ANATOMY OF A RESEARCH ARTICLE

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Introduction

As massage therapy enters its place among the professions of complimentary alternative medicine (CAM), the need for research becomes clear. We may know many wonderful things that massage therapy can do for our clients, but others do not, and our word is not always enough. Conducting research studies shows to the world that the beneficial effects of massage therapy are many and are reproducible. Reproducibility means that it doesn't just work for our clients; it will also work for their clients. For this reason, the massage world is stepping to the plate and an increasing amount of research is being done. The Massage Therapy School Research Consortium is a consortium of schools that are pledged to conducting research in the field of massage. The Massage Therapy Foundation is an organization that supports this research by awarding grants.

The first step toward research literacy is having a familiarity and comfort level with reading and critically thinking through research articles. Yet, for those of us who are not familiar with reading and making sense of these articles ourselves, it may be a daunting task when asked to read the first few articles. The good news is that most every research article is organized in a similar manner and if we are familiar with its structure, it is easier to read, understand, and navigate the article. To facilitate the process of becoming familiar with the structure of a research article, I have broken down the 'typical research article' into its basic elements. The main purposes of each section, as well as the definitions of some of the key terms that tend to appear in a research article are also stated.

Anatomy of a Research Article

A research article is usually arranged into 6 sections with the following headers:

1. Abstract
2. Introduction
3. Methods
4. Results
5. Discussion
6. References

Sometimes, the header for one or some of these sections is slightly different. For example, 'methods' might be called 'material and methods' or 'methodology;' or 'results' might be called 'findings.' When present, these alternate names are usually close enough to the above names that the reader will not be confused.

Purpose of Each Section

1. Abstract: The main purpose of the abstract is to summarize the entire research article. The value of the abstract is that when you are doing a literature search and trying to find all articles dealing with a particular topic, reading the abstract can help you decide if that particular article will be useful to you. In other words, the abstract can potentially save you from reading the entire paper only to find out that the article does not address the topic you are investigating.

2. Introduction: The introduction is just that; it introduces you to the topic of the research study of the article. Often the introduction lays out the history of the research studies done in the past for this particular topic, stating what was found in them. It then continues to explain why this particular study is valuable or needed. It will usually also state what the specific objective of this research study is.

3. Methods: the methods section explains the nuts and bolts of how the research study was conducted. It states how many participants were in the various groups, how they were chosen, what the exact procedure was for the treatment group and the control group, etc. One can look at the methods section as being like a recipe that was followed.

4. Results: As the name implies, the results section states the results of the study. This section refrains from drawing any subjective conclusions as to the meaning of the results; it merely objectively states what the findings were.

5. Discussion: The discussion section now discusses the results that were stated in the results section. This is where the meaning of the results is interpreted and conclusions are drawn. This section will hopefully also state whatever limitations the study was found to have. It will usually also state what the implications of the findings of the research study are; i.e. what the implications might be for the massage therapist practicing massage (if the research study involved massage), as well as what the implications are for future research studies involving this topic.

6. References: This section is valuable for two reasons. It tells the reader how thorough and current the people conducting the research project were in reading the literature before choosing to conduct their study. The references section also gives the reader a list of other articles that cover the same topic; for anyone doing a literature search, this is extremely valuable because it points to other research articles that may be of value.

Some Key Terms Defined

There are certain terms that are often used in a research article. Following are the meanings of some of the more common terms that you are likely to encounter:

1. Hypothesis: A hypothesis is the premise/idea that the research study is attempting to prove or disprove. In effect, it is the theme or purpose of the study. An example of a hypothesis might be: 'massage therapy decreases the pain level in people with low back pain.' The study would then be designed to try to find the answer that either proves this to be true or proves this to be not true.

2. Population: The term population is used to describe the population of people that can participate in the study. For example, the population for a particular study might be adults between the ages of 25 and 60 who have low back pain. (Note: The population is defined by inclusion and exclusion criteria; see below.)

3. Inclusion criteria (singular, criterion): The inclusion criteria are the criteria or parameters that a participant must have to be included within the study. For example, following the example above, a criterion is that the participant must have low back pain; another criterion is that the person must be between the ages of 25 and 60.

4. Exclusion criteria: The exclusion criteria are the criteria or parameters that a participant is not allowed to have to participate in the study. Continuing with our example, an exclusion criterion is that the person cannot be younger than 25 or older than 60. Exclusion criteria often become much more specific: another exclusion criterion might be that the participant cannot have a herniated lumbar disc.

5. Random sample: It is not feasible for a research study to be done on the entire population because it is usually too large. In our example, there might be tens of millions of people between the ages of 25 and 60 who have low back pain; it is simply too difficult and expensive to do a study on that many people. Therefore, to do this study it is necessary to take a 'sample' of those people. Hence, a sample is a smaller subgroup of the entire population being studied. The term 'random' refers to the sample of people from the population being chosen at random. In other words, no bias was used in choosing the participants who will be in the study; this means that everyone within the population that you want to study has an equal chance of being a participant in the study. Having a random sample increases the likelihood that the sample group is representative of the larger population and is therefore valid. This means that whatever results are obtained for the sample group will also be true for the entire population.

6. Criterion/parameter: A criterion or parameter is one aspect, characteristic, or standard of something. For example, a participant's height, weight, age, or whether s/he has a certain medical condition, or whether or not s/he receives treatment are all examples of criteria/parameters. It is usually desirable to have all parameters of the treatment and control groups identical except for one. This way, any difference in results found between these groups can be confidently attributed to the one parameter that was different. This one different parameter is usually the treatment being studied, in our example, low back massage.

7. Treatment Group and Control Group: The random sample of people (of the population) that is involved in the study is divided into two groups of participants: the treatment group and the control group. The treatment group is the group of participants who receive the treatment; in our example, they receive massage therapy to the low back. The control group is the group of participants who do not receive the treatment; i.e. they do not receive massage therapy to the low back. The idea is that there should be only one parameter that is different between the treatment and control groups; that parameter is the treatment (low back massage therapy) of which the research study is trying to determine efficacy/value. Note: Just as the sample group is supposed to be chosen at random from the population, the treatment and control groups should essentially be chosen at random from the sample group.

8. Placebo: The term placebo refers to a 'sham' treatment that has no effect that is of interest upon the outcome of the study. The placebo treatment is given to the participants in the control group; its purpose is to keep the participants in the control group from knowing that they are not in the treatment group. For example, when a research study is done to test the efficacy of a drug, the placebo given to the control group is usually a sugar pill that looks identical to the real drug. Placebo sham treatments keep the participants 'blind' to which group they are in.

9. Double blind: The term 'double blind' refers to both the participants and the examiners (i.e. the people conducting the study) not knowing which group, treatment or control, the participants are in. In effect, both participants and examiners are 'blind' to this knowledge. Having a double blind study is considered to be the 'gold standard' in research. A problem for the massage world is that it is virtually impossible to have a double blind study with massage therapy because it is difficult to have a placebo sham treatment. The participants in the treatment and control groups pretty much know whether or not they received massage.

A Few Statistics Terms:

10. Standard deviation: A standard deviation measures how similar the results are relative to the average result. In other words, if the average participant in the treatment group reported a decrease in low back pain from a level of 7 (on a scale of 0-10) to a level of 3, then the average pain decrease was measured as 7-3 = 4 degrees of improvement. One standard deviation in each direction would be the amount of pain decrease that captures 68% of all the participants in the treatment group. In example #1, one standard deviation might be 1 degree of improvement in each direction; this would include all participants who reported a pain level between 2 and 4 (remember, the average was 3). This shows that 68% of the participants improved to between 2 and 4. In this case, having a small standard deviation of one in each direction shows that the improvement of the group is very consistent (i.e. the results are very similar to the average). In example #2, the standard deviation in each direction might be 3; this would include all participants who reported a pain level between 0 and 6 (again, the average was 3). In this case, 68% of the participants improved to between 0 and 6, which is a larger and more diverse span. In this case, having a larger standard deviation shows that the improvement of the group is much less consistent (i.e. the results are not very similar to the average). (Note: 1 standard deviation in each direction is defined as comprising 68% of the group; 2 standard deviations in each direction is defined as comprising 95% of the group; and 3 standard deviations in each direction is defined as comprising 99.7% of the group.)

11. Mean: The term 'mean' is synonymous with the term 'average.'

12. Median: The term 'median' is not the same as mean/average. The median of a group of numbers is the middle score. Let's look at example #1 with the following group of 5 numbers: 2, 4, 6, 8, and 10. These numbers add up to 30. The mean of this group is computed as 30 divided by 5 = 6; and the median is the middle of the five numbers, which is also 6. In this example, the mean and the median happen to be the same. Now let's look at example #2, also with 5 numbers that add up to 30: 1, 1, 1, 12, and 15. Now, the mean is still computed as 30 divided by 5 = 6. However, the median number is now 1, which is quite different than the mean number of 6. When interpreting results, usually either the mean or the median is used to describe the results. When the scores are very similar (i.e. homogeneous), the mean is usually used because it well represents the results of the group. When the scores are quite dissimilar (i.e. heterogeneous), the median is usually used because it better represents the results of the group.