

Australian Spinal Research Foundation

RESEARCH TO REALITY PROJECT

*The Influence of a Putative Cervical Vertebral Subluxation on
Sympathetic Nerve Activity – Bolton*



1998 #2: Influence of a Putative Cervical Vertebral Subluxation on Sympathetic Nerve Activity - Bolton

HISTORICAL AND PROJECT CONTEXT

In the late 1990s, chiropractic research was at a critical juncture. Different schools of thought were emerging over what a subluxation was, with some bunkering down on a mechanical definition of spinal misalignment and others lining up behind the Palmer concept under which Chiropractic was founded.

This paper invested considerable time into the discussion of these divergent concepts, and two decades on, the same debate remains. To this end, the Australian Spinal Research Foundation has developed its own definition of subluxation in consultation with several chiropractic groups. In our eyes, the subluxation is “a diminished state of being, comprising a state of reduced coherence, altered biomechanical function, altered neurological function and altered adaptability.”

When this paper was published, this definition had not yet emerged. What was known was that chiropractors were adjusting something. What we called an adjustment, other professions called spinal manipulation. What we called a subluxation, others called a manipulable lesion, among other names.

What Dr Philip Bolton set out to discover was a simple thing: what effect does a cervical vertebral subluxation have on the sympathetic nervous system? This study, though concise, provided a vital, foundational discussion on the matter by bringing together the experimental evidence on the reflex effects of vertebral subluxation.

ABOUT THE STUDY

At the time of writing, chiropractic is finally getting some wins on the board when it comes to getting subluxation-based research into indexed journals. At the time Bolton’s paper was published, this was not so, and hence, he operated off of a common vertebral subluxation paradigm at the time – that of a vertebral misalignment that was less than a dislocation but caused nerve interference leading to disease or ill health. This “bone out of place, pinching a nerve” definition was entirely too simplistic, but nevertheless one that journals such as the *Journal of Manipulative and Physiological Therapeutics* (which carried the resultant article) accepted.

Much of the data at the time was based on either theoretical models, hypothesis papers springing from the ironically named “basic science” research, and animal models for testing vertebral subluxation and chiropractic paradigms. All of this added to the growing understanding of the types of ‘lesions’ (*subluxations*) that were being ‘manipulated’ (*adjusted*). We were beginning to see the reflex impacts of subluxation on afferent information flowing to the brain, and efferent information flowing out of it, as well as early indications of what this might mean for reflexes. It would be a long time before things like Heart Rate Variability would enter the conversation as simple way to measure sympathetic activity. It would be seventeen years until discoveries from the New Zealand College of Chiropractic would lead us to understand measures of spinal cord excitability and brain changes post-adjustment. But this paper was one that contributed to vital understanding of sympathetic nerve activity and the adjustment.

The Findings

RESEARCH LEVEL

The Bolton paper obtained and elucidated evidence to clearly show that “slow conducting afferents (Group III and IV) with receptive fields in the zygapophysial joints and paravertebral tissues can be activated by mechanical forces applied to the zygapophysial joints, para-articular tissues or both.” [1] The paper also found that group IV afferents, in particular, may be responsible for relaying signals that result in pain from vertebral joints.

Bolton found good evidence to support the hypothesis that displacement of vertebrae modulates nerve activity in afferent nerves activating muscle spindles and other low-threshold receptors. It was also becoming clear that heart rate, blood pressure, and electrical activity in the renal and adrenal nerves and gastrointestinal muscles could be impacted by vertebral displacement.

These findings emerged largely from animal models combined with existing hypotheses and theoretical models. However, the strength of the findings was great enough to recommend further research into segmental reflexes and whole-of-body impacts of vertebral subluxation. At the time, these were characterised as “to be determined.”

Bolton, P (2000). Reflex Effects of Vertebral Subluxation: The Peripheral Nervous System. An Update. Journal of Manipulative and Physiological Therapeutics, Plenary Papers. Vol 23. No. 2. pp. 101-103

CLINICAL LEVEL

This study brought together and explained the seminal findings on the vertebral subluxation and sympathetic nerve activity. Much of the resultant findings came from theoretical models, hypotheses and animal models, but the evidence was deemed to be significant.

Group III and Group IV afferents were found to be significant in pain from vertebral joints. “Displaced vertebra” (which was the working model used by the author) were also shown to affect afferent activity in muscle spindles, low threshold receptors, heart rate, blood pressure and electrical activity in renal and adrenal nerves as well as gastrointestinal systems.

It was thus apparent from the study that there were possibilities for chiropractic beyond pain alone, and that whole-of-body impacts of vertebral subluxation may exist. Further research was recommended.

Time has since revealed much on the topic, including differences in H Reflex and V Waves pre and post-adjustment, the utility of heart rate variability in the clinic as a way of measuring sympathetic activity, and differences in tonic pain pre and post-adjustment. [2,3,4]

LAYMAN LEVEL

When this paper was authored, chiropractic was just 103 years old. The profession was somewhat divided over the question, “Can chiropractic impact more than just back and neck pain?” This paper brought together initial evidence that started to paint a scientific picture that said, “Yes, it can.” We could now clearly see that some groups of nerves coming from the brain could affect pain in spinal joints. However, initial evidence shows that vertebral subluxation could also impact signals to muscle groups, gastrointestinal function, electrical activity in the kidneys and adrenal glands, heart rate and blood pressure. This was all starting to indicate that whole-of-body effects of chiropractic and subluxation were likely. This moved us from pain-alone, to functional outcomes. While this had been suspected by some groups within chiropractic for some time, it was finally on paper.

This paper was written at a time when subluxation was a politically charged word in research. Many people felt more comfortable thinking about it as a ‘bone out of place, pinching a nerve.’ We have moved way past that now and see it as something that affects the way we function across biomechanical and neurological states, thus affecting the way we live and adapt to life.

***Chiropractic is a lot more than back pain. It is about your whole body.
Getting adjusted can affect you in many different ways.***

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