Changes in effective neural connectivity following a chiropractic adjustment

By

Stephanie G. B. Sullivan

(Under the direction of Rebecca Shisler Marshall)

Individuals who receive chiropractic care often report improvement in memory, attention, reaction time, executive function, and spatial awareness. While much of the reports are anecdotal, several research studies have supported the changes observed by the patients. From the initial development of chiropractic as a distinct healing profession, it was suggested that the chiropractic adjustment – the therapeutic application of force to a dysfunctional joint – influences the nervous system, yet little is understood about how that influence occurs. The goals of the current study were to examine if changes in regional brain communication patterns occurred following a single chiropractic adjustment and if those changes were sustained for up to one-week. A secondary analysis of electroencephalography (EEG) data from a previous study in which participants received either a chiropractic adjustment, a sham (placebo) adjustment, or no intervention (control) were analyzed at three time points (baseline, immediate post, and one-week post) using Phase Slope Index (PSI). PSI provides a measure of the direction and magnitude of communication patterns between brain regions. The brain regions selected in this study were chosen to provide insight into areas of the brain previously shown to change following a single chiropractic adjustment and areas known to respond during cognitive task performance. Similar to previous chiropractic research, the results of the study demonstrated changes within the brain in the areas associated with executive function, attention, and spatial awareness. These included the prefrontal cortex and posterior cingulate cortex, with the unique

observation of additional changes to the dorsal lateral prefrontal cortex. Contrary to current expectations, changes similar to previous chiropractic research were also noted in the sham adjustment group; these included the somatosensory cortex and posterior cingulate, with a unique presentation in the visual association area. Not all of the previous chiropractic research had accounted for touch to the spine that occurs during the chiropractic adjustment and the sham adjustment. This suggests that while the brain demonstrated unique changes following the chiropractic adjustment, more research is needed to delineate the effects of touch compared to the effects of force. Additionally, both the chiropractic and sham adjustment groups demonstrated changes in regions associated with cognitive task performance, although each group was unique: anterior brain regions for the chiropractic adjustment group and more posterior regions for the sham adjustment group. Few changes were noted between the baseline and immediate post assessment, and in some instances the additional observation of the one-week time point demonstrated lack of sustained immediate post changes in the brain within the chiropractic adjustment group and the sham adjustment groups. Changes in regional brain connectivity were most noted at the one-week time point. Overall, the results of this study suggest that a single session of chiropractic can change brain patterns, that those patterns are different from an applied sham adjustment, and that the changes occur over one-week. Further, additional insight was provided into the need for more research in the development of a sham adjustment protocol that accounts for individual complex elements of the chiropractic adjustment, such as touch.