

# Physical Therapists and Student Physical Therapists demonstrated good to strong agreement when identifying lower extremity structures using diagnostic ultrasound.

## Introduction

- Ultrasound imaging generates a depiction of anatomical structures through real-time visual feedback using tissue interface reflections (Henry & Westerveldt, 2005).
- Diagnostic ultrasound (DUS) is increasingly used by physical therapists (Manske et al., 2023).
- There is a gap in knowledge pertaining to licensed physical therapists (PTs) and student physical therapists (SPTs) ability to use diagnostic ultrasound to identify healthy soft tissue structures (Markowski et al., 2018).
- This study aims to investigate the agreement between licensed physical therapists and student physical therapists when identifying healthy soft tissue structures.



Figure 1. DUS image of lateral collateral ligament of the knee  
\*lateral femoral condyle



Figure 2. DUS image of medial collateral ligament of the knee  
\*medial femoral condyle  
#medial joint line



Figure 3. DUS image of Achilles tendon  
\*calcaneus

## Methodology

- Participants were recruited using flyers and snowball sampling.
- 22 healthy participants (9 females, 13 males, mean age of 26.6 years) with no recent right lower extremity injuries were included.
- 3 participants were excluded for not meeting inclusion criteria. 1 participant did not finish data collection due to difficulty obtaining testing positions.
- Measurements were taken with the patient in a supine position with the knee at 25° of flexion except the calcaneus with the ankle in resting position in prone.
- Percent agreement was calculated for each structure among experienced PTs, SPTs, and across all four raters.

## Data

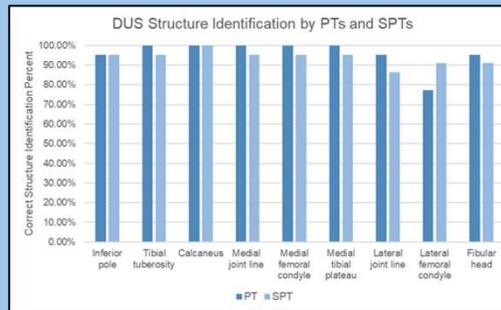


Figure 4. Nine structures with percent identification by PTs versus SPTs

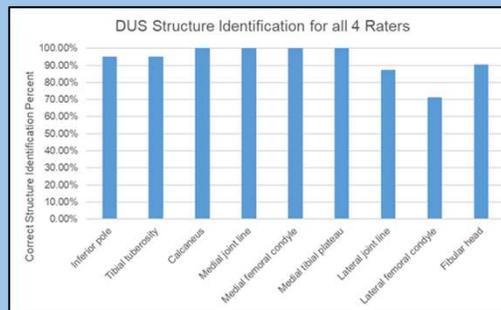


Figure 5. Nine structures with percent identification total across 4 raters

## Results

- PTs identified the tibial tuberosity, medial joint line, medial femoral condyle, medial tibial plateau, and calcaneus in 100% of the participants. They had high agreement in identifying the inferior pole of the patella, fibular head, and lateral joint line in 95.2% of participants and the lateral femoral condyle in 77.3% of participants.
- SPTs had over 90% agreement on all structures.
- Both PTs and SPTs agreed on the calcaneus and medial knee structures in 100% of participants. For all remaining structures, agreement was over 85%, except for the lateral femoral condyle, which had 71.4% agreement.

## Conclusion

- PTs and SPTs should explore the use of DUS as an additional tool to implement into clinical practice.
- Further research is needed to determine the reliability and validity of DUS for PTs and SPTs.

# Physical Therapists' and Student Physical Therapists' Ability to Identify Similar Structures using Diagnostic Ultrasound Imaging

Stephanie Deering, Corey Borromeo, Emilyn Angelica Simon, Darren Dinh, Glenn Manapat, Christina Gomez, Jeremiah Samson



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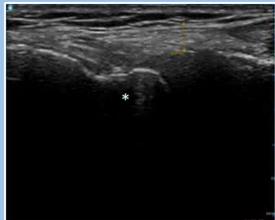


- Slide 1 is the updated poster
- Slide 3 is the original

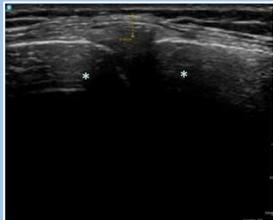
# Physical Therapists' and Student Physical Therapists' are capable of using diagnostic ultrasound to identify anatomical structures. This can be used to identify pathologic tissue to help guide their treatment interventions and plan of care.

## Introduction

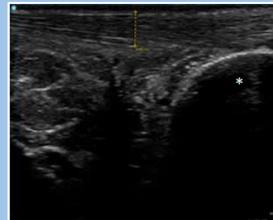
This research aims to bridge the gap in our understanding by investigating the inter-rater reliability of both licensed physical therapists (PTs) and student physical therapists (SPTs) when employing diagnostic ultrasound to identify healthy soft tissue structures. By shedding light on the reliability of diagnostic ultrasound (DUS) in the hands of these healthcare professionals, this study seeks to contribute valuable insights that may enhance the diagnostic capabilities and confidence of physical therapists in assessing musculoskeletal tissues and ultimately improve patient care.



DUS image of lateral collateral ligament of the knee. Asterisk indicates lateral femoral condyle identified by PT and SPT.



DUS image of medial collateral ligament of the knee. Asterisk indicates medial femoral condyle and tibial tuberosity identified by PT and SPT.

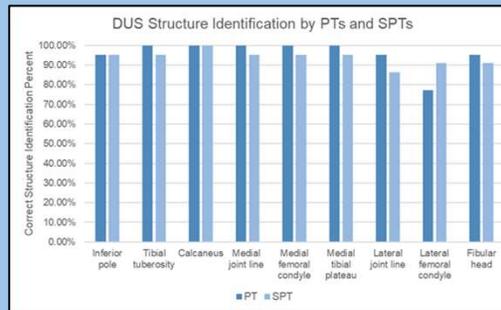


DUS image of achilles tendon. Asterisk indicates calcaneus identified by PT and SPT.

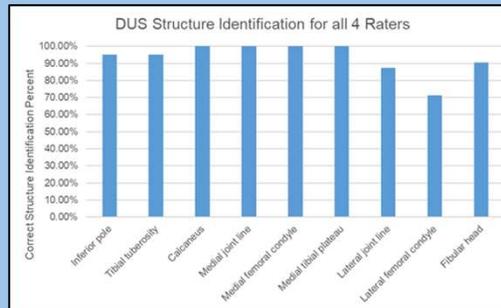
## Methodology

- 22 healthy participants (9 females, 13 males, mean age of 26.6 years) with no recent right lower extremity injuries were included.
- 4 participants were excluded for not meeting inclusion criteria.
- Measurements were taken with the patient in a supine position with the knee at 25° of flexion except calcaneus with the ankle in resting position in prone.
- Percent agreement was calculated for each structure among experienced PTs, SPTs, and across all four raters.

## Data



Nine structures with percent identification by PTs versus SPTs.



Nine structures with percent identification total by all 4 raters.

## Results

- Licensed PTs consistently identified the tibial tuberosity, medial joint line, medial femoral condyle, medial tibial plateau, and calcaneus. They had high agreement in identifying the inferior pole of the patella, fibular head, and lateral joint line in 95.2% of participants and the lateral femoral condyle in 77.3% of participants.
- SPTs had over 90% agreement on all structures. Both experienced PTs and SPTs always agreed on the calcaneus and medial knee structures in 100% of participants. For all remaining structures, agreement was over 85%, except for the lateral femoral condyle, which had 71.4% agreement.

## Conclusion

- PTs and SPTs can use diagnostic ultrasound to identify anatomical structures.
- Useful for identifying pathology and planning patient care.
- More research needs to be conducted on inter-rater reliability diagnostic ultrasound measurements between PTs and SPTs on different anatomical structures.

# Physical Therapists' and Student Physical Therapists' Ability to Identify Similar Structures using Diagnostic Ultrasound Imaging

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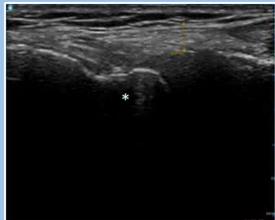


# PTs and SPTs are capable of using diagnostic ultrasound to identify anatomical structures. This can be used to identify pathologic tissue to help guide their treatment interventions and plan of care.

## Introduction

Diagnostic ultrasound (DUS) has evolved into a versatile and indispensable resource for real-time visualization of nerves, muscles, joints, and various anatomical features [5]. It has found widespread applications across diverse medical specialties, including clinical gynecology, cardiology, rheumatology, and radiology [6].

This research aims to bridge this gap in our understanding by investigating the inter-rater reliability of both licensed physical therapists and SPTs when employing diagnostic ultrasound to identify healthy soft tissue structures. By shedding light on the reliability of DUS in the hands of these healthcare professionals, this study seeks to contribute valuable insights that may enhance the diagnostic capabilities and confidence of physical therapists in assessing musculoskeletal tissues and ultimately improve patient care.



DUS image of lateral collateral ligament of the knee. Asterisk indicates lateral femoral condyle identified by PT and SPT.



DUS image of medial collateral ligament of the knee. Asterisk indicates medial femoral condyle and tibial tuberosity identified by PT and SPT.



DUS image of achilles tendon. Asterisk indicates calcaneus identified by PT and SPT.

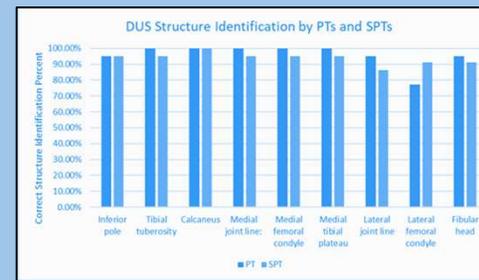
## Methodology

22 healthy individuals (9 females, 13 males, mean age of 26.6 years) with no recent right lower extremity injuries were recruited. 4 participants were excluded due to not meeting inclusion criteria.

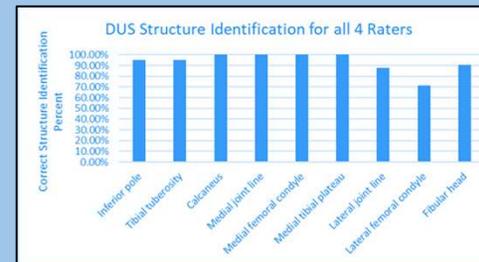
VScan Air Ultrasound probe used by raters to identify the 9 structures (the inferior pole of the patella, tibial tuberosity, calcaneus, medial and lateral knee joint lines, medial and lateral femoral condyles, the medial tibial plateau, and the fibular head).

Structures measured with the patient in supine and knee in 25° of flexion, except the calcaneus which was prone with ankle in resting position. Percent agreement was calculated for each structure between the experienced PTs, the SPTs, and across all four raters.

## Data



Nine structures with percent identification by PTs versus SPTs



Nine structures with percent identification total by all 4 raters

## Results

The licensed PTs similarly identified the tibial tuberosity, medial joint line, medial femoral condyle, medial tibial plateau, and the calcaneus for all participants. Of the four remaining structures, the PTs identified the inferior pole of the patella, the fibular head, and the lateral joint line similarly in 95.2% of the participants, and the lateral femoral condyle in 77.3% of the participants. The SPTs agreed on all structures in more than 90% of the participants. The experienced PTs and the SPTs identified similar structures as being the calcaneus and the medial knee structures in 100% of the participants. The four raters similarly identified all remaining structures in greater than 85.0% of the participants, except for the lateral femoral condyle, 71.4%.

## Conclusion

- PTs and SPTs are capable of using diagnostic ultrasound to identify anatomical structures.
- This can be used to identify pathologic tissue to help guide their treatment interventions and plan of care for future patients.
- More research needs to be conducted on inter-rater reliability diagnostic ultrasound measurements between PTs and SPTs on different anatomical structures.



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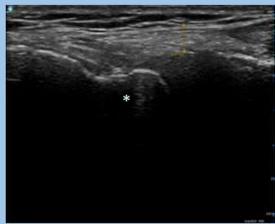
# PTs and SPTs are capable of using diagnostic ultrasound to identify anatomical structures. This can be used to identify pathologic tissue to help guide their treatment interventions and plan of care.

## Introduction

In the realm of medical diagnostics, the introduction of ultrasound as a tool for identifying anatomical structures marked a significant milestone in 1942 when a neurologist first employed it to detect brain tumors [6]. Since then, diagnostic ultrasound (DUS) has evolved into a versatile and indispensable resource for real-time visualization of nerves, muscles, joints, and various anatomical features [5]. It has found widespread applications across diverse medical specialties, including clinical gynecology, cardiology, rheumatology, and radiology [6].

In the context of military physical therapy, where practitioners often serve as primary contact providers, the utilization of DUS has gained prominence [11]. Takahashi and Fujino found excellent intra-rater reliability in physical therapists using DUS to measure muscle thickness, emphasizing its potential as a reliable measurement tool [10]. Rheumatologists have also demonstrated the excellent inter-rater reliability of DUS in assessing articular inflammation [8].

This research aims to bridge this gap in our understanding by investigating the inter-rater reliability of both licensed physical therapists and SPTs when employing diagnostic ultrasound to identify healthy soft tissue structures. By shedding light on the reliability of DUS in the hands of these healthcare professionals, this study seeks to contribute valuable insights that may enhance the diagnostic capabilities and confidence of physical therapists in assessing musculoskeletal tissues and ultimately improve patient care.



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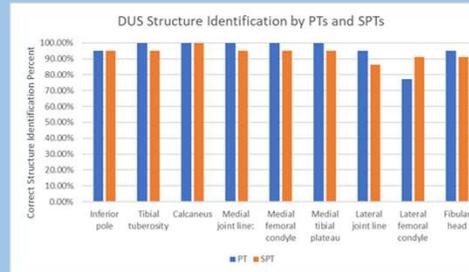
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## Methodology

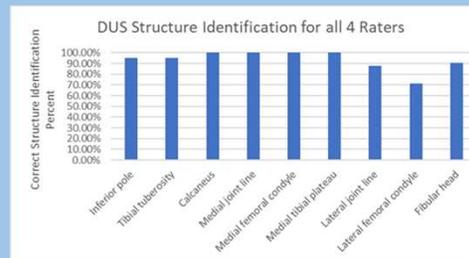
22 (9 females, 13 males, mean age of 26.6 years) 3 individual excluded due to not meeting the inclusion criteria. One participant was excluded due to pregnancy status and difficulty assuming the body positions required during data collection.

Healthy individuals with no recent right lower extremity injuries were recruited using flyers and snowball sampling. Nine structures (the inferior pole of the patella, tibial tuberosity, calcaneus, medial and lateral knee joint lines, medial and lateral femoral condyles, the medial tibial plateau, and the fibular head) were identified by each rater using the linear transducer side of the VScan Air Ultrasound probe. All knee structures were measured at 25° of knee flexion with the patient in supine. The calcaneus was measured with the patient in prone and the ankle in resting position. All raters underwent a one-hour training session from healthcare providers who specialize in diagnostic ultrasound. To maintain blinding of all raters, one SPT was present with subject and rater to record structure identification. Percent agreement was calculated for each structure between the experienced PTs, the SPTs, and across all four raters.

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