A Massage Therapist's Guide to Pathology, 4e

Appendix B
Research Literacy, Research Capacity

"But We've Always Done it This Way"

Many people who were educated in massage therapy more than a few years ago learned about its physiological effects through revered but seldom-questioned lore, common sense, and educated guesses. Based on this tradition massage therapists have been taught that "massage boosts circulation," without guidance for what kind of massage, for how long, and for whom. Many were taught that "massage spreads cancer" based on guesses about massage and fluid flow, but this claim turns out to be probably overstated. We have traditionally assumed that massage has its best applications for musculoskeletal issues, but our impact on the nervous and endocrine systems may be even more profound. What other traditions have we clung to out of loyalty rather than knowledge?

Every health care profession must go through the process of having its beloved mythologies tested and analyzed. The justification of the traditional "we've always done it this way" approach doesn't always hold up under scrutiny. The process of testing and analysis is a reflection of a basic aspect of human nature: the drive to know the best possible way to go about achieving certain goals. Massage therapy is finally entering this world, and massage therapists must become capable of reading and interpreting results: this is *research literacy*. Some practitioners must also become capable of *conducting* research projects—otherwise, clinical trials will not accurately reflect what happens in a realistic massage setting. The ability to conduct credible research is *research capacity*.

Good research creates amazing opportunities: it can supply information to massage therapists and educators; it can offer informed guidance to licensing and regulatory bodies; it provides a bridge to other health care practitioners. But, as Benjamin Disraeli wrote (and Mark Twain famously quoted), "*There are three kinds of lies: lies, damned lies, and statistics*." This can be especially true when highly individualized modalities, such as massage therapy, are studied with the intent to quantify the unquantifiable, and where the practice of massage is often unique to each client-therapist relationship. This presents challenges to many traditional kinds of research design.

Fortunately, a number of invaluable resources have emerged to help massage therapists work their way through this jungle of observational studies, experimental studies, randomizing, blinding, confounds, and controls. This document is a grateful nod toward the pioneers who are working to make research literacy an attainable goal for massage therapists everywhere. These sources are listed with great appreciation and respect in the references section of this appendix.

Some vocabulary for research issues may be new to many readers. A brief definition of **bolded terms** is provided in Table B-1.

Traditionally, **quantitative** research has been held in higher regard than research on those processes which cannot be quantified. For example, if a patient with high blood pressure gets a massage, her blood pressure may go from 145/95 to 130/85, a quantitatively-measurable change. However, recent innovations have strengthened the acceptability of **qualitative** research, which focuses on describing process and experience, rather than on numbers. For example, **Likert scales** (figures B-1 and B-2) or **Visual Analog Scales** (figure B-3) are validated methods by which measurement can be

carried out qualitatively. In many ways these methods are better suited to track benefits of massage and bodywork, and as the results come in, we are discovering exciting, unexpected, and sometimes paradigm-shifting pieces of information.

Very interested	Somewhat interested	Neutral	Not very interested	Not at all interested

Figure B-1: Likert Scale.

Figure B-2: Likert Scale Alternate.

No effect ---------- Huge effect

Figure B-3: Visual Analog Scale.

Research in massage therapy is happening at an astonishing pace. As of this writing, a search for "Massage NOT cardiac NOT prostate" in the PubMed database of health sciences research articles (http://www.pubmed.com) yields over 6,000 entries: each one an article describing some kind of research project in which massage was studied. The amount of information that is being generated today is dizzying—but how do we make sense of it, and put it to use?

Science and the Scientific Method

Reading technical research reports on massage can feel intimidating at first, but a few basic principles make the process much more straightforward. Most research articles follow a basic framework, and all credible studies are grounded in science and the

scientific method. This is simply a formalized way of observing and describing something about the natural world in a way that others can repeat.

Evidence from scientific studies is often referred to as **empirical**, meaning it is derived from experiments. People frequently assume that "doing science" requires lots of fancy machines or special training, but all it really means is that we are making observations about the world that are organized, unbiased, well-documented, reproducible, and understandable to others.

The scientific method is a widely applicable set of steps that can be adjusted for any scientific study, from physics to biology. For the context of massage, it can be described in the following steps:

1. Make an observation about the natural world.
2. Develop a testable theory about how massage or bodywork might influence that observation.
3. Make a prediction or hypothesis for what you expect to happen when you test your theory.
4. Carry out an experiment that tests your theory. Try to control the circumstances around your test so that you can accurately connect the experiment to the outcomes.
5. Observe and document your results. Did the test go as you expected, or not?
6. Based on your results, decide whether your theory needs to be modified, or if it really did successfully predict what happened.

It is important to point out that the scientific method can be much broader than what is presented here, but this model provides a good starting point for this discussion.

Structure of a Journal Article: IMRAD

In keeping with the scientific method explained above, most research articles follow a standard format, which describes a project in an organized way. This allows other researchers to repeat the study to see if they get similar results. The format is sometimes called IMRAD, an acronym that stands for *introduction, methods, results, and discussion*. We'll use a study that tested whether massage could benefit the health of infants in an orphanage (Jump 2006), to see how the parts of an article correspond to the scientific method.

I= *Introduction*

The "I" in IMRAD stands for "introduction", which is the first part of the body of an article. The author uses the introduction to explain the importance of the research, to share an observation, and to offer a testable explanation and prediction for what is expected to happen in the study. In other words, the introduction covers steps 1-3 of the scientific process.

Step 1: Make an observation about the natural world:

> According to a recent World Health Organization report, during the 2000-2003 period, diarrhea remained the second most common factor responsible for mortality of children

> younger than 5 years in the world…Diarrhea is quite common in institutions such as orphanages where infants come in close contact with each other for prolonged periods of time. (Jump 2006, p. 314)

Step 2: Develop a testable theory about how massage or bodywork might influence that observation.

> It is imperative that interventions with the potential to decrease the incidence of diarrhea be developed and tested to decrease the likelihood of diarrhea in infants and young children. Massage therapy is one intervention with such potential as it has been linked to positive health outcomes in a variety of populations. (Jump 2006, p. 315)

Step 3: Make a prediction or hypothesis for what you expect to happen when you test your theory.

> The purpose of this study was to determine whether infant massage would decrease the incidence of diarrhea and overall illness in infants living in orphanage settings. (Jump 2006, p. 315)

M = *Methods*

The "M" in IMRAD stands for the "methods" section of the article. This segment describes exactly how the experiment is conducted. It needs to be especially clear, because the **validity** of the results depends mostly on the integrity of the methods.

Step 4: Carry out an experiment that tests your theory. Try to control the circumstances around your test so that you can accurately connect the experiment to the outcomes.

> Infants in the experimental group received a 15-minute full-body (including the legs, stomach, chest, arms, face, and back) massage daily, usually in the morning, delivered by orphanage volunteers or staff, all of whom were trained in infant massage by a PhD-level, certified instructor using techniques endorsed by Infant Massage USA. (Jump 2006, p. 316)

R = Results

The "R" in IMRAD stands for the "results" section of the article. This is where the researcher reports what happens, without interpretation. This may be done as a verbal description, and/or with charts or graphs to display data.

Step 5: Observe and document the results—did your prediction occur as expected, or not?

> The prevented fraction for the target population was estimated to be l6%, indicating that by participating in the massage intervention, the incidence of diarrhea could

> possibly be reduced by l6% among similar populations of infants. (Jump 2006, p. 317)

AD = *and Discussion*

"A" stands for "and", and "D" stands for the "discussion" section of the article. In this segment the researcher discusses the meaning of the results; whether the hypothesis was confirmed or not, and why; and what this means both for future research and in current applications.

Step 6: Based on your results, decide whether your theory needs to be modified, or if it really did successfully predict what happened

> Results of this experimental pilot project were promising in that infants who were massaged daily had significantly fewer days of diarrhea and slightly lower rates of overall illness than infants in the control group. As noted above, other studies have indicated that massage improves immune functioning, and there may have been increased immunity in the infants in the experimental group in this project. Another possibility is that massage improved infants' gastrointestinal functioning through stimulation of the vagus nerve. If massage can indeed decrease the incidence of diarrhea among orphaned infants, this avenue of intervention should be pursued, particularly given the

high risk of mortality associated with this condition in developing countries. . (Jump 2006, p. 317)

Understanding the structure of the scientific method and of research articles can help you to navigate the literature and decide what specific studies mean for you and your practice. But life is wonderfully complex, and the approach described above cannot be applied to all types of questions. Consequently, researchers have developed a wide array of designs to apply the scientific method to real-life circumstances that occur whenever we work with people. We'll discuss some of those approaches below, relating them to the steps we just went over, in order to keep them understandable in context.

The Scientific Method and Massage: Strengths and Weaknesses

The scientific method often derives information about the natural world by separating components of a process, and studying each piece independently of the others. Then that knowledge is reintegrated into a larger context. This is analysis (looking at individual pieces), followed by synthesis (putting ideas together).

An effective way to study how massage works is to isolate various aspects of the practice, which can later be reintegrated into larger pictures. This control of variables allows us to be more precise about how we link exposure to outcome, or cause to effect. For example, look at the following questions and identify which one is likely to yield the most reliable information about how massage affects human function?

Example A: What is the effect of massage therapy administered by parents on sleep disturbances in autistic children?

Example B: What is the effect of pétrissage administered by sports massage practitioners to marathon runners on post-event soreness in the gastrocnemius (calf) muscle?

Example B is the correct answer for several reasons: the scope of the research question is much narrower (one muscle, versus the whole process of sleep). The population is much more similar to each other (highly-trained athletes have more in common than does a diverse group of children with a poorly-understood condition). The amount of time being studied is much shorter for the athletes (post-event, versus all night). There is much less variation in the one stroke (petrissage) than in all of massage therapy, and finally sports massage practitioners have more standardized training than do parents. All of these factors make a study of the effect of massage therapy administered by parents on sleep disturbances in autistic children much more challenging than a study of the effect of pétrissage administered by sports massage practitioners to marathon runners on post-event soreness in the gastrocnemius muscle. This does not mean that we can't study how massage affects the sleep patterns of autistic children, but we have to make some adjustments to the research design in order to do so.

The Randomized Control Trial

A **randomized controlled trial** (RCT) is considered the gold standard of research study design, because it adheres as closely as possible to the ideal scientific method. A treatment group and a **control group** are studied, so that outcomes can be compared between them; this helps to isolate cause and effect, and helps to eliminate **bias**. Participants are **randomized** into the two groups, so that any differences among the groups average out as much as possible, and don't confuse or **confound** the outcome.

Other steps to reduce bias include blinding. The trial may be **single-blinded**, in which case the participants don't know whether they are receiving the treatment or not: in this way preconceived notions about effectiveness won't taint the outcomes. In blinded tests some participants receive a **sham** treatment, or participants could receive some different kind of intervention: a friendly visit, or a relaxation tape for instance, but not know which intervention is truly being studied. If the people analyzing the data don't know which participants received the real treatment, they work with the data exactly as it is created, and expectations cannot creep in and taint their analysis. When analysts are blinded in this way as well, we say the trial is **double-blinded**.

You probably see some design challenges with this for massage already: if you're studying a drug, you can give the control group a sugar pill, and if you're studying acupressure, you can use a sham point instead of the real one as a placebo. But how do you give someone a placebo massage? That is one of the difficulties with carrying out RCTs in this context.

Another challenge is ethical. In order to carry out a full-fledged RCT, the study needs a large enough number of participants (sufficient **power**) in order to determine what is a real treatment effect, and what is not. But it can be difficult and expensive to

round up a significant number of participants and qualified therapists and analysts to conduct a large-scale study. In this case, two ethical imperatives compete against each other. On one hand, it is unethical to claim knowledge about massage which cannot be backed up with reliable evidence. On the other hand, if logistical problems interfere with the collection of information, is it right to deny patients the relief that massage may provide? In this situation, **evidence-based medicine** advises that we follow the **best practices** standard in the profession. It is our responsibility then to evaluate the effectiveness of massage to the best of our abilities, and to neither over-promise what massage can do, nor deny patients the benefits of massage, simply because it cannot meet the standards of an RCT.

Beyond the Randomized Control Trial

The RCT can be difficult or impossible to apply to some aspects of massage research, but other research designs may be a better fit. They can help identify best practices for massage, and they can provide research questions for later, methodologically-stronger, studies. For example, practitioners who work with someone with catastrophic burn injuries, or brain damage from oxygen deprivation, can write up their work as case studies. Other practitioners with similar clients can use that work, and write up their case studies in turn. And a university researcher can decide that several case studies indicate a trend that deserves further investigation, and marshal the resources of the university and medical communities to design a larger RCT on the same research questions.

Researchers have created a hierarchy of evidence, ranging from the RCT at the strongest end, to the **case study** and **anecdotes** (stories) at the weakest end. A **case series**

is a collection of case studies that all address a similar question or make a similar observation. **Experimental** or **explanatory studies** allow the investigators to control the variables, and to look for mechanisms or causes to explain results. **Descriptive** studies observe phenomena without attempting to explain cause and effect. In a **crossover study** each participant serves as his or her own control, and the results of an intervention are measured twice: once when the subject gets no treatment, and again when the subject receives the treatment. Each type of study is valuable in different situations.

What Can One Massage Therapist Do?

The easiest and fastest way to begin moving from research literacy into research capacity is by conducting a case study. If you want to be part of a research team that is funded to carry out studies on massage, a long journey of learning is probably ahead. But you can start to along that path, and you can give back to others who would benefit from your experience, by writing up interesting or unusual case reports from your practice. Most trade journals for massage dedicate space to research issues; consider submitting your report for publication. You may also consider participating in the Massage Therapy Foundation's student or practitioner case report contests. Visit http://www.massagetherapyfoundation.org/ for more information.

Remember the IMRAD structure as you document your experience.

- **I:** Write the introduction first. What is this patient's need? What is the larger context? What does the literature say about it? You can learn how to find articles related to your topic from databases such as PubMed, the Massage Therapy Foundation, and other sources. Explain your basis for thinking that massage

would be a good treatment. The literature you refer to here will become your References/Bibliography section.

- **M:** Next comes the methods section: describe what you did to treat the patient. Be careful, clear, and detailed, so that an interested reader could reproduce your study if he or she wanted to.

- **R:** Report the outcome in your results section. This is a place just for the facts you have gathered; interpretation comes next.

- **D:** The discussion or conclusions section is the place to interpret or relate the meaning of your results to the larger context from your introduction, and where you recommend what you consider is the next step for other people to take.

Finally, write the abstract. An abstract is a very short summary that sketches out the entire article. Readers use it to decide whether your report is pertinent to their practice. If you have addressed an issue interesting to them, they can read the full text.

As a practicing massage therapist, you have a lot of knowledge to offer. Developing your research literacy and research capacity is a way of making an important contribution, both to other massage therapists, and to the profession as a whole.

It is not an easy journey, but it is a wonderful one.

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Table B-1: Research Literacy Vocabulary List: Definition of Terms

Anecdotes	Informal stories, which are not rigorously analyzed.
Best practices	An example or guideline of a standard which a profession recognizes as embodying the highest knowledge available.
Bias	To be influenced or to make errors in a particular direction, rather than to objectively evaluate the evidence.
Case series	Multiple case studies for a particular condition or treatment.
Case study	A detailed rigorous observation and analysis of the effects of a treatment or a condition in one patient.
Confound	A factor in a study which can interfere with, or confuse, the connection between treatment and outcome.
Control group	A group of subjects in a experiment/study that does not receive the treatment being studied. Sometimes the control group receives a placebo treatment; other times it simply receives a different treatment from the one being studied.
Crossover study	A form of research studies where each subject receives, in random order, both the control treatment and the experimental treatment. In this way, each subject serves as his own control.
Descriptive studies	A form of research studies which simply describes the observed effects of treatments without forming a

	hypothesis or trying to find a cause for whatever effects were observed**.**
Double-blinded	A form of research studies where neither the persons carrying out the experiment nor the subjects know which treatment the subjects are getting (the treatment being tested, or a placebo in its place). In other words, **both** the researchers and the study subjects are **blinded** to that information.
Empirical	Based on practical experimentation and observation.
Evidence-based medicine	Attaining to the highest standard of clinical care of patients by combining the best scientific evidence available with the practitioner's clinical judgment and experience, as well as with respect for the patient's preferences.
Experimental/explanatory studies	A form of research studies concerned with not only describing the effects of a treatment, but also with discovering **how** and **why** it works or not—the relationship between cause (treatment) and effect (outcome).
Likert scale	A scale in which a patient or a subject in a study indicates a level of agreement with statements that are arranged in order from more to less strongly (or vice versa).
Power	A measurement of the number of study participants or subjects are necessary to ensure that the study will be able to reliably detect treatment effects.

Qualitative	Observations that are measured by "qualities" or descriptive properties of the experience, rather than with numbers ("soft", "hard", "easy", "difficult", "feels good", "hurts", "big", "small", "sad", "happy", etc., are all qualitative descriptions of outcomes).
Quantitative	Observations that are measured by numbers, such as 98.6°F temperature, 120/80 blood pressure, etc.
Randomization	A technique for lowering the opportunity for bias in a study, by using chance to decide which group (treatment or control) the subjects of a study are assigned to.
Randomized control trial (RCT)	A form of research studies where outcomes for a treatment group are compared to outcomes for a control group, and the assignment of study subjects to one of the two groups is carried out through randomization.
Sham	A fake treatment, used to blind study subjects as to whether or not they are receiving the real treatment, so that their expectations cannot unconsciously bias the outcomes.
Single-blinded	A form of research studies where the persons carrying out the experiment know which treatment the subjects are getting (the treatment being tested, or a placebo in its place), but the subjects do not know which treatment they are receiving. In other words, **only** the study subjects are **blinded** to that information.

Validity	A measure of how well a study or experiment actually tests what it is intended to test.
Visual analog scale	A scale in which a patient or a subject in a study reports a subjective opinion of the intensity of a sensation. The Visual Analog Scale is often used, for example, to report the degree of pain (i.e. from tolerable/less intense to intolerable/very intense).