ARTICLES

A RESEARCH SURVEY ON PERFORMANCE ENHANCEMENT THROUGH SPINAL MANIPULATION IN A STRENGTH ATHLETE POPULATION - A PILOT STUDY

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Objective

Spinal Manipulation has become increasingly popular as an intervention for athletes. Although progress is being made, little research or interest has looked at manipulation and its effect on strength athletes. Research shows correlations between it and positive outcomes regarding pain, range of motion (ROM), cortical drive/maximal voluntary contraction (strength), balance and proprioception (technique) and recovery. The main research question in this study was, "What is the perceived impact of SM on strength athletes?"

Methods

An international research survey was conducted for this purpose. Each of the 5 questions included in the survey was designed to measure the perceived effectiveness of SM on strength performance: recovery, technique, range of motion (ROM), pain, and strength. For each question, participants indicated their opinions about the effectiveness of SM by providing a score between 1-10. Each filled survey would be submitted out of 50, covering 5 questions, each worth 1/10.

Outcomes

All enrolled participants (n = 69; ±0.10) were 21–55; 81.2% were men, and 18.8% were women. Of the participants who responded, there was a perceived improvement in recovery (68%), lifting technique (60%), ROM (73%), and strength (59%), with an associated decrease in pain during training (78%). 95% of the sample population scored above the hypothetical mean value of 25, with 33.7 or 67.4% (95% CI: 31.2–36.3), meeting the critical value inclusion criteria of 5% (P = 0.05) with a 95% confidence interval, a margin of error of 2.6, and a standard deviation of 10.8.

Conclusion

The data indicates that there is a perceived benefit of SM on the overall performance of strength athletes based on improvements in pain modulation, ROM, technique, strength, and recovery. It's essential to recognise the need for further research to transition from subjective perceptions to objective measurements. Rigorous investigations employing quantitative assessments before and after SM interventions are necessary to provide a deeper understanding of the precise effects. Our study serves as an illuminating stepping stone, underlining the potential role and current use of SM in enhancing the performance and well-being of strength athletes.

INTRODUCTION

In recent years, spinal manipulation (SM) has become increasingly popular as an intervention for athletes worldwide.[1] As research efforts continue to elucidate the underlying mechanisms of SM, coaches and sports practitioners are increasingly equipped to harness its benefits and incorporate it into their training regimens.[1,2] While this progress represents a significant step forward,

there remains a notable lack of research and exploration into the specific impact of SM on strength athletes, including powerlifters, weightlifters, and strongman competitors.

The existing body of research has consistently demonstrated the potential correlations between SM and a range of positive outcomes, including pain management, enhanced range of motion (ROM), amplified cortical drive, maximal voluntary contraction (strength), improved balance, heightened proprioception (technique), and expedited recovery.[3-11] These findings, while promising, have predominantly focused on the general population and athletes as a broad category, leaving strength athletes in a relative research void.

The imperative to delve deeper into the effects of SM on strength athletes arises from the pressing need to advance our understanding in this underexplored domain. Despite the substantial benefits SM has exhibited for athletes in general, there remains a paucity of empirical evidence dedicated specifically to the unique training demands and performance nuances of strength athletes.

To provide insight into whether strength athletes have had positive outcomes from SM, we conducted a research survey. Our survey aimed to gather data on the perceived efficacy of SM in enhancing the performance of strength athletes. Leveraging an opportunistic sampling strategy, we collected and analysed data in an effort to gain new insights into the possible benefits of SM for strength athletes.

METHOD

A 5-question cross-sectional survey was designed and posted on the hosting website www.ownsurvey.com.[12] Each question was worth 10 marks (out of 50 marks total). 69 participants completed the survey, resulting in 69 data sets being analysed using Microsoft Excel via inductive quantitative methods (t-test and p-value). Each question was designed to cover the impact SM has on pain modulation, range of motion (ROM), technique, strength, and recovery.

5 Key Questions

1. Has spinal manipulation (chiropractic adjustments) improved your recovery? (1-10)
2. Has spinal manipulation (chiropractic adjustments) improved your lifting technique? (1-10)
3. Has spinal manipulation (chiropractic adjustments) improved your Range of Motion? (1-10)
4. Has spinal manipulation (chiropractic adjustments) reduced your pain or training discomfort? (1-10)
5. Has spinal manipulation (chiropractic adjustments) improved your strength? (1-10)

The Research Question/Question Calculations

Research Question: What is the perceived impact of SM on strength athletes?

Each question in the survey was marked from 1 to 10 as follows:

- 1 (not at all)–10 (yes, very much so)
- Five questions in total, each representing 10 marks (10 = SM works, 0 = does not work)

Each of the 5 questions was worth 10 marks out of 50. The total marks out of 50 represent how well that respondent felt SM worked for that individual athlete. In order to determine the perceived efficacy of SM, the sample mean must be higher than the score of 25/50 = 0.5. In other words, the sample group needed to score 25/50 or greater (50% or higher) and be within the 5% probability value to ensure statistically valid results. This means 95% of the sample population must score a mean higher than 25 (>50%) in the survey, meeting the critical value inclusion criteria of 5% (P = 0.05), therefore qualifying the results as statistically significant.

Sampling Process

The survey was designed on www.ownsurvey.com and posted online (primarily on social media platforms Facebook and Instagram). The survey received the majority of attention via Instagram, where it was shared on various profiles. The survey was advertised as open to all who wanted to participate if they fit the criteria required. This resulted in an opportunistic or convenience sample collection.

The inclusion criteria are given below.

1. Male or Female
2. 18-60 years old
3. Has competed in powerlifting, weightlifting, or strongman or follows a strength-based training regime
4. Has had SM or been under chiropractic care during this time

Data Analysis

Microsoft Excel and OwnSurvey.com[12] were used with inductive quantitative methods (t-test and p-value). To facilitate data evaluation, descriptive statistical analysis was also conducted to provide metrics such as mean, mode, median, minimum, maximum, range, sample variance, skewness, sum, count, standard deviation, confidence interval, population, sample mean, mean difference, and various graphs.

t-Test and descriptive analysis:	
	Variable 1
Mean	33.72463768
Variance	118.4083546
Observations	69
Hypothesized Mean Difference	25
t Stat	.6.660100347
P-value	< .00001.
Standard Error	1.30998592
Median	34
Mode	50
Standard Deviation	10.8815603
Sample Variance	118.4083546
Kurtosis	-0.665179654
Skewness	-0.313578827
Range	45
Minimum	5
Maximum	50
Sum	2327
CI:	33.72463768 **± 2.57 (31.2 to 36.3)**
Confidence Level (95.0%)	2.614036204

Table 1. T-test and descriptive statistics

RESULTS

All enrolled participants (n = 69) were aged 21–55, of which 81.2% were men and 18.8% were women. SM was perceived as effective, with 95% of the sample population scoring above the hypothetical mean value of 25, with 33.7 or 67.4% (95% CI: 31.2–36.3). This met the critical value inclusion criteria of 5% (P = 0.05). The results were significant, with a confidence interval of 95%, a 10.8 standard deviation and a 2.6 margin of error.

Each question was designed to measure the perceived effectiveness of SM on strength performance. Five questions were selected to cover the most prominent results in the literature: recovery, technique, ROM, pain, and strength. Each answer was assigned a value of 1–10 to determine the participant's perception of improvement in a particular factor after SM, with the value weighed against a possible total of 50. For graphing convenience, these values were then converted to percentages.

The questions and results are given below.

Does SM improve recovery: 68% (mean of 6.8/10)

Does SM improve the lifting technique: 60% (mean of 6/10)

Does SM improve ROM 73% (mean of 7.3/10)

Does SM decrease pain: 78% (mean of 7.8/10)

Does SM improve strength: 59% (mean of 5.9/10)

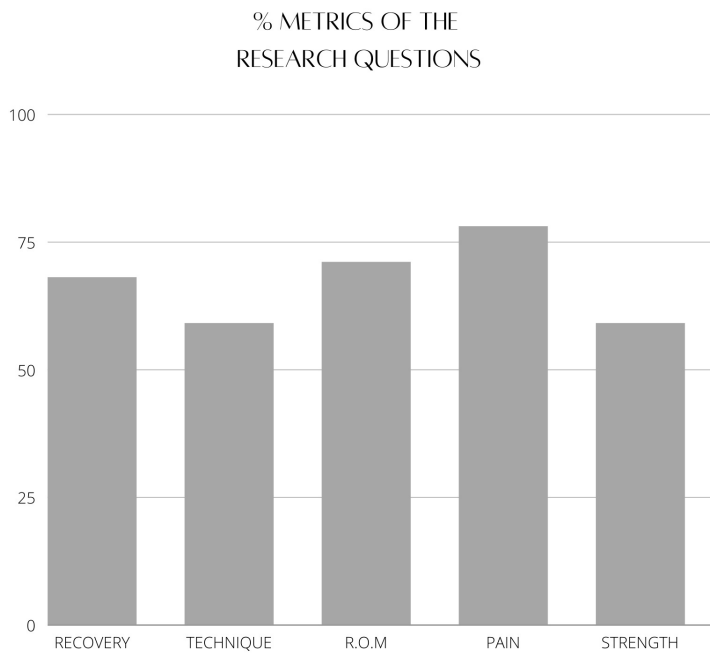

Figure 1. Research question percentages (original image)

DISCUSSION

The performance scores of each question were also evaluated independently. The highest-scoring question was whether SM helped reduce pain, which received a resounding "yes" with a mean of 7.8/10 (95% CI 6.55–9.05). Notably, the highest score was 10/10, which was 30.4% of the 69 sets of data received. This clearly indicates that athletes strongly perceived this effect and will likely use SM for pain mitigation. These findings are consistent with other published literature, showing SM to be an effective treatment for chronic pain,[13] lower back pain,[14] neck pain,[15,16] and headache.[17] In fact, a 2001 systematic review of 9 trials and over 600 patients showed cervical manipulation to be very effective at treating chronic headaches, even better than massage and some medications.[17] Furthermore, a 2012 meta-analysis reported the positive effects of SM on one's perception and regulation of pain.[18] The various neurophysiological complexities of SM were then further explored via a review in 2019.[2,18]

The remaining rankings were in the order of ROM at 7.3/10 (95% CI 5.82–8.76), recovery at 6.8/10 (95% CI 5.21–8.47), technique at 6/10 (95% CI 4.28–7.74), and strength at 5.9/10 (95% CI 4.23–7.71).

These results are plausible based on the existing literature. SM has been reported to improve ROM.[19,20] A 2006 study showed a greater increase in ROM and a decrease in pain following chiropractic manual therapy and heat treatment as opposed to heat treatment alone in patients with osteoarthritis.[21] Further, SM has been shown to improve cortical drive and force output,[8,9,22] proprioception, body awareness and alter sensory-motor integration.[23,24]

Figure 2. The research question results in percentages (original image).

Limitations

It's important to note that the choices regarding sample size (n=69), confidence Interval (CI), and margin of error were tailored to the scope of this pilot study, setting the stage for future research endeavours. Furthermore, it's vital to acknowledge that our study relied on subjective survey responses without objective measurements. This reliance introduces the potential for heavy bias, as various factors can influence participant perceptions and self-reported experiences. Despite these limitations, our study serves as an important initial exploration into the effects of Spinal Manipulation on strength athletes, providing valuable insights for future, more comprehensive investigations.

Consent And Ethical Approval

Before taking the survey, the participants were required to sign a consent form to ensure they were at least 18 years of age and understood the details of the study. Each participant gave their consent before participating in this study. All information was kept strictly confidential and private.

Ethical approval was granted by the **SUSL faculty** of the **Natural Health Sciences Research and Ethical Review Committee (RERC)**. All guidelines stipulated by the **SUSL RERC** were strictly adhered to. Participant privacy was prioritised, and confidentiality of information was maintained while the prerequisite of participant consent was achieved.

CONCLUSION

While numerous studies have delved into the impact of SM on the general population, there is a lack of knowledge regarding its role in the context of strength athletes. Our survey has unveiled insights into the perceived benefits of SM among strength athletes. Notably, we have observed self-reported improvements across various facets, including recovery, technique, ROM, pain management, and strength enhancement. These findings collectively suggest the prevalent use and perceived benefit of SM on strength athletes.

However, it's essential to recognise the need for further research to transition from subjective perceptions to objective measurements. Rigorous investigations employing quantitative assessments before and after SM interventions are necessary to provide a deeper understanding of the precise

effects. Despite this imperative for future inquiry, our current study serves as an illuminating stepping stone, underlining the potential role and current use of SM in enhancing the performance and well-being of strength athletes.

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REFERENCES

1. Lin AFC, Piong SZ, Wan WM, et al. Unlocking athletic potential: the integration of chiropractic care into the sports industry and its impact on the performance and health of athletes and economic growth in China and Hong Kong. *Cureus*. 2023;Apr 5.

2. Gyer G, Michael J, Inklebarger J, Tedla JS. Spinal manipulation therapy: is it all about the brain? A current review of the neurophysiological effects of manipulation. *J Integrative Med*. 2019;17(5):328-337. doi:10.1016/j.joim.2019.05.004

3. Williams B, Redmon S. The effects of extremity manipulation on plantar fascia pain: a case report. *J Contemporary Chiropr*. 2023;6:88-91.

4. Buffamonte M, Kellner M, DiMond M. Rehabilitative principles in the management of hip pain in mma patient: a case report. *J Contemporary Chiropr*. 2021;4:12-16.

5. de Zoete A, Rubinstein SM, de Boer MR, et al. The effect of spinal manipulative therapy on pain relief and function in patients with chronic low back pain: an individual participant data meta-analysis. *Physiother*. 2021112:121-134.

6. Remsburg J. Chiropractic and mckenzie method assessment and treatment of a patient with a shoulder derangement mimicking adhesive capsulitis. *J Contemporary Chiropr*. 2019;2:54-59.

7. Cross KM, Kuenze C, Grindstaff T, Hertel J. Thoracic spine thrust manipulation improves pain, range of motion, and self-reported function in patients with mechanical neck pain: a systematic review. *J Orthop Sports Phys Ther*. 2011;41(9):633-642. doi:10.2519/jospt.2011.3670

8. Navid MS, Niazi IK, Lelic D, et al. chiropractic spinal adjustment increases the cortical drive to the lower limb muscle in chronic stroke patients. *Front Neurol*. 2022;12. doi:10.3389/fneur.2021.747261

9. Holt K, Niazi IK, Nedergaard RW, et al. The effects of a single session of chiropractic care on strength, cortical drive, and spinal excitability in stroke patients. *Sci Rep*. 2019;9(1). doi:10.1038/s41598-019-39577-5

10. Yang J, Lee B, Kim C. Changes in proprioception and pain in patients with neck pain after upper thoracic manipulation. *J Phys Ther Sci*. 2015;27(3):795-798. doi:10.1589/jpts.27.795

11. Haavik H, Murphy B. Subclinical neck pain and the effects of cervical manipulation on elbow joint position sense. *J Manipulative Physiol Ther*. 2011;34(2):88-97. doi:10.1016/j.jmpt.2010.12.009

12. OwnSurvey. Create your own survey. Published 2023. https://www.ownsurvey.com/

13. Descarreaux M, Blouin JS, Drolet M, Papadimitriou S, Teasdale N. Efficacy of preventive spinal manipulation for chronic low-back pain and related disabilities: a preliminary study. *J Manipulative Physiol Ther*. 2004;27(8):509-514. doi:10.1016/j.jmpt.2004.08.003

14. Manga P, Angus DE, Swan WR. Effective management of low back pain: it's time to accept the evidence. *J Canadian Chiropr Assoc*. 1993;37(4):221-229.

15. Chaibi A, Stavem K, Russell MB. Spinal manipulative therapy for acute neck pain: a systematic review and meta-analysis of randomised controlled trials. *J Clin Med*. 2021;10(21):5011. doi:10.3390/jcm10215011

16. Hays RD, Sherbourne CD, Spritzer KL, et al. Experiences with chiropractic care for patients with low back or neck pain. *J Patient Experience*. 2019;7(3):357-364. doi:10.1177/2374373519846022

17. Bronfort G, Assendelft WJJ, Evans R, Haas M, Bouter L. Efficacy of spinal manipulation for chronic headache: a systematic review. *J Manipulative Physiol Ther*. 2001;24(7):457-466. doi:10.1016/s0161-4754(01)99423-0

18. Coronado RA, Gay CW, Bialosky JE, Carnaby GD, Bishop MD, George SZ. Changes in pain sensitivity following spinal manipulation: a systematic review and meta-analysis. *J Electromyography Kinesiol*. 2012;22(5):752-767. doi:10.1016/j.jelekin.2011.12.013

19. Whittingham W, Nilsson N. Active range of motion in the cervical spine increases after spinal manipulation (toggle recoil). *J Manipulative Physiol Ther*. 2001;24(9):552-555. doi:10.1067/mmt.2001.118979

20. Sandell J, Palmgren PJ, Björndahl L. Effect of chiropractic treatment on hip extension ability and running velocity among young male running athletes. *J Chiropr Med*. 2008;7(2):39-47. doi:10.1016/j.jcme.2008.02.003

21. Beyerman KL, Palmerino MB, Zohn LE, Kane GM, Foster KA. Efficacy of treating low back pain and dysfunction secondary to osteoarthritis: chiropractic care compared with moist heat alone. *J Manipulative Physiol Ther*. 2006;29(2):107-114. doi:10.1016/j.jmpt.2005.10.005

22. Christiansen TL, Niazi IK, Holt K, et al. The effects of a single session of spinal manipulation on strength and cortical drive in athletes. *Eur J Appl Physiol*. 2018;118(4):737-749. doi:10.1007/s00421-018-3799-x

23. Yang J, Lee B, Kim C. Changes in proprioception and pain in patients with neck pain after upper thoracic manipulation. *J Phys Ther Sci*. 2015;27(3):795-798.

24. Haavik-Taylor H, Murphy B. Cervical spine manipulation alters sensorimotor integration: A somatosensory evoked potential study. *Clin Neurophysiol*. 2007;118(2):391-402. doi:10.1016/j.clinph.2006.09.014