OUTPUT// CAPTURE MOBILITY VALIDATION

INTRO

Accurate assessment of mobility plays a crucial role in various fields, including healthcare and sports science. Traditional methods often rely on subjective measures, such as clinician observations, patient self-reports, or the use of goniometers, which can be prone to errors and inconsistencies. To address these limitations, there is a growing demand for objective and reliable methods of mobility assessment. The Output Capture app, used in conjunction with an Output sensor, is one such method and seeks to minimize subjectivity and allow for frequent and consistent measurements. The validity of Output Capture in measuring angular range of motion during a shoulder external rotation exercise was investigated against a number of known range of motion measurements from a digital angle finder as outlined in the methodology below.

METHODOLOGY

A 360 degrees digital angle finder with an accuracy of ± 0.3 degrees was used as the ground truth for this validity investigation. One arm of the angle finder was fixed in place and the Output sensor was secured to the participants wrist. The angle finder was zeroed prior to each measurement and then the free arm was moved to an approximate target angle. While seated with their arm resting on a table, the start button was pressed on the Output Capture app and the participant performed a shoulder external rotation with their shoulder abducted to 90° and elbow flexed at 90°. Once the participant's movement range closely approximated the target angle set on the angle finder, the tester carefully aligned the Output sensor on the participants wrist with the angle finder at eye level, aiming to minimize any subjectivity in alignment. Once the tester confirmed they were happy with their alignment, the angles from both the angle finder and Output Capture app were recorded. This was repeated for a total of 122 measurements, varying in angles from 15 to 115 degrees. The Pearson Correlation Coefficient (r), Adjusted R^2, Mean Absolute Error (MAE), and Root Mean Square Error (RMSE) were calculated on all 122 measurements.

RESULTS

The results can be seen in Table 1 below. All measurements were plotted in a correlation plot and can be seen in Figure 1.

r	0.9997
Adj. R^2	0.9974
MAE	1.1983°

RMSE	1.5284°

CONCLUSION

These results show a very strong agreement between Output Capture and the digital angle finder confirming the device's ability to provide accurate and objective measurements during a shoulder external rotation movement. This addresses a key limitation of traditional methods, which often rely on subjective assessments.
Further studies could explore the device's performance during other specific mobility exercises. Assuming secure sensor placement, the accuracy observed in this study is likely to translate effectively to real-world applications of mobility testing.

CORRELATION PLOT // MOBILITY SHOULDER EXTERNAL ROTATION