

**A critical appraisal of “The effects of two therapeutic patellofemoral  
taping techniques on strength, endurance, and pain responses”**

**By**

**Chelsea Davis, SPT, MS, CSCS**

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**Department of Physical Therapy**

**Angelo State University**

**Member, Texas Tech University System**

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## **Abstract**

This is a critical appraisal of “The effects of two therapeutic patellofemoral taping techniques on strength, endurance, and pain responses”, which was published in 2012 in the journal, *Physical Therapy in Sport* and was written by Javier A. Osorio et al.. This study compared two patellofemoral taping techniques to each other and to a control condition of no tape. The outcome measures they recorded were strength, endurance, and pain. This was an organized and well written article in which the strengths outweighed the weaknesses. Some of the strengths include the extensive literature review process in the introduction and discussion sections, the experimental design, as well as the clarity of the methods. Some of the weaknesses include the inconclusive nature of the literature review in both the introduction and discussion, the chosen outcome measures, and the subjects not being blinded to the conditions they were in. This study is a useful resource to clinicians on the benefits of patellofemoral taping techniques on patients with patellofemoral pain. In addition, it is a useful resource to researchers interested in taping techniques to further the research based on these findings.

**Key words: patellofemoral pain, tape, treatment, pain**

## **Introduction**

Research on patellofemoral pain is vast, but the specifics of each therapeutic intervention as well as treatments for pain and function are fewer than expected. People may put forth excessive financial resources on doctors' appointments, MRI's, and physical therapy when something less expensive may alleviate their symptoms. I wanted to research if a simple, inexpensive tape could improve pain and function in people with patellofemoral pain. As a future therapist, I wanted to find out if these, and other tape applications could alleviate some pain and improve function in weight bearing tasks in my future patients. This goal led me to my clinical question, "Do patellofemoral taping techniques change the contact area and reduce pain during weight bearing activities?".

## **Methods**

For this literature search process, I used PubMed, ASU Library, Science Direct, as well as PEDro to find the greatest variety and most relevant articles. The keywords I used were: Patellofemoral, tape, KT tape, McConnell tape, and treatment. After getting over 1,000 hits on my initial search, I narrowed my results to only the articles in which full text were provided. This eliminated many articles that I could not gain access to. Since patellofemoral pain is a prominent clinical topic I was expecting many results. After I limited my search to full text, I continued having trouble finding articles that specifically detailed contact surfaces and pain in weight bearing activities. I broadened my search to include other treatments and exclude key words such as "weight bearing activities". This enabled me to get less than 100 articles with full text looking at the different treatments and outcomes for patellofemoral pain.

This study, “The effects of two therapeutic patellofemoral taping techniques on strength, endurance, and pain responses” was published in 2012 in the journal, *Physical Therapy in Sport* and was written by Javier A. Osorio et al.. The research was conducted within the athletic training department laboratories at The Penn State University and East Stroudsburg University, and at Penn State Hershey Orthopedics, all of which are in Pennsylvania. I chose to critically appraise this article because of its comparison of two therapeutic taping techniques as well as its outcome measure of pain which I believe is critically important for physical therapy treatment interventions.

## **Results**

### Summary of the study

This study was a crossover experimental design, which used twenty physically active participants with diagnosed unilateral patellofemoral pain syndrome. Researchers wanted to know whether isokinetic strength, endurance, and/or perceived pain varied with two different patellofemoral taping techniques vs. the control condition of no tape. The study was divided into three sessions, each 72 hours apart. The first session consisted of baseline measures for all the participants on both the involved and uninvolved limbs. The follow up sessions were the Spider and McConnell conditions with randomization on which was tested first. Perceived pain was measured using a visual analog scale, strength and endurance were measured on a Biodex machine. Statistical analysis revealed that perceived pain was significantly lower in both taping techniques than the control condition during the strength and endurance protocols with no difference between the taping conditions. Both the McConnell and Spider taping conditions had significantly greater strength and endurance measures than the control condition, with no

difference between the two tapes. With the results from this study, researchers concluded that both the McConnell and Spider techniques were effective in reducing perceived pain and increasing strength and endurance measures on patients with PFPS.

#### Appraisal of the study introduction

This introduction was very comprehensive on the importance of research in patellofemoral pain syndrome (PFPS) due to the widespread clinical implications. They also provided an extensive literature review on many different taping techniques as well as outcome measures. Most the sources used in the literature review were from current (since 2000) research on the topic and were primary sources from well renowned journals. The authors clearly stated their key words within the introduction as well as the dependent and independent variables.

Some weaknesses of this introduction were the vast array of topics covered within the literature review. It made for an extremely thorough and well-rounded review, but the outcomes of each were not presented clearly enough for the reader to take a firm grasp on the take home message. Within the sources for the literature review there were a few obvious weak links. One study was an original from the developer of the taping method which dated back to 1986. Another was a systematic review on the rehabilitation of patellofemoral pain disorders which is not a primary source.

#### Appraisal of the study methods

This study was a prospective cross sectional study in which they looked at the results of their interventions at the time that the independent variables were applied. Twenty participants were recruited for the study via flyers and the researchers did not mention any withdrawal from the participants. Because this study was a cross sectional design the participants served as their own

control condition. This may have enhanced the validity of their outcome measures since pain is difficult to compare between subjects. Additionally, the researchers could not compare one subjects' strength and endurance measures to another subject or the results would be invalid due to varying levels of these outcomes in different individuals. The crossover design was the key to the validity of the outcomes differing from the baseline condition of the uninvolved limb as well as the no tape condition. The methods section included very clear instruction on the conduction of the study making it easy for another researcher to follow up and validate the results. Data analysis began with a paired samples t-test to check if there were differences at baseline for the involved and uninvolved limb. This was the correct test to see if the baseline measurements for each limb was different from each other indicating that patellofemoral pain syndrome was present on the involved limb and that function would be decreased on the outcome measures. They then conducted an ANOVA to determine differences among taping conditions and from baseline. This is also the correct test to use to determine if there are differences between the "groups" of taping methods and vs. the control condition.

They did not mention that anyone was blind during the study so we can assume both the participants and researchers were not. It would've been challenging to blind the participants since they had tape on their knee, and the only way to blind the researchers would've been to cover both knees to hide the taped condition. Some subjects did the McConnell taping condition first while other subjects did the Spider. This could've skewed results in that fatigue by the third testing day could've become a factor, or increased pain due to vigorous tests. One limitation to the methods is the functional significance of the strength and endurance measures using the Biodex machine. Researchers do not mention the clinical significance of either normal or abnormal measures on these strength and endurance results. To make the outcomes more

clinically relevant the researchers could've used more functional outcome measures such as stair climbing, running, or jumping maneuvers. Since the Biodex machine is used almost solely in the research setting the researchers should've made the connection to the clinical implications from the results obtained.

### Appraisal of the study results

The results section of this article was presented in the same order as the outcome measures were in the introduction making it easy to follow and refer if needed. The authors mentioned the same outcome measures in the introduction and results which leads the reader to believe that they did not omit information due to unwanted outcomes. Within each outcome measure, there is a table presenting numerical data. This method of placing the table near the written account of the results makes it more clear for the reader to compare what they are saying to their raw data. It also makes it easier to see the significance and numerical representation of what they are describing. This article used a p-value of 0.05 and a confidence interval of 95%. The most clinically significant result they found was a reduction in pain on a VAS in both taping conditions when compared to the control condition.

Some of the outcome measures and subsequently the statistically significant results are less clinically meaningful than others. The strength and endurance tests on the Biodex machine are very limited to laboratory values, and the authors did not make the connection to the clinical implications of the results. Additionally, the results section did not include an assessment of minimal clinically important difference (MCID) or the number needed to treat (NNT). These values are important to identify what is a significant change to the patient, as well as the likelihood of the treatment in producing a positive outcome out of total treatments performed.

### Appraisal of the study discussion

This discussion not only explained the results section more clearly, but brought in additional research to elaborate on the results. The authors mentioned some limitations they found to the study as well as suggestions for follow up studies. This shows the researchers recognize that though their results are significant, there is much research to be done on the subject. As someone interested in their study and results, I can take their suggestions and perform another literature review considering those suggested studies to see if anyone has taken the next step.

The discussion, much like the introduction was very thorough and tied in many different sources to help explain and justify the results. The authors presented many possibilities for the results, but no definitive consensus on why they obtained them. This would have been an appropriate place to make some clinical implications and bridge the gap for the reader and clinician.

### **Discussion**

With a growing number of baby boomers reaching their sixties and seventy's the population with knee pain continues to grow as well as the cost of healthcare. This study serves as a tool to provide clinicians with an evidence base that taping techniques can reduce pain and improve strength and endurance in patients with patellofemoral pain. For a therapist interested in reducing pain and getting patients back to the activities they enjoy, this is a relatively inexpensive tool to assist them in the process. This can be used in conjunction with therapeutic exercise to improve strength and reduce pain to make sessions more enjoyable and beneficial for the patient. This study was a great starting point to my clinical question, but did not answer all there is to know about patellofemoral taping and the clinically significant results it can provide. Further research



and literature review need to be conducted to more closely pinpoint my clinical question regarding weight bearing activities and patella contact points.

After critically appraising this article, I am in favor of using both taping techniques on patients with patellofemoral pain. The benefits outweigh the risks and if it does not reduce pain or improve function in a patient, it is easily removed and minimal economic resources were invested. Tape is a great tool to use during therapy to help reduce pain and improve strength with the only risks being allergies to the tape, and skin irritation when removing it. One tool that would enhance my use of the tape is if researchers had used more functional outcome measures that patients are likely to encounter daily.

I believe that this article as well as others on the subject provide enough evidence for me to make a clinical judgement on the effectiveness of tape. Since the benefits far outweigh the risks, I would argue that there is no reason not to try taping a patient with chronic patellofemoral pain to see if there is even a slight improvement. Along with other treatment protocols, this is a technique I could see myself using in the future due to its safety, cost efficiency, and possible benefits.

Overall, this was a well conducted study in which the strengths far outweighed the weaknesses. I believe that the authors articulate their findings clearly, and the skilled clinician can interpret and utilize the information provided to improve interventions on the patient with patellofemoral pain syndrome.