

Research Assessment #2

Date: 09/13/2024

Subject: Research Areas in Biomechanics

MLA Citation:

“Biomechanics in the Rehabilitation Process.” *Noraxon*, 15 Aug. 2024,
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Assessment:

Introduction

I found University of Nebraska Omaha’s website which shows different types of research that can take place in the field of biomechanics. In my last research assessment I learned about biomechanics as a general subject but for this one I want to delve deeper into each aspect so that I can decide which area interests me the most. The different areas consist of **Clinical and Rehabilitation Biomechanics**; **Neuromechanics**; **Prosthetics**; and **Cardiovascular Biomechanics**.

Clinical and Rehabilitation Biomechanics

In this area of research, you focus on creating assistive devices that can be used in hospitals, clinical, and rehabilitation centers. According to the article these devices need to be individually tested on people and be tailored to their needs which means in this profession communication and collaboration are two big aspects. I do find it interesting to help people through making devices for them. This is a field I can definitely see myself working in, overall I know that my goal is to create medical devices that can help operate on people but I find it hard to figure out exactly what part of it I want to work in.

Neuromechanics

Is an underdeveloped and underappreciated field of study - at least not as appreciated as its counterparts, neurology, neuroscience, and all that. I like that it is something that I can contribute to rather than being something that is already so well known and well studied. Although it is easier to be a part of something that already exists I find it even more intriguing to be part of something that doesn't already and needs more improvement. I was part of the orchestra instead of the band for the longest time only because people thought it was stupid. I am also interested in learning about the brain and even considered psychology at one point. Neuromechanics would be a good field of study for me.

Prosthetics

Prosthetics are a bigger part of biomedical engineering because they are very up and coming. They are a very cool way to make a human look like a cyborg (which was mostly why I was initially interested in it) but then I realized it is more serious than that when I learned more about the amputees who need this technology. This industry makes me realize how much the world truly needs this type of technology. Although there is a lot of cool stuff I can do while helping humans as well.

Cardiovascular Biomechanics

Cardiovascular biomechanics is the study of forces on cardiovascular tissues, including arteries, veins, and heart valves. Helps study and learn more about atherosclerosis, hypertension, and heart valve diseases as well as solve those aspects. I am not too interested in learning about the heart, at least not as much as the other topics I talked about above.

Conclusion

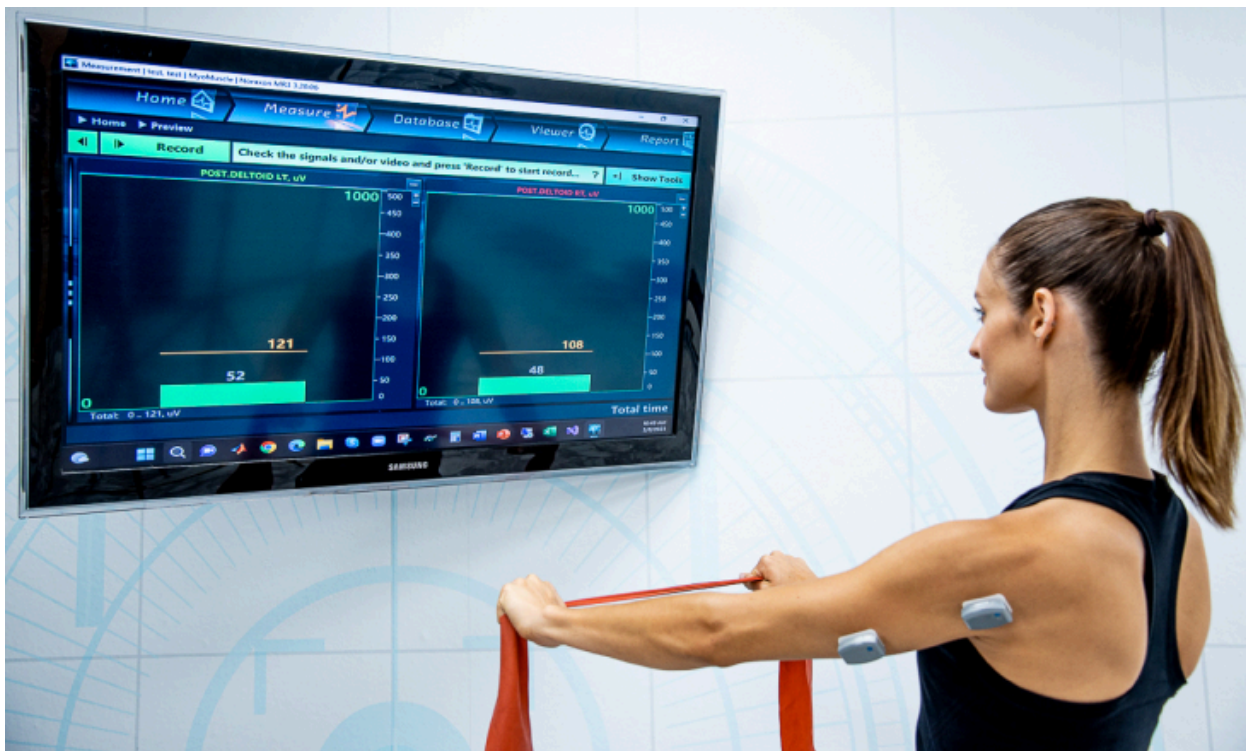
I am most interested in prosthetics and neuromechanics. Prosthetics seems like a really cool area to study and provide my services for since a lot of people are in dire need of it but neuromechanics seems like a really undiscovered area which sparks my interest as well. In the future I would like to learn more about these two topics and figure out which one is the best one for me. I also plan on doing hospital volunteering to be surrounded by medical technologies so that I can further explore my interest and perhaps even narrow it down to a specification. This assignment narrowed it down to a few that I am interested in though which was helpful.

Article Annotations

*****Annotations are bolded and italicized in red with a Times New Roman font. Important information is highlighted.***

Biomechanics in the Rehabilitation Process

Human biomechanics involves the investigation of human movement and function. This field centers around the analysis of how forces interact with the musculoskeletal system and the subsequent responses of bodily tissues to these forces. *Simple Wording: field looks at how forces act around bones and other muscles as well as how they respond to bodily tissues.* Biomechanical principles and tools are used by physical therapists and other healthcare professionals to enhance patient care, develop effective recovery strategies, and educate their patients about optimal body movements that can help minimize the risk of future injuries.



How do clinicians use biomechanics?

Clinicians employ various **biomechanical devices** to guide personalized rehabilitation programs for individuals with different injuries and conditions. Examples of these devices include:

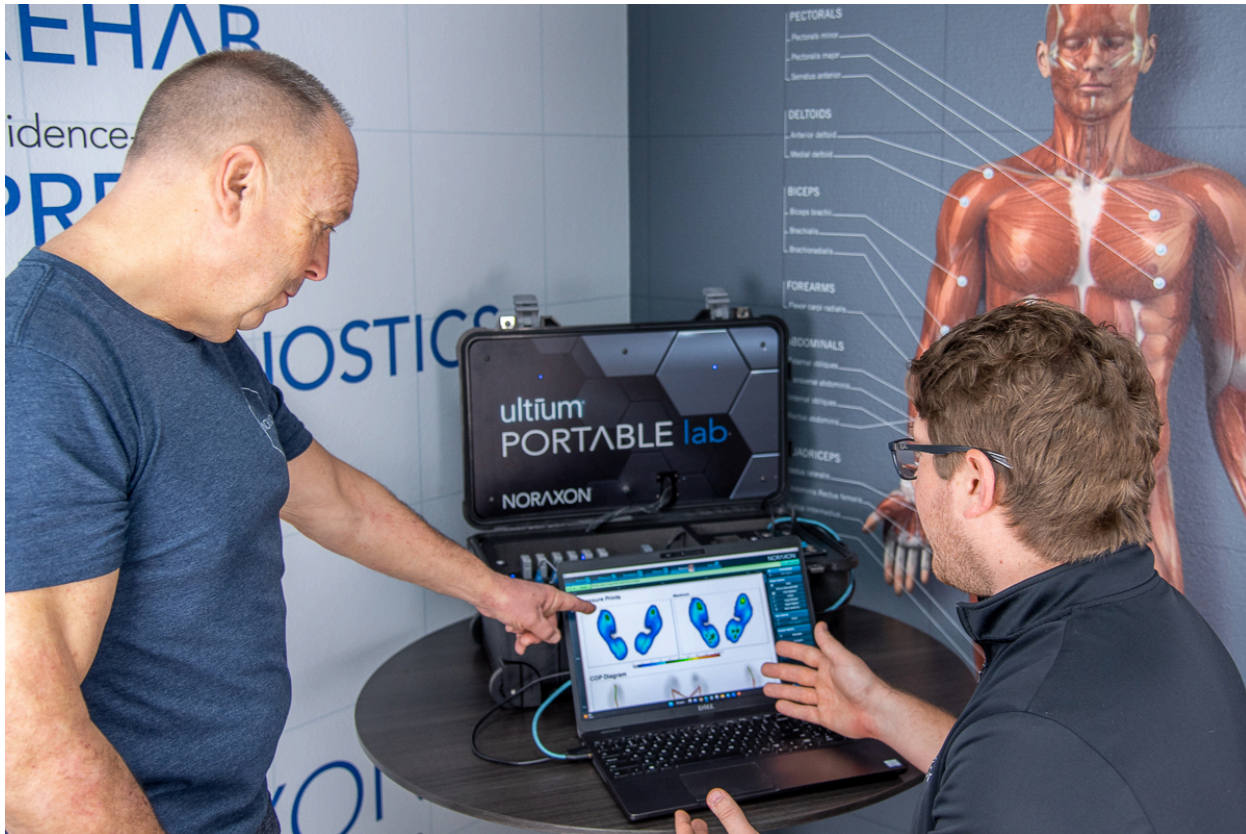
- **electromyography systems** : *Measures the muscle response to nerve stimulation. (kinda like the hammer thing when you go for a check up at the doctors.)*
- **motion capture systems**: *detects human motion and turns into digital data which can be used for various things.*
- **force plates** :*Measures ground reaction to human movement.*
- **pressure distribution platforms**: *allows the assessment of plantar (bottom of the feet or the sole) pressure distribution.*
- **video analysis systems**: *uses videos to analyze data that is helpful.*

With these tools, clinicians can administer **different assessments** that allow them to establish baseline measurements and help track the progress of patients through the rehabilitation process. These biomechanical assessments can help determine the most suitable exercises for patients and can greatly improve the patient's knowledge on how their bodies are reacting to the treatment. They can also help give patients a visual representation of the work that needs to happen during rehabilitation or training.

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How biomechanics are used in rehabilitation

Rehabilitation is not a one-size-fits-all phenomenon. What works for one person may not work for another, so it is important to tailor therapy to the individual. First, it is important that the clinician thoroughly assesses and evaluates the current state of the patient's movement patterns and deficiencies. *Involves: analyzing range of motion, muscle imbalances and limitations.* This process may involve analyzing their range of motion, muscle imbalances, and existing limitations. After that, a clinician will discuss their findings with the patient and set clear goals that are attainable while considering health concerns and the aforementioned limitations.



Based on the assessment that was conducted, exercises will be chosen and modified to fit the patient. From there, a progressive exercise regimen will take place which gradually increases in intensity and challenge while avoiding overloads on vulnerable areas. *Basically rehab but uses technology to make that process efficient.* In addition to traditional movements, these exercises will include more cross-functional movements that mimic everyday tasks, as it is likely they are relevant to the patient's lifestyle. By doing this, it can improve the overall functionality and capacity of the patient's movements further reducing the risk of re-injury.

Continuously monitoring the patient's progress and adjusting exercises to accommodate improvements or newfound challenges is important because there will be many changes throughout the process. **Educating patients** about the biomechanical principles that are being applied can significantly increase their understanding of why certain workouts are necessary and make them feel more involved and active in their rehabilitation. *Good non-profit idea lol.*