RAPID RESEARCH

@physicaltherapyresearch

September 2022

Inside This Week:

Strengthening the Hips

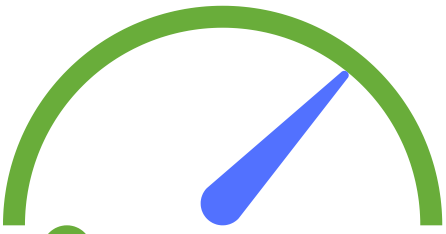
- Best GluteMax & GluteMed Exercises
- GluteMax Activations Across Common Exercises
- Hip vs. Knee Joint Strength for Patellofemoral Pain?

BEST GLUTE.MAX & GLUTE.MED EXERCISES

SEPTEMBER 2022

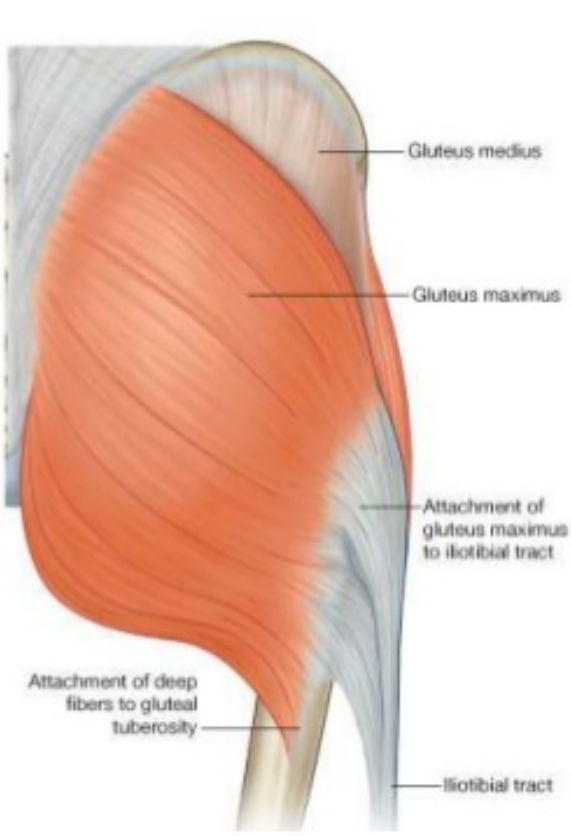
Click for Full Text (Macadam et al. 2015)

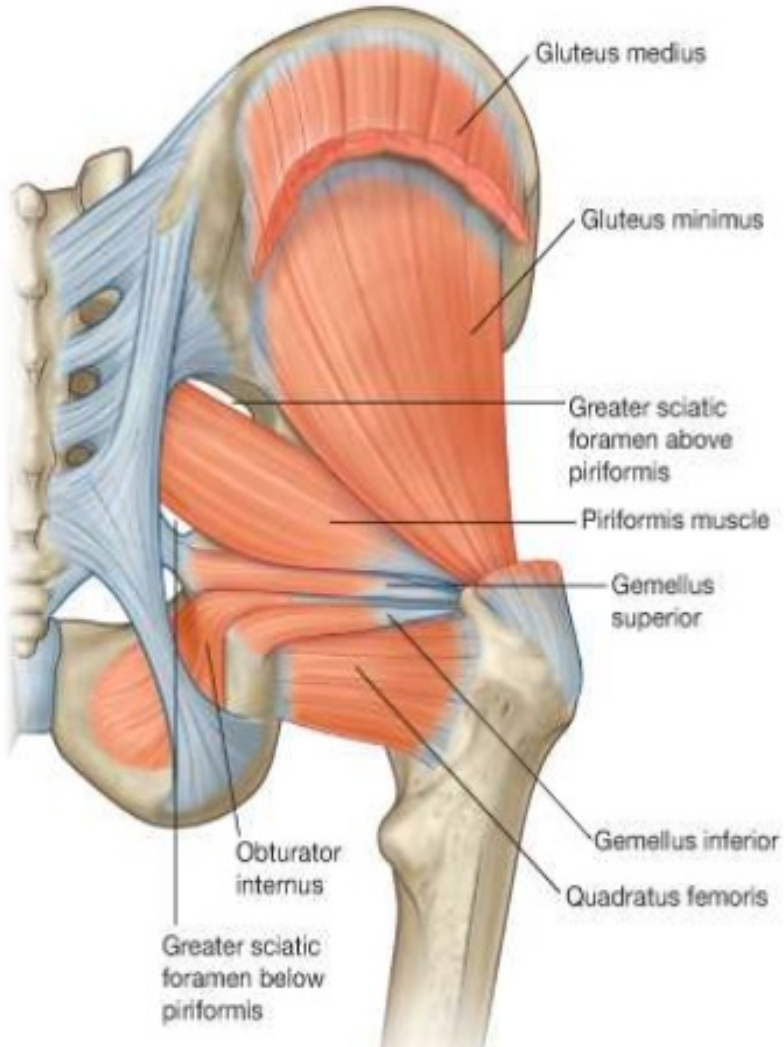
JBI 8/11 [72%]



Quality Check
*see appx

This systematic review quantified the electromyographic (EMG) activity of exercises that utilize the Gmax and Gmed muscles during hip abduction and hip external rotation.





KEY FINDINGS

23 studies included; 467 participants & 52 Exercises

Very High Activation Exercises (>60% MVIC): Gmax=11, Gmed=14
GMax: Cross over step-up exercise **(103% +/- 64%).**
GMed Side bridge w/ hip abduction **(103%).**

High Activation Exercises (41-60% MVIC): Gmax=4, Gmed=8
Gmax: Transverse Lunge **(54%)**
Gmed: Transverse Lunge **(57%)**

Moderate Activation Exercises (21-40% MVIC): Gmax=21, Gmed=14
Gmax: Side-lying Hip Abduction **(37%)**
Gmed: Lateral Stepping, band at foot **(35%)**

Low Activation Exercises (0-20% MVIC): Gmax=15 exercises, Gmed=5
Gmax: Lateral Step-up w/ +25% BM **(20%)**
Gmed: Monster Walk, band at knee **(18%)**

MAIN TAKEAWAYS

EMG activity for Gmax ranged from 4-113 % MVIC. Gmed ranged from 12-103 % MVIC.

Exercises with greater movement complexity were found to elicit greater % MVIC for both Gmax and Gmed.

Exercises performed in weight bearing produced a greater % MVIC for both Gmax and Gmed compared to non-weight bearing.

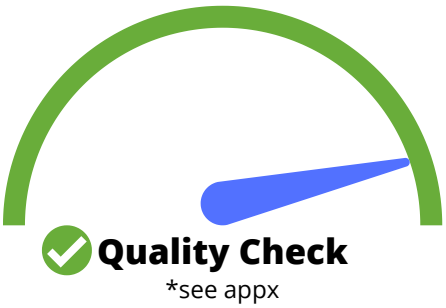
The ranges of glute activation can be used to prescribe progressive strengthening exercises at a patient's appropriate level.

GLUTE.MAX ACTIVATIONS ACROSS COMMON EXERCISES

SEPTEMBER 2022

Click for Full Text (Neto et al. 2020)

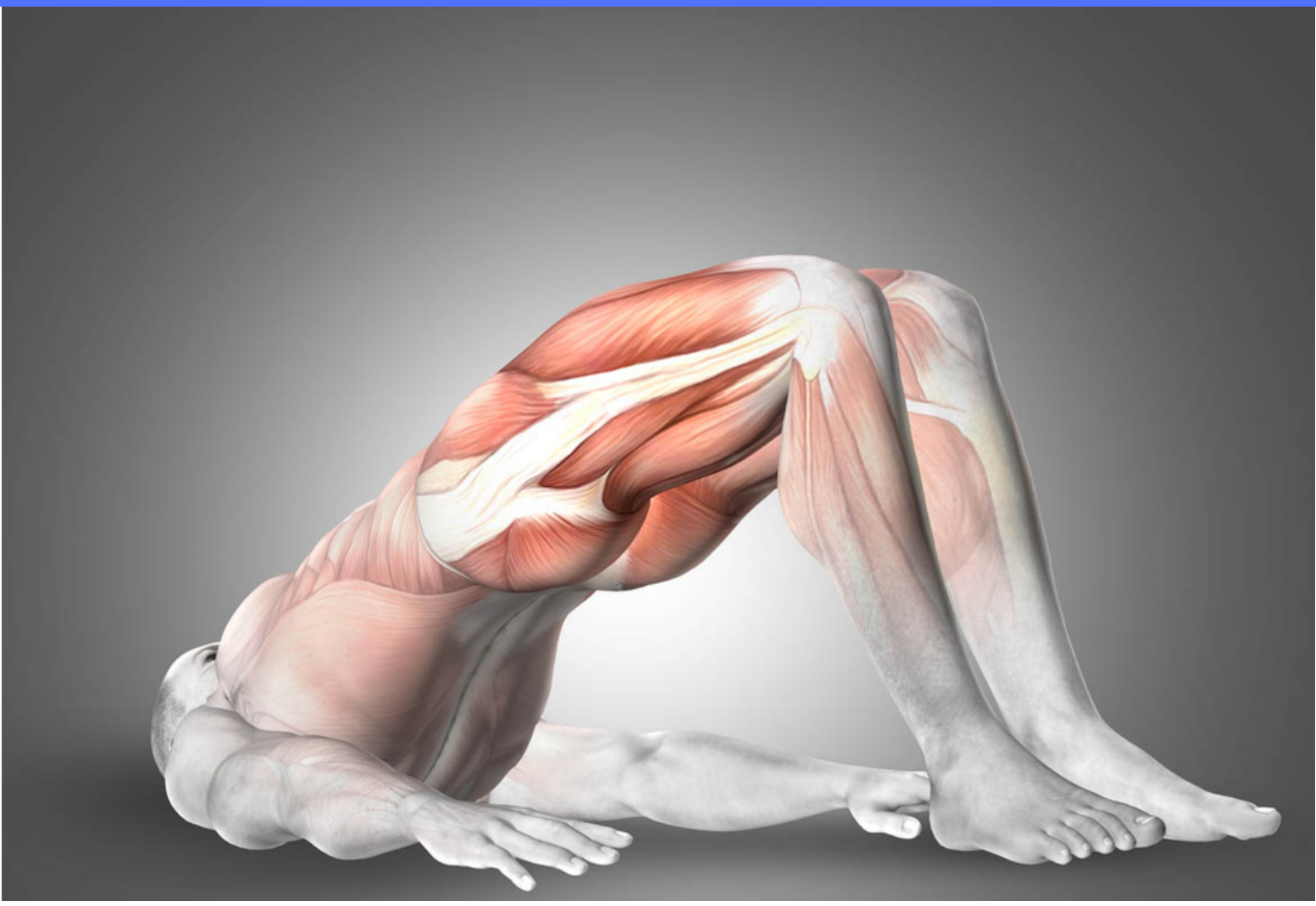
JBI 10/11 [90%]



Quality Check

*see appx

This systematic review described the GMax activation levels during strength exercises that incorporate hip extension and use of external load.



KEY FINDINGS

16 studies were included.
231 participants, 24 strength exercises tested

Step-up exercise & its variations [lateral, diagonal, and cross-over] showed the highest GMax activation **(average 125.09% MVIC, ranging from 104.19-169.22% MVIC).**

Top 5 % MVIC:
Step-Up **(169.22 %)**
Lateral Step-Up **(114.25%)**
Diagonal Step-Up **(113.21%)**
Crossover Step-up **(104.19%)**
Hex Bar Deadlift **(88%)**

MAIN TAKEAWAYS

This systematic review demonstrated that the step-up exercise and its variations present the highest levels of muscle excitation of GMax.

Followed by several bilateral exercises and its variations, such as deadlifts, hip thrusts, and squats.

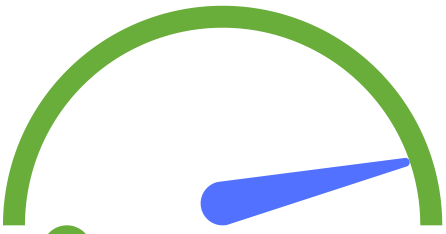
GMax activity may vary significantly according to changes in technique during the exercise.

HIP VS. KNEE JOINT STRENGTH FOR PATELLO-FEMORAL PAIN?

SEPTEMBER 2022

Click for Full Text (Na et al. 2021)

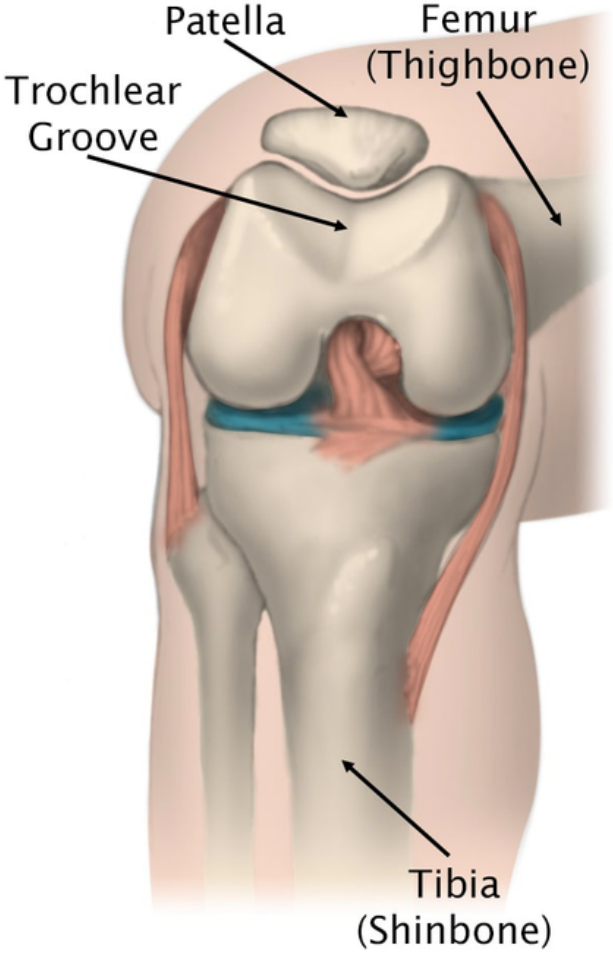
JBI 10/11 [90%]

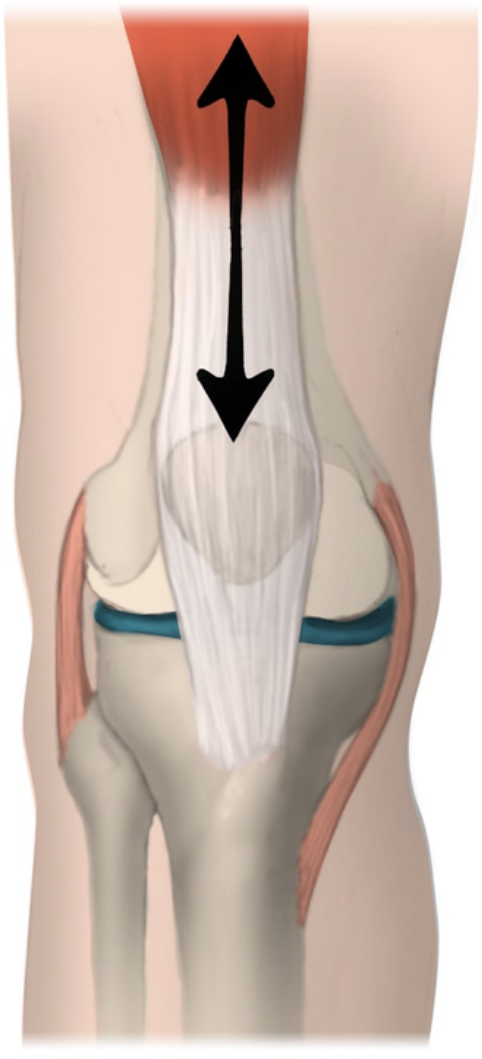


Quality Check

*see appx

This systematic review compared the efficiency of isolated hip strengthening versus traditional knee-based strengthening for patients with patellofemoral pain syndrome (PFPS).





KEY FINDINGS

5 comparative studies were included; (4 RCTs, 1 prospective comparative study)
All studies were moderate to high quality and reflected good internal and external validity.

Pain (VAS):
Significant improvements observed for both hip and knee-strengthening exercise groups from baseline to post-intervention, in all studies.
No significant differences in favor of the hip group over the knee group.

Function (Anterior Knee Pain Scale):
Improved in both the hip and knee groups after strengthening intervention.
1 study found improved WOMAC scores in the hip group vs. knee group immediately and at 6 months.

Hip and Knee Muscle Strength:
In 2 studies, patients in the hip group had statistically greater hip abductor and extensor strength than did those in the knee group after intervention.

MAIN TAKEAWAYS

The best-available evidence suggests that overall, isolated hip and knee strengthening were equivalent for PFPS.

In some of the included studies, isolated hip muscle strengthening was more effective in increasing hip abductor and extensor strength and reducing pain earlier compared with knee-based strengthening.

Athletes and patients should still be evaluated and prescribed an individualized program based on their symptoms, assessment findings, and goals.

GIVE US YOUR FEEDBACK!

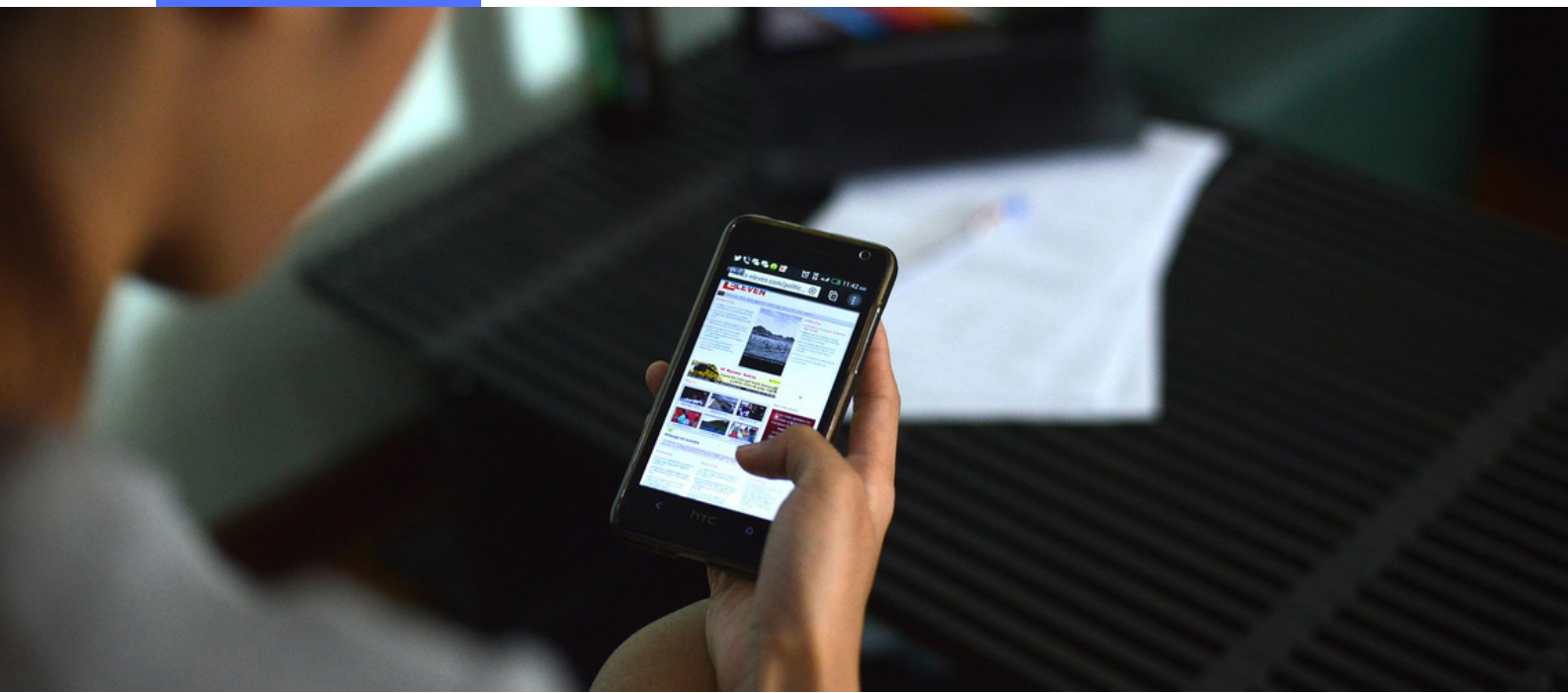
MEMBERS

We are on a mission to make research more accessible, easier to interpret, and quicker to implement.

Help us by giving 1 minute of your time to leave feedback for us.

We would greatly appreciate any feedback you have, as it helps us continually improve!

Leave Review



JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses

Author: Macadam et al. Year: 2015

		Yes	No	Unclear	Not applicable
1.	Is the review question clearly and explicitly stated?	+	☐	☐	☐
2.	Were the inclusion criteria appropriate for the review question?	+	☐	☐	☐
3.	Was the search strategy appropriate?	+	☐	☐	☐
4.	Were the sources and resources used to search for studies adequate?	+	☐	☐	☐
5.	Were the criteria for appraising studies appropriate?	☐	☐	X	☐
6.	Was critical appraisal conducted by two or more reviewers independently?	☐	☐	X	☐
7.	Were there methods to minimize errors in data extraction?	+	☐	☐	☐
8.	Were the methods used to combine studies appropriate?	+	☐	☐	☐
9.	Was the likelihood of publication bias assessed?	☐	X	☐	☐
10.	Were recommendations for policy and/or practice supported by the reported data?	+	☐	☐	☐
11.	Were the specific directives for new research appropriate?	+	☐	☐	☐

Overall appraisal: 8/11 (72%)

Comments:

Overall, this study successfully organized and categorized which glute-targeting exercises had the highest and lowest activations. Although the findings are easy to interpret, the quality of the included studies were not assessed, so the accuracy of the data is at question. As a general reference, this is a good piece of research to distinguish different levels of glute exercise training.

JBI Critical Appraisal Checklist for systematic reviews and research syntheses

Author: Neto et al. Year: 2020

		Yes	No	Unclear	Not applicable
1.	Is the review question clearly and explicitly stated?	+	☐	☐	☐
2.	Were the inclusion criteria appropriate for the review question?	+	☐	☐	☐
3.	Was the search strategy appropriate?	+	☐	☐	☐
4.	Were the sources and resources used to search for studies adequate?	+	☐	☐	☐
5.	Were the criteria for appraising studies appropriate?	+	☐	☐	☐
6.	Was critical appraisal conducted by two or more reviewers independently?	+	☐	☐	☐
7.	Were there methods to minimize errors in data extraction?	+	☐	☐	☐
8.	Were the methods used to combine studies appropriate?	+	☐	☐	☐
9.	Was the likelihood of publication bias assessed?	☐	X	☐	☐
10.	Were recommendations for policy and/or practice supported by the reported data?	+	☐	☐	☐
11.	Were the specific directives for new research appropriate?	+	☐	☐	☐

Overall appraisal: 10/11 (90%)

Comments:

Overall, this was a well conducted study and combined different Gmax exercise EMG data in an effective way. Thai study is more recent and includes lifts more advanced athletes typically include in their programs, such as squats, deadlifts, etc. The findings were consistent, and give an idea of glute activation in core lifts, not just accessory rehab-based exercises.

JBI Critical Appraisal Checklist for systematic reviews and research syntheses

Author: Na et al. Year: 2021

		Yes	No	Unclear	Not applicable
1.	Is the review question clearly and explicitly stated?	+	☐	☐	☐
2.	Were the inclusion criteria appropriate for the review question?	+	☐	☐	☐
3.	Was the search strategy appropriate?	+	☐	☐	☐
4.	Were the sources and resources used to search for studies adequate?	+	☐	☐	☐
5.	Were the criteria for appraising studies appropriate?	+	☐	☐	☐
6.	Was critical appraisal conducted by two or more reviewers independently?	+	☐	☐	☐
7.	Were there methods to minimize errors in data extraction?	+	☐	☐	☐
8.	Were the methods used to combine studies appropriate?	+	☐	☐	☐
9.	Was the likelihood of publication bias assessed?	☐	X	☐	☐
10.	Were recommendations for policy and/or practice supported by the reported data?	+	☐	☐	☐
11.	Were the specific directives for new research appropriate?	+	☐	☐	☐

Overall appraisal: 10/11 (90%)

Comments:

Overall, this is a high quality study, which included high quality articles to evaluate. Although few studies directly compared hip to knee exercise regimes, all were of good quality and had sound findings. Both hip and knee function contribute to PFPS in different and sometimes combined ways. Both programs will work, making sure to prioritize based on a patients assessment, i.e. where they are weak, hip movements vs. knee movements.