



# A COMPARISON OF MEDIAN NERVE COMPRESSION SYMPTOMS BETWEEN FIRST-YEAR AND FOURTH-YEAR KINESIOLOGY STUDENTS

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## Abstract

**A COMPARISON OF MEDIAN NERVE COMPRESSION SYMPTOMS BETWEEN FIRST-YEAR AND FOURTH-YEAR KINESIOLOGY STUDENTS**  
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**BACKGROUND** The median nerve is one of three nerves that control the intrinsic muscles of the hand. The median nerve may become compressed within the carpal tunnel of the wrist, the most common manifestation being carpal tunnel syndrome. Causes of median nerve compression (MNC) or carpal tunnel syndrome (CTS) include pathological and habitual factors. Repetition and vibration seem to be prominent work-related risk factors in the development of CTS; however, more research is needed to clarify factors causing the development of MNC and CTS.

**PURPOSE** The purpose of this study was to test first-year college students and fourth-year college students for symptoms of median nerve compression at the wrist and see if there were any significant differences.

**METHODS** Subjects were asked to complete a survey containing questions regarding physical activity, average computer use, course workload, involvement in sport activities, and injuries to their wrists. Subjects also completed the Symptom Severity Scale and Functional Status Scale which asked them to rate the severity of symptoms and the pain when subjects performed activities involving their hands and wrists. Each subject then completed a Phalen’s Maneuver and a Tinel’s test. Following the test, subjects asked if they experienced any pain, numbness, or tingling their hands or wrist. If yes, subjects were asked to mark the area of the symptom on a picture of a forearm. Measurements of wrist range of motion for each subject’s dominant wrist were taken, namely, flexion, extension, ulnar deviation, and radial deviation. Finally, grip strength was tested three times for each hand using a hand-held dynamometer. The statistical analysis used in this experiment was a standard t-test and the alpha level for significance was set at  $p \leq 0.05$ .

**RESULTS** The first-year group was composed of eight males (M: 70.0 in  $\pm$  2.56; 21.5 yrs.  $\pm$  2.9; 177.8 lbs  $\pm$  19.4) and five females (F: 66.75 in  $\pm$  1.5; 18.8 yrs.  $\pm$  1.79; 139.6 lbs  $\pm$  7.64). The fourth-year group was composed of five males (69.4 in  $\pm$  3.36; 23.4 yrs  $\pm$  3.71; 167.0 lbs  $\pm$  22.53) and nine females (64.7 in  $\pm$  2.39; 23.0 yrs  $\pm$  1.22; 145.1 lbs  $\pm$  19.72). The range of motion values for the first-year group for flexion, extension, ulnar deviation, and radial deviation were 87.7 degrees  $\pm$  20.13; 74.0 degrees  $\pm$  10.65; 29.8 degrees  $\pm$  14.77, and 11.8 degrees  $\pm$  6.56, respectively. The average range of motion values for the fourth-year group for flexion, extension, ulnar deviation, and radial deviation were 85.4 degrees  $\pm$  8.62; 73.1 degrees  $\pm$  9.20; 27.9 degrees  $\pm$  8.65, and 7.7 degrees  $\pm$  5.01 respectively. The differences between the two groups were not significant (flexion:  $p=0.69$ , extension:  $p=0.81$ , ulnar deviation:  $p=0.67$ , radial deviation:  $p=0.08$ ). The average grip strengths for the first-year group were 36.9 kg  $\pm$  8.58 for the dominant hand and 35.6 kg  $\pm$  10.14 for the non-dominant hand. The average hand grip strengths for the fourth-year group were 33.4 kg $\pm$  10.68 for the dominant hand and 30.4 kg $\pm$  9.24 for the non-dominant hand. The differences were not significant (dominant:  $p=0.35$ ; non-dominant:  $p=0.18$ ). The average SSS score, FSS score, and total SSS and FSS for the first-year group was 13.5  $\pm$  4.43; 9.2  $\pm$  2.19, and 22.7  $\pm$  5.50 respectively. The average SSS score, FSS score, and total SSS and FSS score for the fourth-year group was 11.7  $\pm$  1.33; 8.8  $\pm$  1.12, and 20.5  $\pm$  2.10 respectively. The results were not significant (SSS:  $p=0.15$ ; FSS:  $p=0.58$ ; Total:  $p=0.18$ ). Three subjects in the first-year group tested positive for Phalen’s Maneuver (n=14) and one for Tinel’s test (n=14).

**CONCLUSION** The results of this experiment indicate that although there were no significant differences between the two groups, the amount of course work taken as well as the average computer usage per day that may put an individual at risk for developing median nerve compression. More research is needed to see whether or not studying a subject that requires extensive computer or writing usage would put students at more of a risk for developing MNC.

## Background

The median nerve innervates the palm side of the thumb, as well as its base, and the first two digits (1). Originating from spinal roots C6, C7, C8, and T1, the median nerve also innervates muscles in the hand such as the pronator teres, palmaris longus, flexor carpi radialis, flexor digitorum superficialis, and others (2). However, it must pass through the carpal tunnel of the wrist. Formed by the carpal bones of the wrist, this space is a passage way for the median nerve and several flexor tendons (1). If the median nerve becomes compressed, a common manifestation of this condition is termed carpal tunnel syndrome. Carpal tunnel syndrome is caused by a variety of diseases and factors including diabetes, hypothyroidism, rheumatoid arthritis, and work-related factors (3). While there is lack of research on work-related factors causing CTS, activities involving repetition and vibration seem to be important (3). One study found that using a computer for 60 min increased both the cross-sectional area of the median nerve and its swelling ration when compared to baseline sonographic measurements (4).

## Purpose

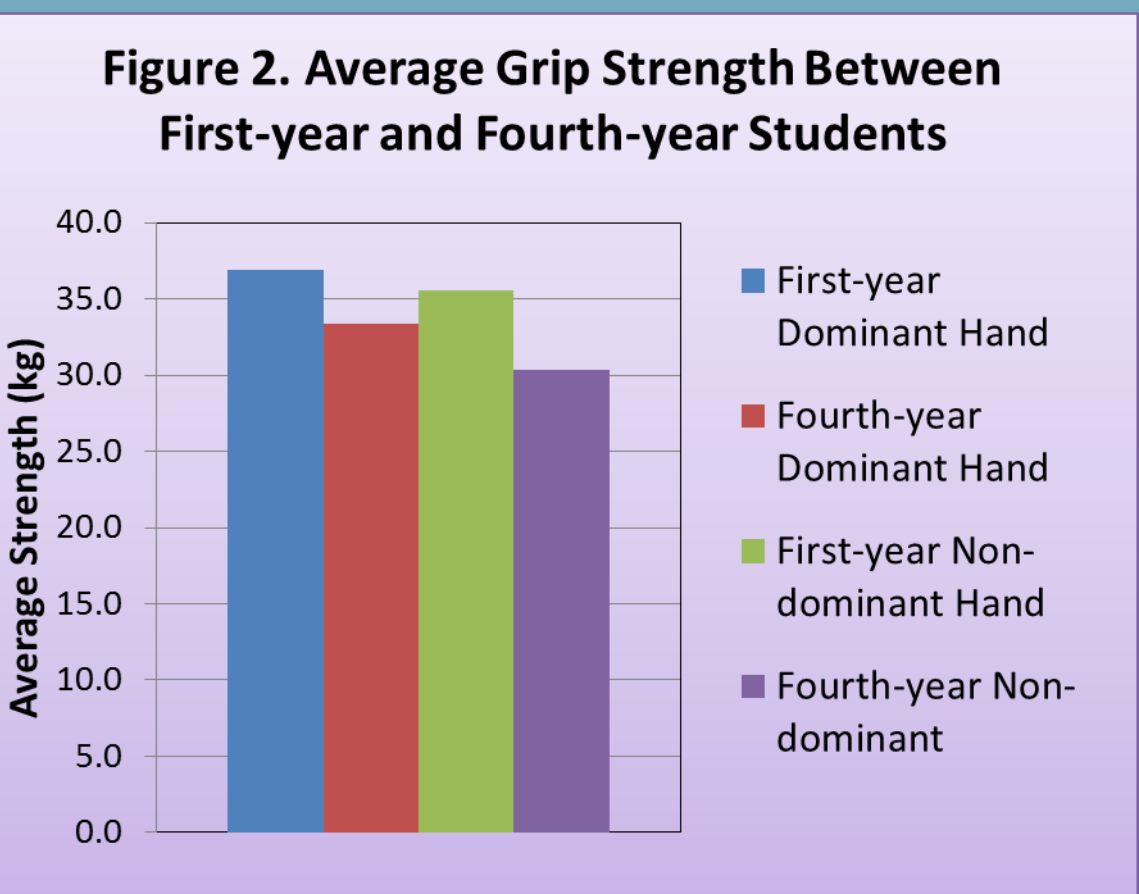
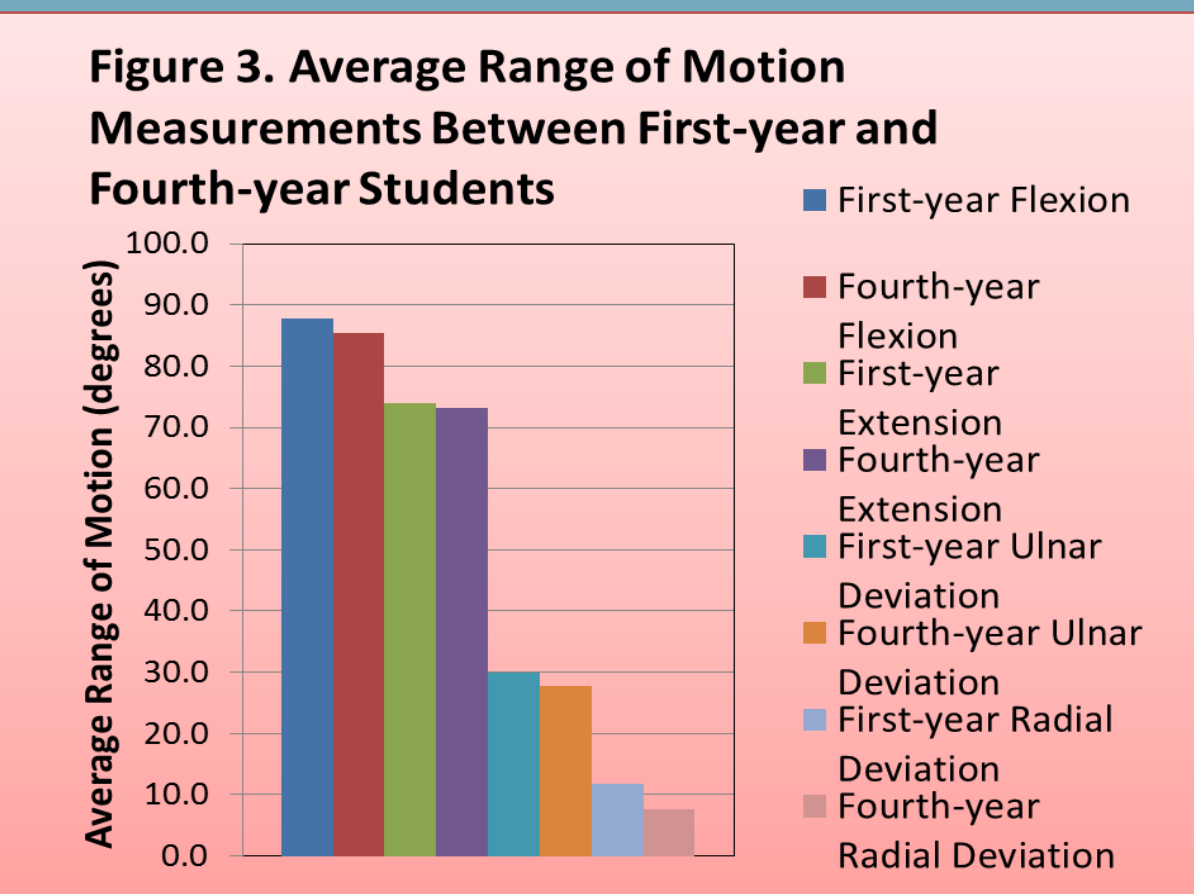
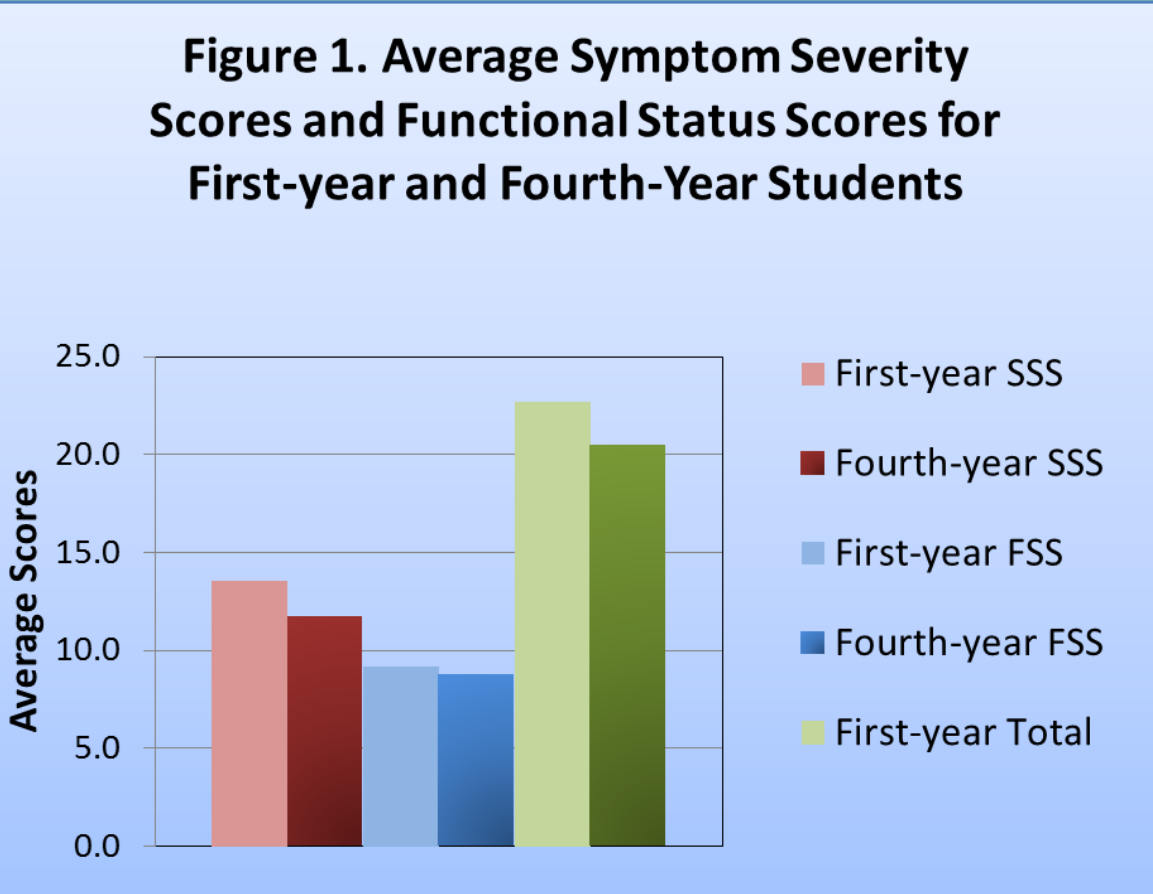
The purpose of this experiment was to test first-year kinesiology students and fourth-year kinesiology students for symptoms of median nerve compression and see if there were any differences between the two groups.

## References

## Methods

Subjects were asked to complete a survey containing questions regarding physical activity, average computer use, course workload, involvement in sport activities, and injuries to their wrists. Subjects also completed the Symptom Severity Scale, asking them to rate the severity of symptoms such as tingling, weakness, and felt in their hands and wrists, and the Functional Status Scale, asking them to rate the pain experienced in the hands and wrists when subjects performed activities involving such. Each subject then completed a Phalen’s Maneuver in which subjects were instructed to rest their elbows on a table and let their wrist fall freely into flexion for one minute without applying any forcible flexion. Following the test, subjects were assessed for pain, numbness, and tingling. Next, a Tinel’s test was performed on each subject’s dominant wrist. Subject was asked to relax his or her hand and the area over the median nerve on the wrist was taped 6 times. Subjects assessed for symptoms in the same way as outlined for the Phalen’s Maneuver. Measurements of wrist range of motion for each subject’s dominant wrist were taken, namely, flexion, extension, ulnar deviation, and radial deviation. Finally, grip strength was measured three times on each hand using a hand-held dynamometer. The statistical analysis used in this experiment was a standard t-test.

## Results



## Results (cont’d)

The average range of motion values for the fourth-year group for flexion, extension, ulnar deviation, and radial deviation were 85.4 degrees  $\pm$  8.62, 73.1 degrees  $\pm$  9.20, 27.9 degrees  $\pm$  8.65, and 7.7 degrees  $\pm$  5.01 respectively. See Figure 3. The differences between the two groups were not significant (flexion:  $p=0.69$ , extension:  $p=0.81$ , ulnar deviation:  $p=0.67$ , radial deviation:  $p=0.08$ ). The average grip strengths for the first-year group were 36.9 kg  $\pm$  8.58 for the dominant hand and 35.6 kg  $\pm$  10.14 for the non-dominant hand .The average hand grip strengths for the fourth-year group were 33.4 kg $\pm$  10.68 for the dominant hand and 30.4 kg $\pm$  9.24 for the non-dominant hand. See Figure 2. The differences were not significant (dominant:  $p=0.35$ ; non-dominant:  $p=0.18$ ) The average SSS score, FSS score, and total SSS and FSS for the first-year group was 13.5  $\pm$  4.43, 9.2  $\pm$  2.19, and 22.7  $\pm$  5.50 respectively. The average SSS score, FSS score, and total SSS and FSS score for the fourth-year group was 11.7  $\pm$  1.33, 8.8  $\pm$  1.12, and 20.5  $\pm$  2.10 respectively. See Figure 1.The results were not significant (SSS:  $p=0.15$ ; FSS:  $p=0.58$ ; Total:  $p=0.18$ ). Three subjects in the first-year group tested positive for Phalen’s Maneuver (n=13) and zero for Tinel’s test (n=13). Two subjects in the first-year group tested positive for Phalen’s Maneuver (n=14) and one for Tinel’s test (n=14). The results from the survey concerning course workload and average computer usage is presented in Table 2.

	Height (in.)	Weight (lbs.)	Age (years)
First-year Males (n=8)	70.0 $\pm$ 2.56	177.8 $\pm$ 19.40	21.5 $\pm$ 2.88
First-year Females (n=5)	66.75 $\pm$ 1.50	139.6 $\pm$ 7.64	18.8 $\pm$ 1.79
Fourth-year Males (n=5)	69.4 $\pm$ 3.36	167.0 $\pm$ 22.53	23.4 $\pm$ 3.71
Fourth-year Females (n=9)	64.7 $\pm$ 2.39	145.1 $\pm$ 19.72	23.0 $\pm$ 1.22

Table 1. Demographic Information

	Course Workload (credit hours) participants(%)	Computer Usage (hours/day) participants (%)
First-year students	1-4 2(25) 5-8 0(0) 9-12 5(38) 13+ 5(38)	0-2 4(31) 2-4 4(31) 4-6 3(23) 6-8 2(15)
Fourth-year students	1-4 1(7) 5-8 1(7) 9-12 8(57) 13+ 4(29)	0-2 6(43) 2-4 5(36) 4-6 3(21) 6-8 0(0)
First-year Averages	10.54 credit hours $\pm$ 3.76	4.46 hours/day $\pm$ 2.18
Fourth-year Averages	11.43 credit hours $\pm$ 2.47	3.57 hours/day $\pm$ 1.60

Table 2. Course Workload and Computer Usage

## Conclusions

The results of this experiment indicate that although there were no significant differences between the two groups, average course workload and computer usage need to be isolated to see their direct influences of the development of median nerve compression. Further research should include groups of students who study majors involving extensive use of the wrists.

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