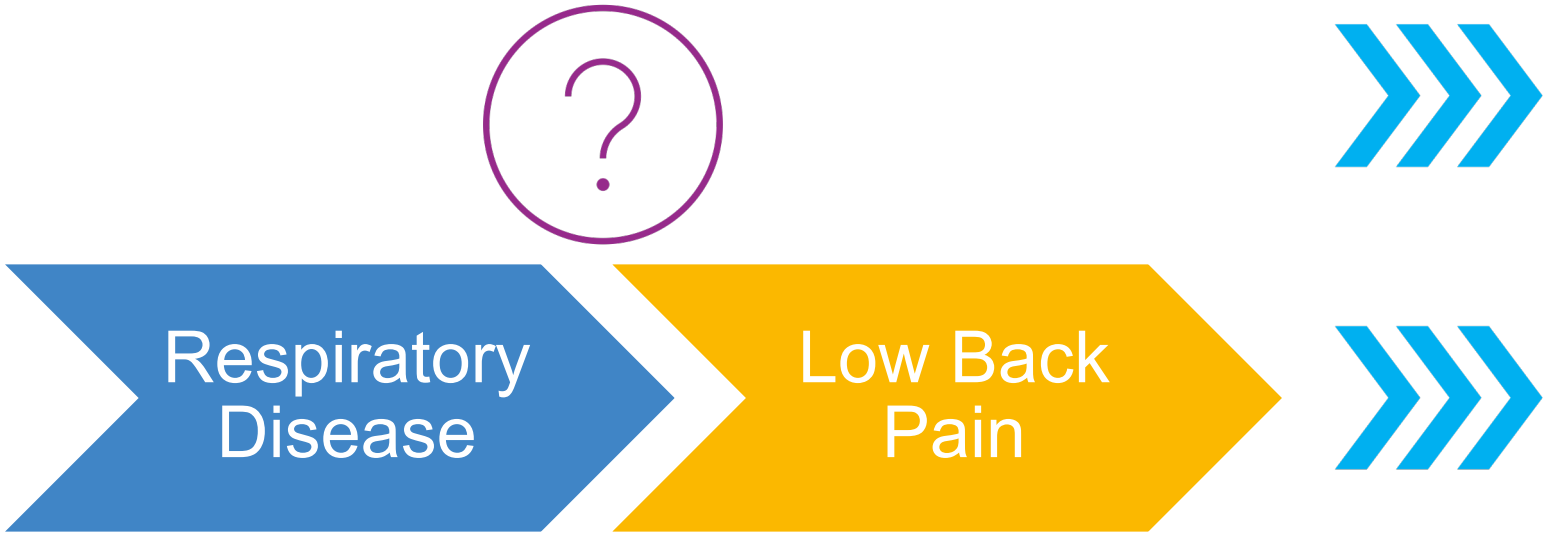
How does it work?

Plausible Mechanisms

Behavioural modulators that have been hypothesised to underlie respiratory hypoalgesia include relaxation (via the ANS), distraction from pain and patient expectation (Jafari et al., 2017)

Altered motor performance – spinal stability (Hodges et al., 2000)

Respiratory Disease and Low Back Pain



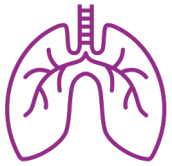
ALSWH survey (n = 38050) self- report; only asked about frequency of breathing difficulties which may limit interpretation of the data

(Smith et al., 2006, 2009, 2014)

- Diaphragm dysfunction or systemic inflammatory influence on pain response? (Caramori et al., 2015; Morris et al., 2020)
- Disease process vs. impacts on physical activity? (Wertz et al., 2010; Allen et al., 2015)
- Breathing difficulty: no differentiation between respiratory disease pathologies (Smith et al., 2006)

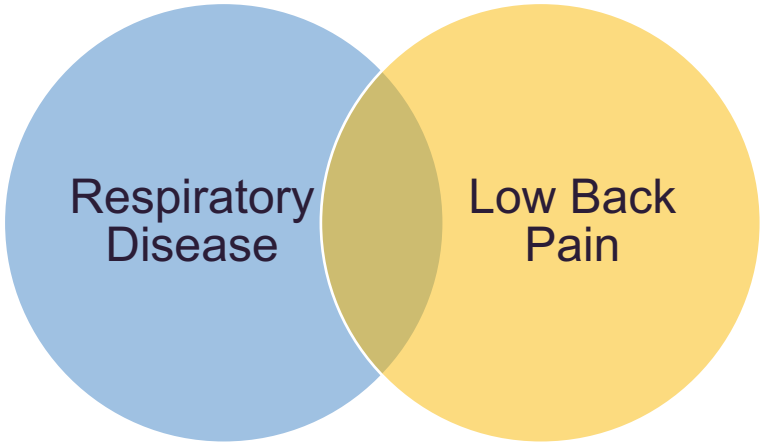
Respiratory Conditions: Are They Created Equal?

(Beeckmans et al., 2016; Rasmussen-Barr et al., 2019)



Reduced exercise tolerance: lung hyperinflation (Perez et al., 2016; Wertz et al., 2010)

Smoking (Behrend et al., 2012; Centres for Disease Control and Prevention, 2022; Nieminen et al., 2021)



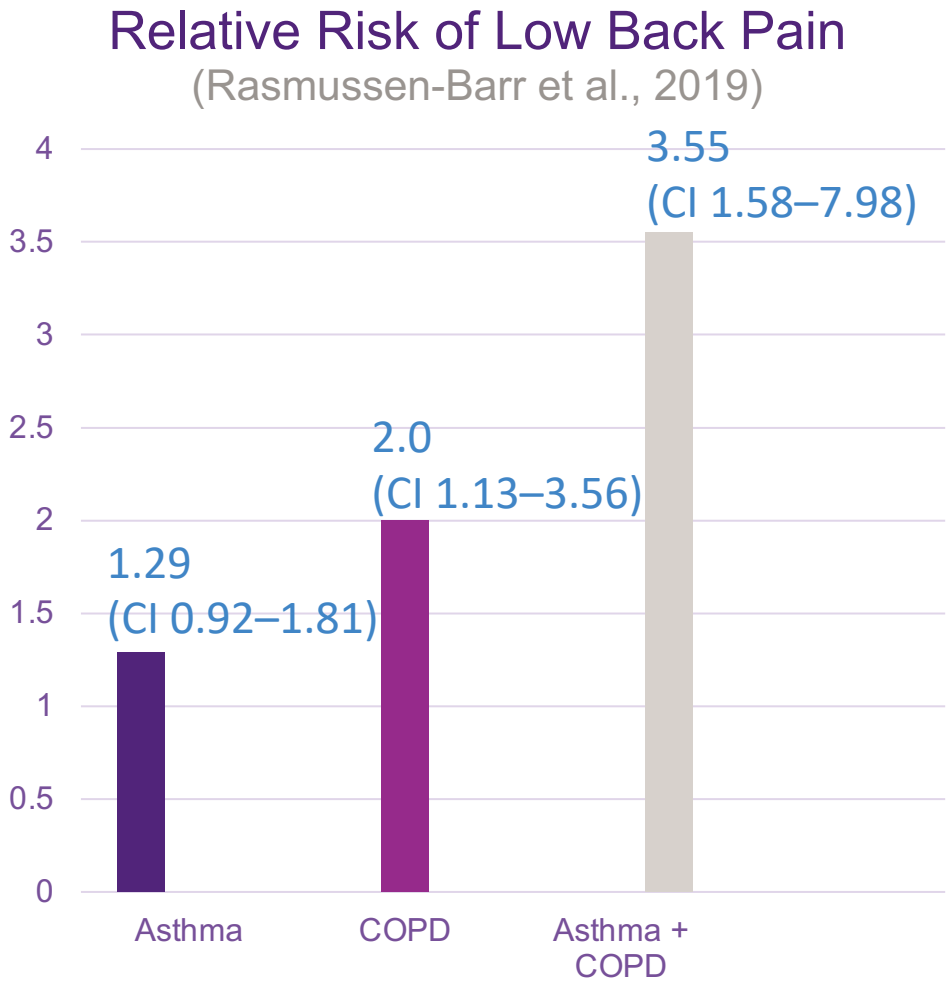
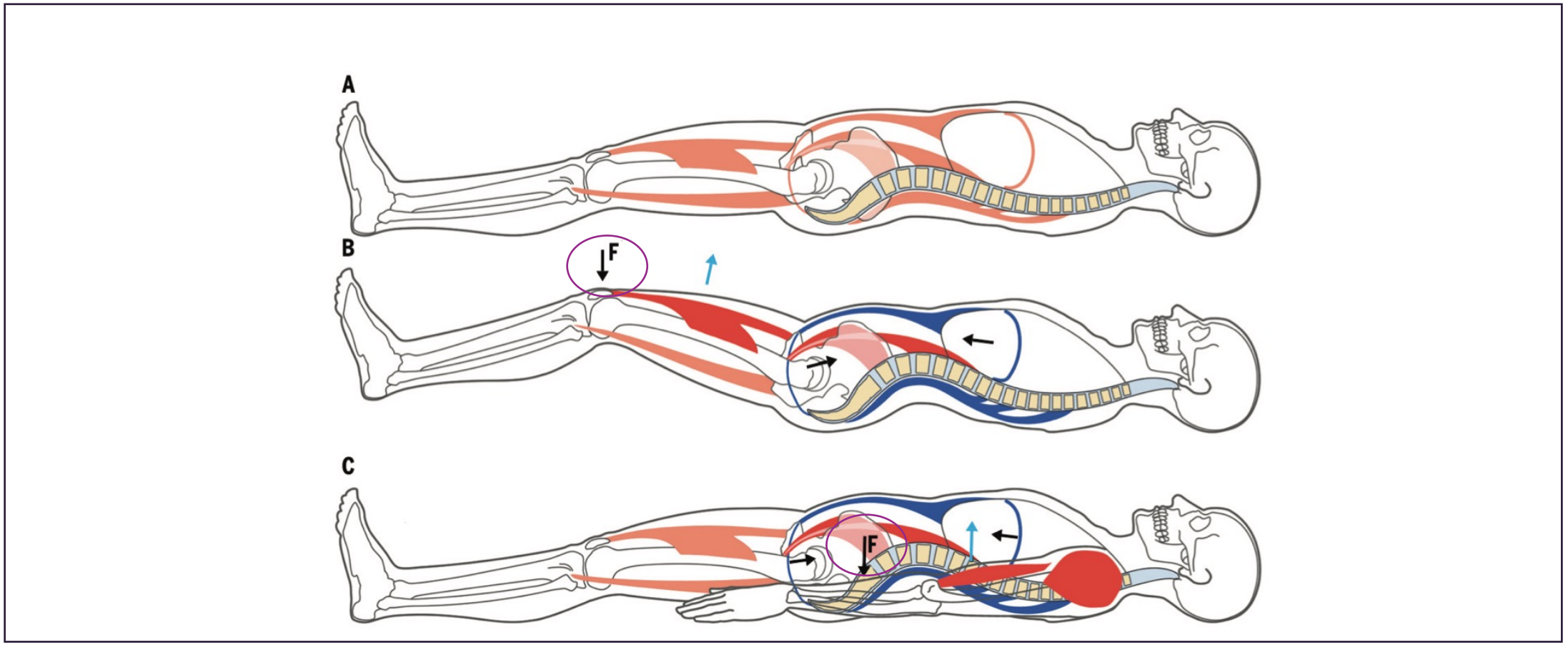


Image sourced via The University of Queensland: https://medicine.uq.edu.au/article/2021/04/climatic-factors-linked-asthma-prevalence

The Diaphragm: A Postural Stabiliser

(Kolar et al, 2012)



Low back pain ⟷ altered diaphragmatic biomechanics

Are Breathing Exercises the Answer?

(Usman et al., 2023)

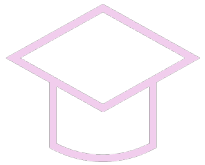
Effect Size for CLBP Parameters

Pedro Score	(8/10)	(6/10)	(5/10)	(5/10)	(4/10)	(6/10)	(3/10)
Trials	Kapitza et al. (2010)	Janssens et al. (2015)	Kang et al. (2016)	Finta et al. (2018)	Finta et al. (2020)	Mohan et al. (2020)	Park et al. (2020)
Pain	0.19 (at rest) 0.06 (during activity)	1.5	x	0.05	x	x*	x
Disability	x	n	0.4	x	x	x	x
Proprioception	x	x*	x	x	x	x	x
Balance	x	x	x	x	0.84 (m-FRT) 0.33 (left sided-LRT) 0.67 (right-sided-LRT)	x	x

Note: n: insignificant changes; x: outcomes that were not measured in the study; x*: outcomes for which data to calculate effect size was not given.

- Janssens et al: high (interventional group) vs low load (control) inspiratory muscle training; interventional group displayed significant improvements in pain (NRS)
  - *Mechanism of efficacy unclear*

Fact or Fallacy?



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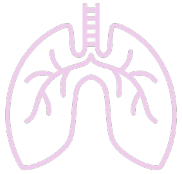


Plausible Mechanisms

How does it work?

Confounding Factors

Why the debate?

Confounding Factors

Association between a sedentary lifestyle, respiratory disorders and back pain
(Kolar et al., 2012; Perez et al., 2016; Wertz et al., 2010)

- Diaphragm dysfunction or lack of physical activity?
  - Primary contributor or consequence?
- Pro-inflammatory response

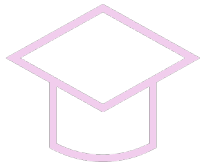
Other lifestyle-related factors
(Behrend et al., 2012; Centres for Disease Control and Prevention, 2022; Nieminen et al., 2021)

- Smoking promotes low back pain and underlies COPD

Psychosocial factors
(Panagioti et al., 2014)

- Enhanced anxiety, stress and hypervigilance

Fact or Fallacy?



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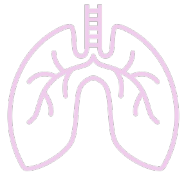


Plausible Mechanisms

How does it work?

Confounding Factors

Why the debate?

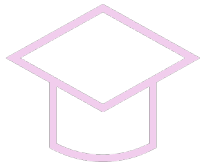
Lab vs Life

What do we know now?

Lab vs Life

- Flawed inferences from research
  - *correlation vs. causation*
- Lack of high quality, recent data
  - *conjecture in the literature*
- Mechanistic data
  - *inferred clinical reasoning*
  - *pain modulation vs. postural stability*
- Lack of clarity in application
  - *dosage parameters – incidental activity vs. prescriptive exercise*

Fact or Fallacy?



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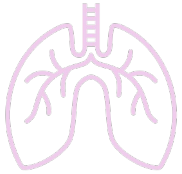

Plausible Mechanisms

How does it work?

Confounding Factors

Why the debate?

Lab vs Life

What do we know now?

In Clinic

What to do about it?

In Clinic

Comorbid respiratory disease history

Breathing exercises as a multimodal interventional tool

Image sourced via: Practicum Script: https://www.practicumscript.education

Contact

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