In response to: Cook C. How about a little love for non-thrust manipulation?

Preface – Chad Cook

I'd like to thank James Dunning, Anita Gross, Charlie Goldsmith, Toby Hall, Ken Olson, Valerie Phelps, Philip Sizer Jr, and Jean-Michel Brismée, for contributing their invited responses to my recent editorial titled 'How about a little love for non-thrust manipulation'. I invited these individuals because I

appreciate their contributions toward policy, evidence, and teaching, and desired to fully represent multiple viewpoints. As you can see by the responses, thoughts regarding the continued debate of thrust versus non-thrust are as polarizing as ever, and based on these responses, one can see that one answer does not fully cover all the questions on this issue.

How about an honorable mention for cervical and thoracic thrust manipulation?

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In the editorial titled 'How about a little love for non-thrust manipulation?', Cook¹ states, 'thrust manipulation is useful when used on the proper candidate...' However, of the two recent clinical prediction rules (CPRs)²⁻⁵ that were developed in an attempt to guide treatment selection for patients with neck pain, one has yet to be validated and only identifies those patients with neck pain likely to benefit from cervical traction,⁵ and the other attempted to identify those patients with neck pain likely to benefit from thoracic manipulation and a general cervical range of motion exercise but was shown to not be valid in a follow-up clinical trial.^{2,4} That is, neither CPR^{2,4,5} guides the selection of thrust manipulation or non-thrust mobilization to the cervical spine in patients with mechanical neck pain. I am not sure what criteria Cook¹ is using to identify who is the 'proper candidate'¹ for cervical manipulation or mobilization, but I would like to hear them.

Similarly, in an independent evaluation ($n=239$) of the ever popular lumbopelvic CPR,^{6,7} Hancock *et al.*,⁸ concluded that even when using all five of five items, the CPR^{6,7} performed no better than chance in identifying those patients with acute, non-specific LBP

most likely to respond to spinal manipulative therapy. Moreover, after appraising 25 unique CPRs for the physiotherapy management of LBP, Haskins *et al.*,⁹ recently concluded, 'the current body of evidence does not enable confident direct clinical application of any of the identified CPRs'. Thus, although Cook¹ claims to be able to identify who will respond to manipulation and/or mobilization, it appears that the 'proper candidate'¹ for neck, thoracic, or lumbopelvic manipulation or mobilization has yet to be determined.^{4,8,9}

Cook¹ states, 'there is no difference in outcomes between thrust and non-thrust manipulation' and cites Leaver *et al.*,¹⁰ as the only supporting reference for this statement. However, there have been three peer-reviewed randomized controlled trials (RCTs)¹⁰⁻¹² in the past decade that have investigated the efficacy of cervical thrust manipulation compared with cervical non-thrust mobilization in patients with neck pain. In the most recent, Dunning *et al.*,¹¹ demonstrated that patients with mechanical neck pain ($n=107$) who received the combination of upper cervical and upper thoracic thrust manipulation experienced greater reduction in pain and disability, had greater improvement in passive C1-2 rotation range of motion, and had greater increases in motor performance of the deep cervical flexor muscles as compared to the group that received non-thrust mobilization at a 48-hour follow-up. That is, in the short-term, superior

biomechanical and neurophysiological effects were found favoring the thrust manipulation group; furthermore, the inclusion of seven treating physical therapists from seven private and hospital clinics in six different geographical states likely enhances the overall generalizability of the results.

Our results are contradictory to the findings of the two other studies^{10,12} in the past decade that compared cervical thrust manipulation with cervical non-thrust mobilization in patients with neck pain. However, in the Leaver *et al.*,¹⁰ trial, an undisclosed number of subjects in the cervical non-thrust mobilization group also received thoracic and/or lumbar thrust manipulation; in addition, randomization occurred after several conservative treatment sessions had already been completed or failed, and it is not known whether any subject actually received thrust manipulation to the upper cervical spine as no description of the particular manipulation or mobilization techniques, dosages, or targeted vertebral levels is given by Leaver *et al.*¹⁰ Likewise, an undisclosed proportion of patients in the study by Hurwitz *et al.*¹² did not actually receive thrust manipulation or non-thrust mobilization to the cervical spine, but instead received thrust manipulation or mobilization to the thoracic spine; moreover, ‘two-thirds’ of the patients had concomitant headaches and ‘many’ had neck pain of radiculopathic origin.¹² Nevertheless, using one level of evidence¹³ down from ‘god’, the most recent systematic review¹⁴ still concluded that there is ‘moderate to low quality evidence that cervical thrust manipulation produces no difference in pain, disability, or patient satisfaction when compared to cervical non-thrust mobilization for subacute or chronic neck pain at short-term follow-up’.¹⁴

The Dunning *et al.*,¹¹ results are in agreement with several other studies^{3,15–18} that found thoracic thrust manipulation to be more effective in the short and long-term than thoracic non-thrust mobilization in patients with neck pain. Therefore, considering the evidence over the past 5 years, and as far as the cervical and thoracic spines are concerned, the statement by Cook¹ that ‘there is no difference in outcomes between thrust and non-thrust’ should be viewed cautiously or further qualified to exclude the cervical and thoracic spines. Therefore, if we give a ‘little love to non-thrust [mobilization]’,¹ it would seem only fair to give an ‘honorable mention’ to cervical and thoracic thrust manipulation, at least for ‘their’ short-term outcomes.^{3,11,15–17}

Cook¹ states ‘... when non-thrust mobilization is performed similarly to how it is designed to be used in clinical practice, by those with skilled hands, it is as useful a technique as thrust manipulation’. The idea that certain kinds or brands of mobilization are superior to other brands of mobilization is not well

supported.¹⁴ In addition, there is no high quality evidence to date to suggest that longer durations of non-thrust mobilization result in greater pain reduction than shorter durations or dosages of non-thrust mobilization.^{14,19} Moreover, Moss *et al.*,¹⁹ found 9 minutes (three sets of 3 minutes) of Grade III tibiofemoral anterior–posterior non-thrust mobilizations had the same effect on clinical measures of pain as did 9 minutes of manual contact. Therefore, in clinical trials, a ‘contact’, or ‘attention effect’ would likely occur if the total contact time of the non-thrust mobilization procedures exceeded the total contact time of the thrust manipulation procedures. Thus, in brief, this is the reason why we¹¹ limited the dosage of the non-thrust mobilizations to three sets of Grade IV unilateral and central PA oscillations; furthermore, this may be why other studies have also chosen to use smaller mobilization dosages.^{3,16,17}

Two years ago, in the British Medical Journal, Glasziou *et al.*,²⁰ reported, ‘The results of thousands of trials are never acted on because their published reports do not describe the interventions in enough detail.’ Furthermore, a review of 80 studies selected for the journal Evidence Based Medicine, as both valid and important for clinical practice, found that clinicians could replicate the intervention in only half of the studies.²¹ More specifically, in his paper titled ‘Taking healthcare interventions from trial to practice’, Glasziou *et al.*,²⁰ states ‘the methods section in a protocol should provide a description of the intervention(s) that is sufficiently detailed to enable people with appropriate expertise to reproduce them ... including the dose (intensity, frequency and duration)...’. The 2010 update of the CONSORT statement^{22–25} requires authors to describe ‘the interventions for each group with sufficient details to allow replication, including how and when they were actually administered’.²⁵ Leaving selection of the particular technique, grade, target vertebral level, and dosage to the ‘discretion’, ‘reasoning’ or ‘judgment’ of each therapist, at each site, and on each patient, assuredly makes replication of the trial almost impossible.^{20–22} Additionally, a recent meta-analysis²⁶ concluded that manual therapy trials ‘do not show a greater therapeutic effect when participating clinicians have discretion regarding treatment selection’; and they actually found standardizing manual therapy interventions, rather than allowing clinicians the choice of technique and dosage, was shown to give superior outcomes in pain and disability in the short-term.²⁶ Thus, since our study¹¹ was short-term in nature, and in an effort to maximize the outcomes of both groups and comply with the CONSORT guidelines,^{22–25,27} we standardized the interventions of both treatment arms.

Let's be honest here, are the elite name branded manual therapists 'with skilled hands'¹ really mobilizing in clinical practice in a vastly different way than what is operationalized in the existing clinical trials? Cook¹ seems to suggest so. It seems all so convenient and too easy to say, 'well they didn't use the same kind or amount of mobilizations as I use in my practice', or better yet, 'they didn't 'reassess'¹ or get 'patient feedback'¹ after each set of mobilizations. Had they 'reassessed', got 'patient feedback' or used a different kind of mobilization, the results would have been different. I don't think so. At this point, the literature appears to be conclusive in favoring thoracic thrust manipulation over thoracic non-thrust mobilization,^{3,15-18} furthermore, and more recently, at least in the short-term, cervical thrust manipulation appears to have gained some ground over cervical non-thrust mobilization for the treatment of mechanical neck pain.¹¹

Lastly, thrust manipulation and non-thrust mobilization are different procedures and certainly require different technical skill sets; that is, being 'good at' one doesn't seem to make you 'good at' the other. Furthermore, in my opinion, using the terms mobilization and manipulation synonymously or interchangeably, as our national professional association currently recommends,²⁸ is likely confusing to patients, practitioners and third party payers. It is of interest to note, in 1999, the first Guide to Physical Therapist Practice²⁹ defined manipulation and mobilization as two dichotomous procedures and provided a separate definition for each; however, in 2001,²⁸ the APTA, AAOMPT and Orthopaedic Section equated 'mobilization' with 'manipulation' (i.e. made them synonymous terms) and defined both as 'a manual therapy technique comprised of a continuum of skilled passive movements to joints and/or related soft tissues that are applied at varying speeds and amplitudes, including a small amplitude high velocity therapeutic movement'.²⁸ In my opinion, the assumption that thrust manipulation and non-thrust mobilization are a single construct is reductionist and artificially lumps two very different procedures and technical skill sets under one heading. Furthermore, in the Guide to Physical Therapist Practice,²⁸ I believe the APTA should consider replacing the word 'movement' with 'thrust', and make mention that the 'audible popping' sound may be produced during manipulation. If our national professional association is unwilling to explicitly define spinal manipulation for us, then other professional organizations and/or legal entities will define it for us — indeed two such examples of this are the Tennessee and Nebraska Attorney General opinions on 'spinal manipulation', in 2007 and 2009 respectively. Furthermore, a third example

of such was the recent 2012 ruling on 'spinal manipulation' by the Supreme Court of Alabama in the Alabama State Board of Chiropractic v Dunning case.

Most physical therapists, osteopaths, and chiropractors alike would agree that the word mobilization first brings to mind images of repeated stretching and oscillating; whereas, manipulation first brings to mind images of popping and cracking — that might be face validity? The practitioners, patients, referring physicians, journal articles, APTA, AAOMPT, Orthopaedic Section, entry-level and post-graduate DPT programs, and the Internet all need to speak the same language. Let's call it what it is and quit beating around the bush with terms such as Grade V passive mobilization (instead of spinal manipulation) or non-thrust manipulation (instead of spinal mobilization) that have little meaning to the public or across professions.

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Consider trial design: an essential element for future comparison trials in manual therapy

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We would agree that fostering better comparative research is essential for moving research forward in manual therapy. When seeking the treatment with optimal overall efficiency, directly comparing available treatments will become increasingly important. First determination of adequately dosed manual therapies will require dosage trials. While certain manual therapies are effective in managing neck pain, the effects are small or moderate and the optimal dosage remains unknown. Factorial designs will allow simultaneous evaluation of the effect of treatment factors such as duration (i.e. number of weeks) and frequency (i.e. number of sessions per week) of treatment, as well as their interactions with each other within a multimodal framework.¹ That is, it is clear from current systematic reviews that best practice will include exercise plus manual therapy² and limited evidence that either manipulation or mobilization work as a stand-alone treatment.³

Second, head to head comparison of adequately dosed and proven manual therapies will require non-inferiority or equivalence testing. Non-inferiority is used when referring to a one-sided trial design, while

equivalence is referring to two-sided trial design. This will allow for comparative assessment of manual therapies with similar primary outcomes but potentially important advantages in secondary outcomes, convenience (attend PT × 1/week versus × 3/week), safety, and costs. These trials require particular planning and analysis.^{4,5} For non-inferiority trials, a margin must be smaller than or equal to the smallest primary outcome value that represents a clinically meaningful difference or the largest value for the primary outcome that denotes a clinically meaningless difference.⁶ This threshold or margin must be defined before beginning the trial. In other words, the margin in the primary outcome below which it would be considered that one new manual therapy treatment is inferior to the older one. It is founded both on statistical and clinical judgment. Typically comparative trials are based on superiority testing; in trials where two viable and effective manual therapies are being compared, superiority will become more difficult to show as the degree of improvement becomes clinically small. Pitfalls and problems related to these three methods are discussed elsewhere.⁷ Without using

such trial designs, the results can be highly misleading with claims of equivalence or non-inferiority, even though their results are inconclusive.⁸

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I applaud Professor Chad Cook for his editorial regarding non-thrust manipulation in this issue.¹ I agree with his comments regarding the importance of these techniques in the management of musculoskeletal disorders. Manipulation is one form of manual therapy that has a valuable place in the management of a range of disorders that we see in the clinic, but it is not a panacea. In general, non-thrust manipulation is the poor cousin of manipulation when it comes to research,² but based on the studies available there is little difference in outcome between the two forms of treatment, at least for low back pain.³ So why would you choose non-thrust manipulation?

Manipulation is fundamentally a more aggressive form of treatment than non-thrust manipulation. In contrast to non-thrust manipulation, manipulation is not under the control of the patient, is closer to the anatomical barrier, and requires a high velocity.⁴ Consequently, for at risk patients and vulnerable areas such as the cervical spine, there is a perception of greater risk of serious side effects associated with cervical manipulation.⁵ Furthermore, there is some evidence of higher risk for cervical manipulation,⁶ although the comparative risk has not been thoroughly investigated.

More and more research evidence is demonstrating that musculoskeletal disorders are multi-dimensional complex problems, which require customized treatments, rather than a one-size fits all approach.⁷ Non-thrust manipulation has a much greater potential for variation to comply with this diversity than manipulation. Mobilization with movement is one variant, which has received increasing research attention⁸ and is used widely in clinical practice.⁹ Not only is this form of treatment completely under the control of the patient, it is pain-free, and can in most cases be applied by the patient as a home exercise. Try replicating a cervical, thoracic, or lumbar manipulation technique as a home exercise!

The purpose of this commentary is not to criticize manipulation or those that use it, but to recognize the equal importance of non-thrust techniques. There are patients where manipulation is highly suited (based on clinical prediction rules or research evidence), but there are many others where these techniques are not appropriate and non-thrust manipulation is a good choice. Both forms of therapy have a place to play in the management of musculoskeletal disorders, and we would do well to further investigate all forms of manual therapy.

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I want to commend Dr Chad Cook for his editorial 'How about a little love for non-thrust manipulation?' The editorial has caused me to reflect on how I

teach manipulation and to consider if my teaching lines up properly with how I practice. Likewise, as clinicians, we must also continually assess if our clinical practice is supported with evidence in the literature.

I tend to consider manipulation on a continuum from non-thrust to thrust in my clinical practice and realize that there are many ways to vary the direction, velocity, point of contact, and force to achieve therapeutic goals. Although, Dr Cook touched on the importance of ‘reassessment and clinical reasoning’, it seems that the importance of the clinical examination, clinical reasoning, and re-examination tends to get lost in debates surrounding issues of which technique is most effective.

Although research studies may assist in predicting which patients will tend to respond to certain thrust manipulation techniques, it is rarely so simple because the majority of the patients we see daily in the clinic do not fit into the inclusion/exclusion criteria used in these studies, and many patients have comorbidities that will tend to delay their recovery.¹

The most important component of the patient/therapist interaction is the examination and clinical reasoning. Physical therapists must strive to use tests and measures with known reliability and validity to categorize the patient’s impairment based condition in a manner that assists in management of the patient’s condition. When a patient’s primary impairments are hypomobility and/or pain with movement and physical therapists use a variety of thrust and non-thrust manipulation techniques combined with specific therapeutic exercises to address the impairments, quality research studies have demonstrated effectiveness in treating both spinal and extremity conditions.²⁻⁴

When using an impairment-based model, the physical therapist should cue in on the findings in that patient that can be used to assess and re-assess the patient’s mobility and pain with mobility. After application of manual therapy techniques, a reassessment of the key findings should be completed. If no change has been elicited, the manual therapy intervention should be modified in the key parameters of direction, velocity, point of contact, and/or force as further feedback is sought from the patient. Further re-assessment must then be completed to determine effectiveness. The key to effective outcomes is dependent on the clinical decision making and modification of manual therapy techniques based on the patient response.

The goal of the intervention is to make a positive change in mobility and pain at each treatment session. There is evidence that intra-treatment changes will enhance patient outcomes.⁵ This goal can be attained with both thrust and non-thrust

techniques when applied with care, skill, and ongoing feedback and attention to the patient’s signs and symptoms. To blindly apply an intervention without attention to patient response, borders on malpractice.

I want to encourage my physical therapy colleagues who wish to effectively practice manual physical therapy to strive to work with a mentor (such as in a manual therapy fellowship program) who can provide quality instruction and feedback not only on the application of thrust and non-thrust techniques, but who can guide development in patient examination and clinical decision making skills.

Thank you for the opportunity to express my opinion on this issue, and I hope that our profession will realize that there are no easy answers to the treatment of complex musculoskeletal conditions and that we all must continue to strive to enhance our clinical reasoning skills and manual handling skills if we are to provide the best possible care for our patients and advance our profession.

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We want to commend Dr Cook for addressing this long-standing argument over the superiority of thrust versus non-thrust manipulation in the management of musculoskeletal patients. As Dr Cook suggests, thrust manipulative techniques simply are tools that should not be deified, considering them more important than the other tools in the toolset used to progress patients toward healing and well-being. Any manual therapy strategy, whether thrust or non-thrust in nature, is only as good as the education and exercise that accompany it. Sound clinical reasoning should be utilized for selecting the manual

therapy strategy that best complements other relevant management choices in context with careful consideration for the patient's biopsychosocial factors and challenges.^{1,2}

Contemporary evidence should support a clinician's judgment, clinical decisions and management choices rather than confine them. Dr Cook eloquently reflected on the findings in the literature that suggest comparable outcomes and values for thrust versus non-thrust strategies.^{3,4} This relative equivalence frees up the clinician from the burden of seeking out a manual therapy silver bullet for maximizing patient outcomes. Additionally, it allows the clinician to execute a patient-centered approach to management, instead of centering the management decisions on a handful of study outcomes that support one strategy over another. Such a patient-centered approach allows the clinician to consider each patient's mechanical, neurophysiological and biopsychosocial needs when selected manual therapy strategies throughout the patient's recovery course.⁵

For example, if the clinician's goals include remodeling a tissue dysfunction, then perhaps they may select a non-thrust strategy in order to provide prolonged input into the tissue to achieve a creep and or hysteresis response.⁶ This could especially serve the clinician when the patient has experienced prolonged symptoms, as more time has passed to potentially allow greater tissue dysfunction to develop. Additionally, such a non-thrust decision could serve as a platform for the education and augmented exercise that follow, allowing the patient to experience a consistent prolonged input in to the dysfunctional tissue and patient confidence in the clinician's choice.^{7,8}

The decision to implement a non-thrust strategy should include a consideration for the patient's neurophysiological status as well. Selected patients, especially those experiencing prolonged symptoms and sensitization, may have such severe symptoms and accompanying apprehension that they may not tolerate thrust-manipulation. While thrust manipulation is gentle and should carry no greater challenge to the patient versus a non-thrust counterpart, some patients simply may not tolerate it.⁹ Thus, a non-thrust strategy may be equally as valuable and better suited for reducing symptoms and optimizing the

patient's confidence in the clinician's judgment and choice to use such a strategy.

It is a great era to serve patients as manual physical therapists, where expertise is not simply defined by a clinician's ability to perfect the execution of a technically demanding technique. Rather, expertise can be measured by the clinician's ability to optimally select the best manual therapy strategy for each patient in context with, and consideration for, the complexity of variables that the patient encounters. Thus, a clinician's role as a manual physical therapist should not be limited to only using thrust manipulation because of its perceived technical prowess. Rather, the clinician's management decisions should embrace the use of every plausible manual therapy strategy that is available in context with a balance between sound clinical reasoning and contemporary evidence. Executing such a patient-centered approach can increase both clinician and patient confidence in the clinician's ability to render effective care and the patient's capacity to recover.

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