SPORTGAIT

Preserving the game, while **making it safer.**

SportGait Platform Overview

For more information contact:

Chris Newton, CEO
cnewton@sportgait.com
919.609.3222

SportGait, Inc. | 803 S. College Road | Wilmington, NC 28403

Concussion Testing

Concussion is a clinical decision

✓ What To Look For In A System

MEETS ZURICH-BERLIN GLOBAL CONSENSUS GUIDELINES

→ Neurocognitive
→ Neurobehavioral (Gait and Balance)

BUILT ON LARGE-SCALE NORMATIVE DATA ACROSS A WIDE DEMOGRAPHIC (PATIENTS AGE 5 TO 85)

→ Baseline not required
→ Comparing to your age range and gender

RELIABILITY

→ Consistency >0.70

HISTORICAL REPORTING TO MEASURE OVER TIME

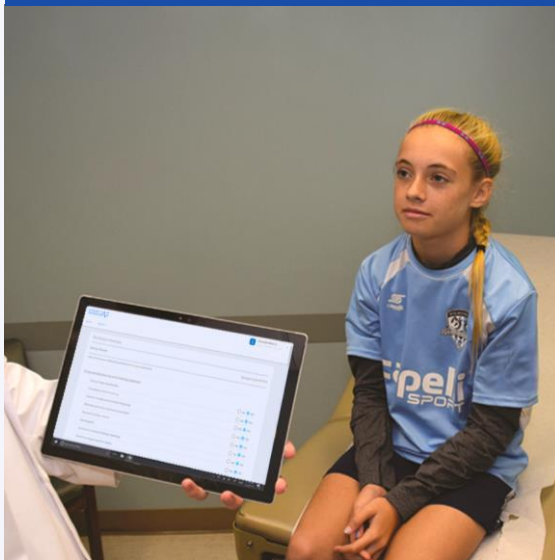→ Measuring progress over time

VALIDITY

→ Is it measuring what it is supposed to measure

APP-BASED

→ Administered at home
→ Remote Patient Monitoring

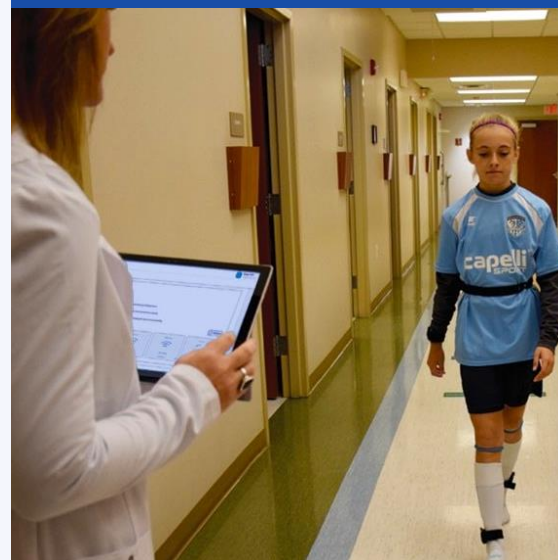# SportGait's Initial Offering: In-Clinic Diagnostic Support

PRESCREEN

Prescreen

Records CDC signs & symptoms, and medical history
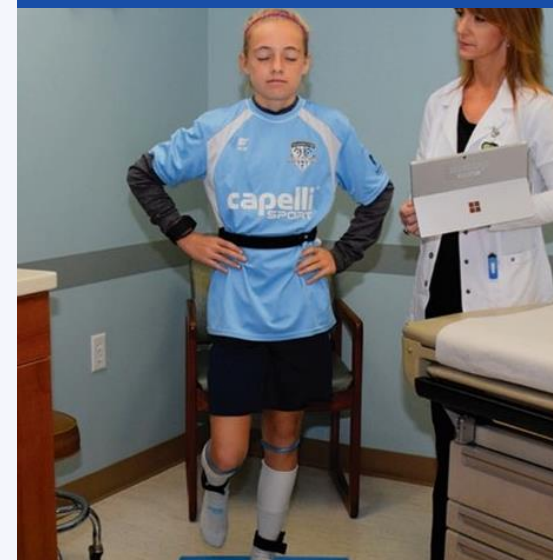
GAIT ANALYSIS

Gait Observation Analysis

Qualitative analysis to address issues regarding smoothness of a patient's gait

NIH 4-Meter Gait

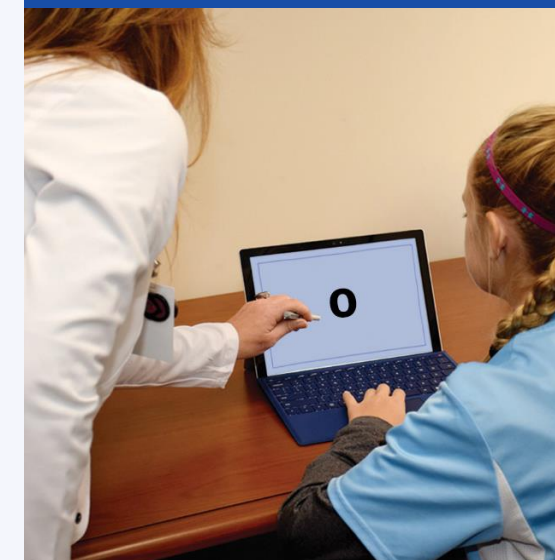Measures dynamic postural stability and sway, specifically locomotion

BALANCE

UNC Balance Error Scoring System

Measures static postural stability and sway

NEUROCOGNITIVE TEST

Conner's Continuous Performance Test

Measures attention, distractibility, processing speed, and variability in attention

SportGait Brain Physical™

A battery of the most reliable tests to measure brain function. Distinct tests—not composite scores—assess neurocognitive and neuromotor ability.

The outstanding reliability and validity of the 3 tests used in the SportGait Brain Physical™ confirm their superiority as instruments that can support your clinical decision-making in concussion assessment and management.
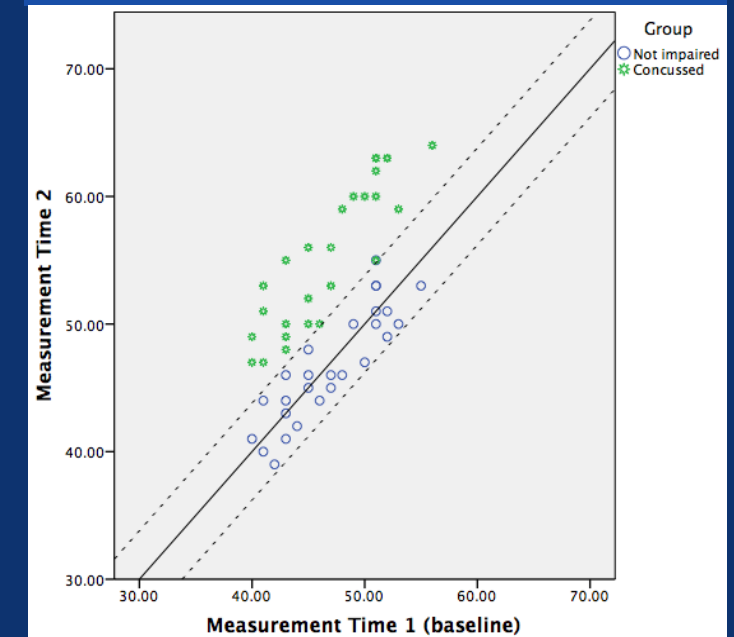
NIH, r = .97 [8]
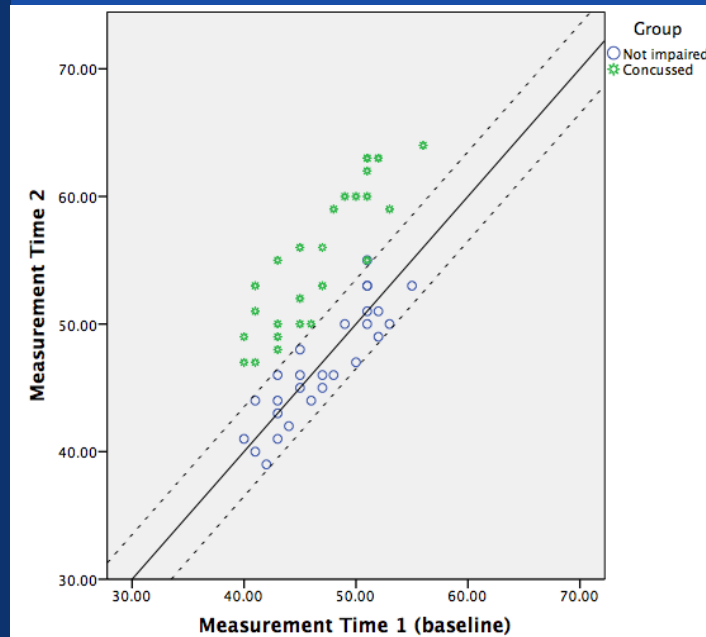
- Among the highest reliability test coefficients—this test is very effective at differentiating a concussed from a non-concussed performance[7]

BESS, r = .70 [10]
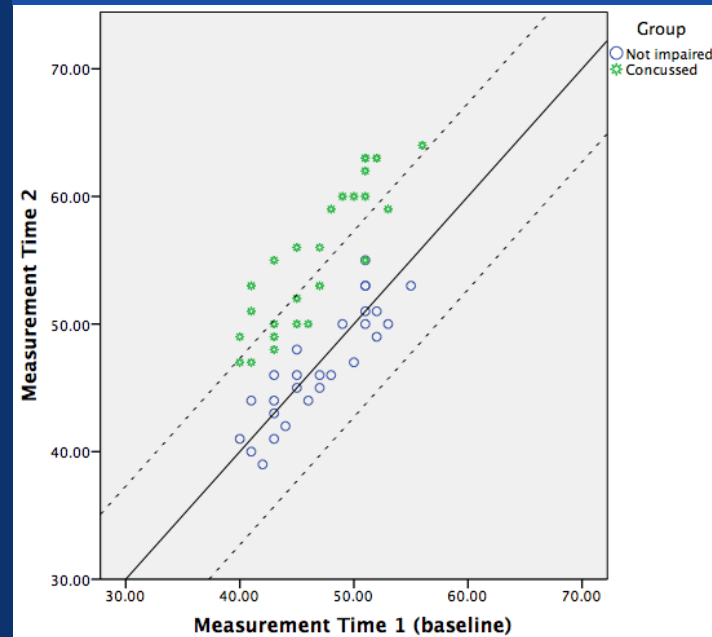
- Best-practice guidelines recommend balance testing as a critical component in the clinical examination of a concussion[9]

CPT, r = .92 [12]

- The CPT has been shown to predict cognitive impairment in a pediatric sample with mild traumatic brain injury[11]

[7, 8] Peters et al, 2013
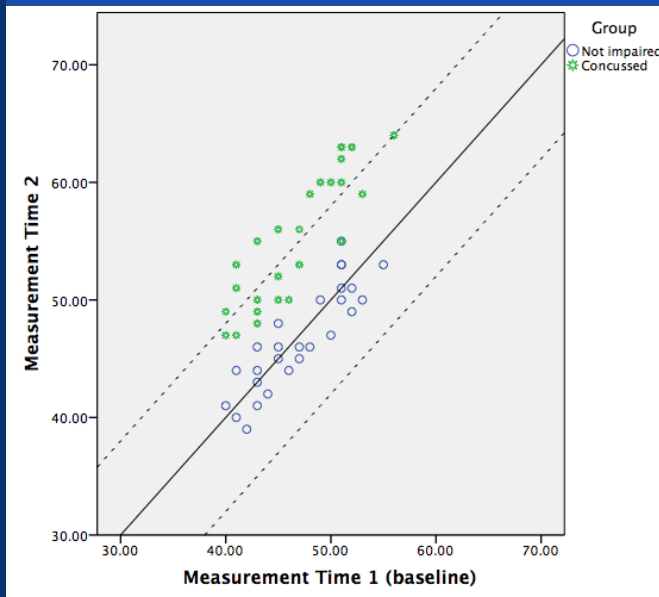[9] McCrory, P. et al, 2013
[10] McLeod, T.C.V. et al, 2006
[11] Allen et al, 2010
[12] Shaked, D. et al, 2019

Competitive Assessments

First to market, declining market-share and reimbursement rates

Competitors provide less reliable neurocognitive-only testing. Using cumulative scores - rather than separate test measures - reduces reliability and validity.

SCAT, r = .55 [14]

- Variable test reliability and validity

- Sensitivity appears limited to 24-hours post injury—less sensitive after 8 days or when symptoms are subtle[13, 14]

ImPACT, r = .22 [15]
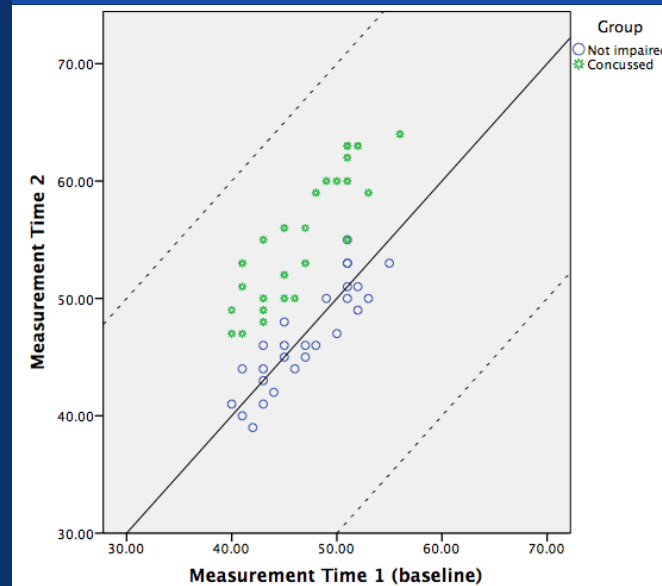
- Very low test reliability and validity—very high misclassification rate[15]

- Computerized tests do not diagnose

- Explicitly moves assessment decisions to outside of the medical community

[13] Chin et al, 2016
[14] Meta-analysis by Broglio and Puetz, 2008
[15] Resch et al, 2013

Research Outcome

PEER REVIEWED PAPERS DEMONSTRATING SPORTGAIT'S VALIDITY

- SG battery predicts concussion outcomes **5-fold better than** the best published values of ImPACT, even when assessments occur an average of three weeks post incident

- SG battery can predict concussion history (incidents that occurred > 6 months previously)

- Our neurocognitive and neurobehavioral measures add significantly to the prediction of CDC concussion symptom endorsement

- BKG can out-predict well validated measures of concussion (NIH and BESS)

- Completing the SG battery can increase individuals' willingness to report concussion symptoms

- The SG mobile cognitive and gait measures takes less than 10 minutes to complete

THOUGHT PIECE PUBLICATION

Highlighting the importance of the addition of Gait into the Concussion Subtypes
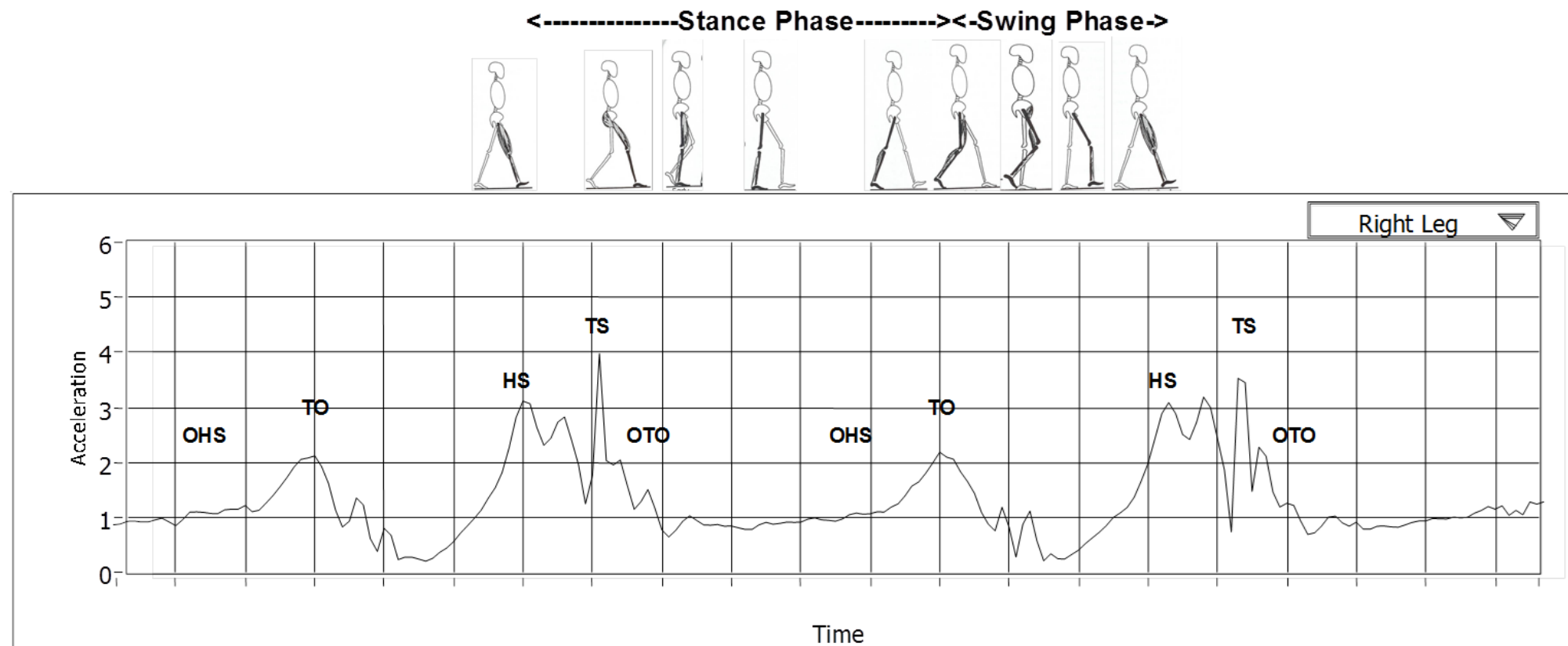
NEAR-TERM STUDIES

- Malingering
- Fall prevention
- Parkinson's
- And more...

Patented Biokinetograph (BKG)
Mapping Gait to Biomarkers and Biometrics

Precisely identifies, measures, or predicts a meaningful clinical, biological,
physical, or functional state such as Concussion, Parkinson's, Frailty

Legend: **HS** is heel strike; **TS** is toe strike; **TO** is toe off; **OHS** is other heel strike; **OTO** is other toe off

Capturing the BioKinetoGraph in Realtime
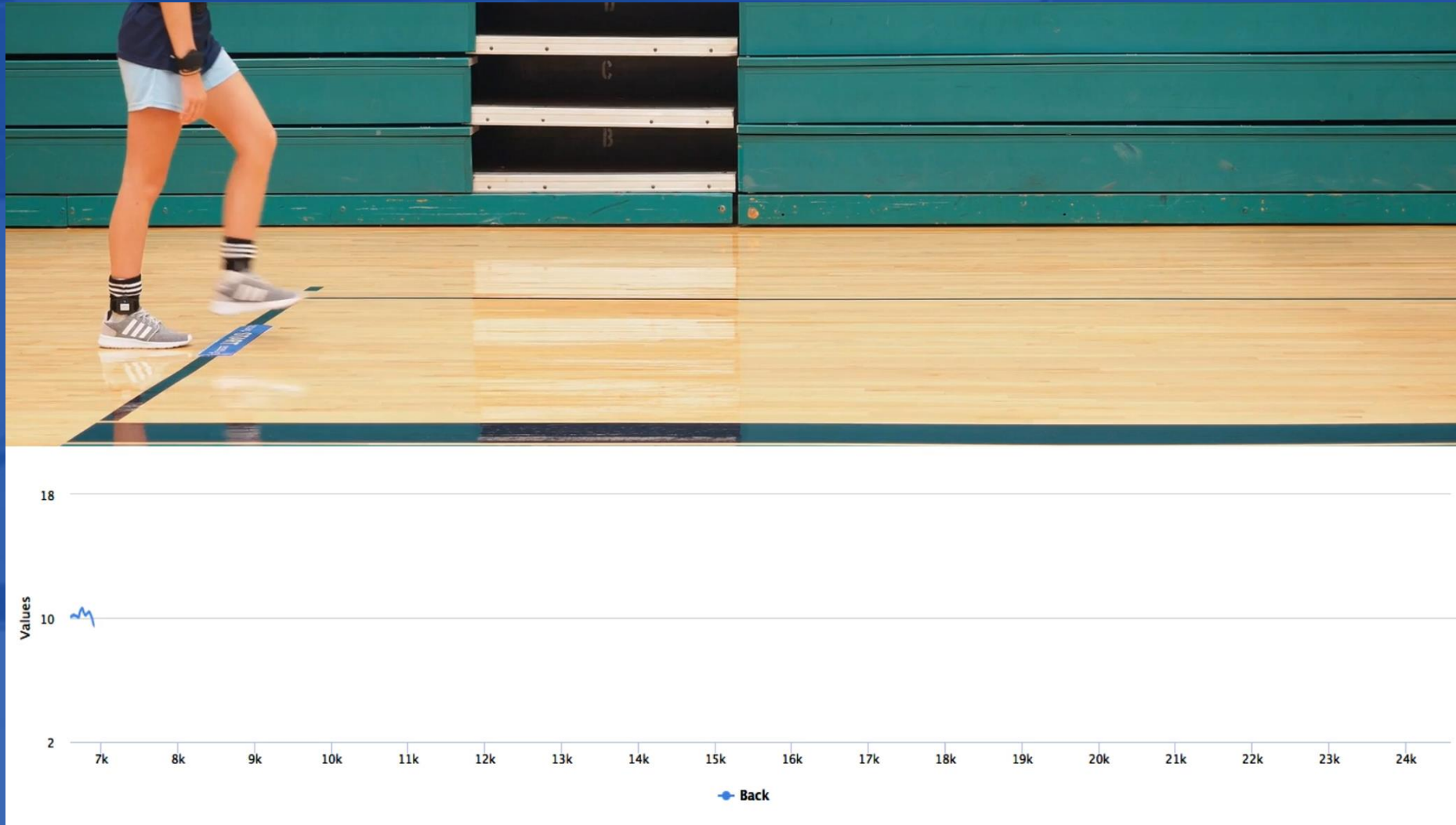
BKG Research Outcome

BKG Results

Peer-reviewed
- Contributes to **predicting concussion decisions** of a pediatric neurologist with **91% accuracy**.

<div align="right">Keith, Williams, Taravath, Lecci, 2019</div>

Under Review
- Predicts concussion symptom endorsement with effect sizes **4.4 times larger than BESS**.

- Predicts concussion symptom endorsement with effect sizes **2.9 times larger than the NIH 4M Gait Test**.

- Predicts concussion symptom endorsement with effect sizes **1.7 times larger than the combined effects** of the BESS and the NIH 4M Gait Test.

<div align="right">Lecci et al., 2022 (manuscript under review)</div>

Expansion to Cell Phones (Q3 2021)

Multimodal Comprehensive Mobile Screener

- ✓ 10 Minutes to administer

- ✓ Opening testing At-home

- ✓ Moving the assessment to the athlete

- ✓ Remote Patient Monitoring

Athlete Baseline Experience

Administering a baseline at home or in a group setting is easy and takes less than 10 minutes

WHEN TO USE

→ We recommend you administer the baseline annually
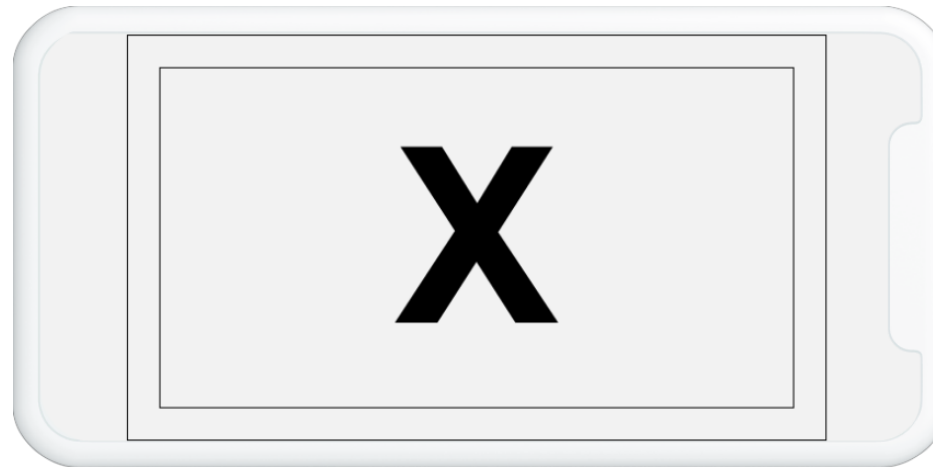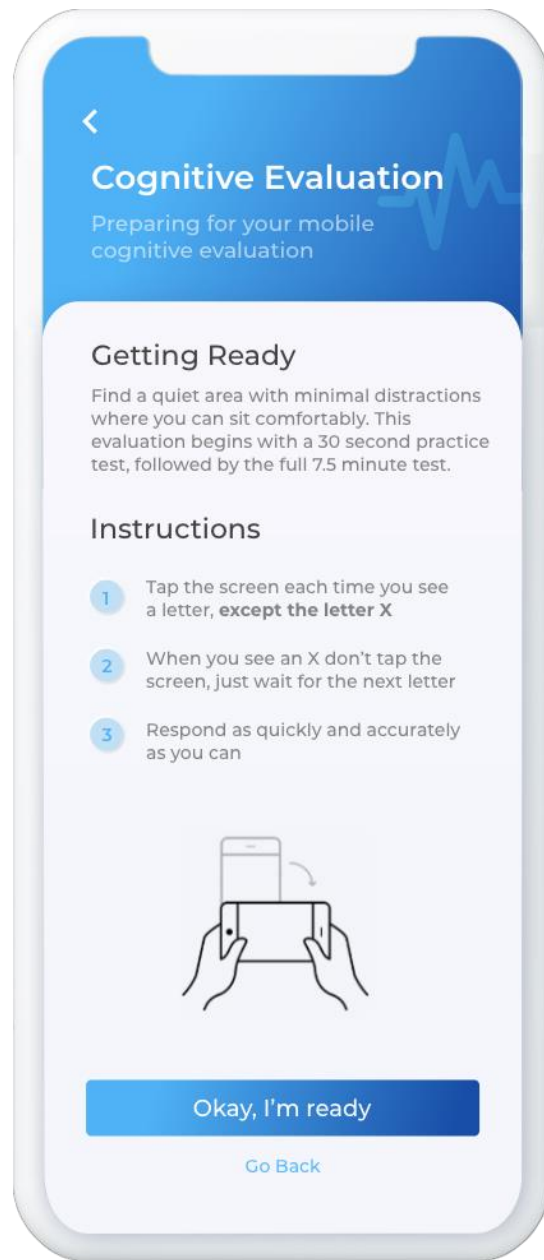
SCREENERS INCLUDES

→ Brief Medical History

→ Symptom Evaluation

→ Cognitive Assessment

→ Gait Analysis

Cognitive Assessment

Derived from the Connors Continuous Performance Test (CPT), which is a challenging go-no-go cognitive test, this provides information regarding speed of mental processing, attention/inattention, response inhibition, and impulsivity.

CPT INSTRUCTIONS

→ Tap the screen each time you see a letter, **except the letter X**

→ When you see an X don't tap the screen, just wait for the next letter

→ Respond as quickly and accurately as you can

Cognitive Evaluation
Preparing for your mobile cognitive evaluation

Getting Ready

Find a quiet area with minimal distractions where you can sit comfortably. This evaluation begins with a 30 second practice test, followed by the full 7.5 minute test.

Instructions

1. Tap the screen each time you see a letter, **except the letter X**

2. When you see an X don't tap the screen, just wait for the next letter

3. Respond as quickly and accurately as you can

Okay, I'm ready

Go Back

X

Cognitive Results

Precise data that's easy to understand.

SCORING

Results are displayed as T-scores which were generated using norms from people of your age group and gender.

SCORING DISPLAY

Scores will be displayed on a scale with normal distribution.

T-SCORES

All scores are displayed as T-Scores, which have a mean of 50 and standard deviation of 10 and are compared to those of your age group and gender.
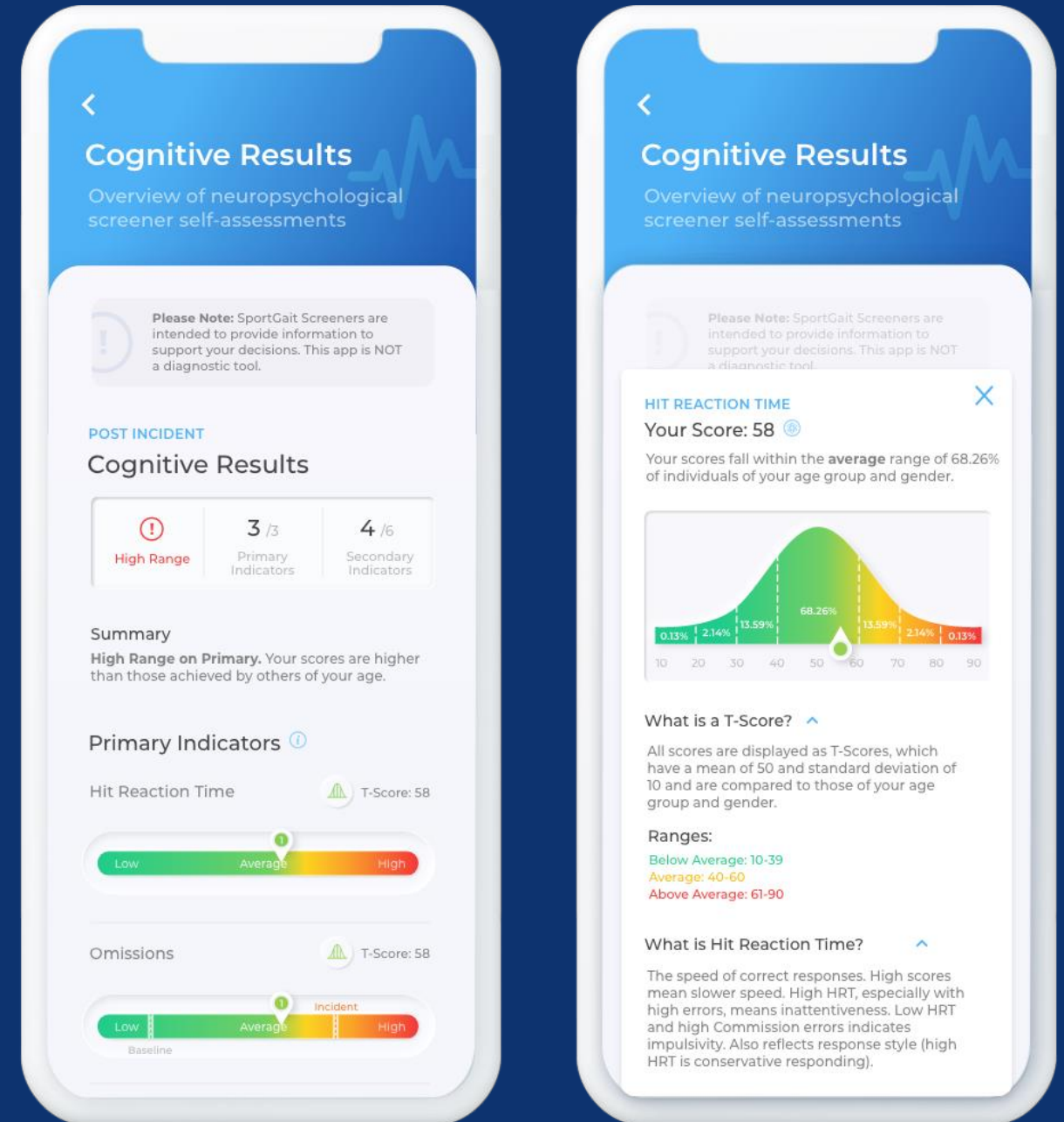
Gait Assessment

Generated from the BioKinetoGraphs invented by Dr. Mark Williams, the gait assessment analyzes, profiles and measures any abnormalities in your walking pattern to provide you with detailed insights into how it relates to concussion, brain wellness and a variety of muscular skeletal conditions.
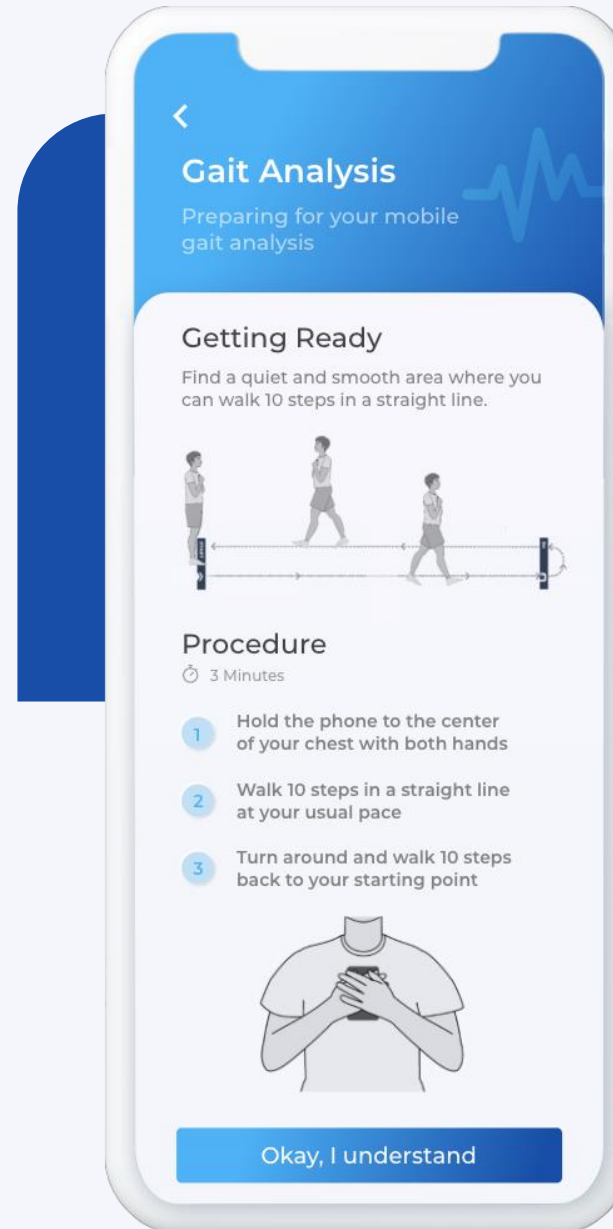
GAIT INSTRUCTIONS

→ Hold the phone to the center of your chest with both hands

→ Walk 10 steps in a straight line at your usual pace

→ Turn around and walk 10 steps back to your starting point
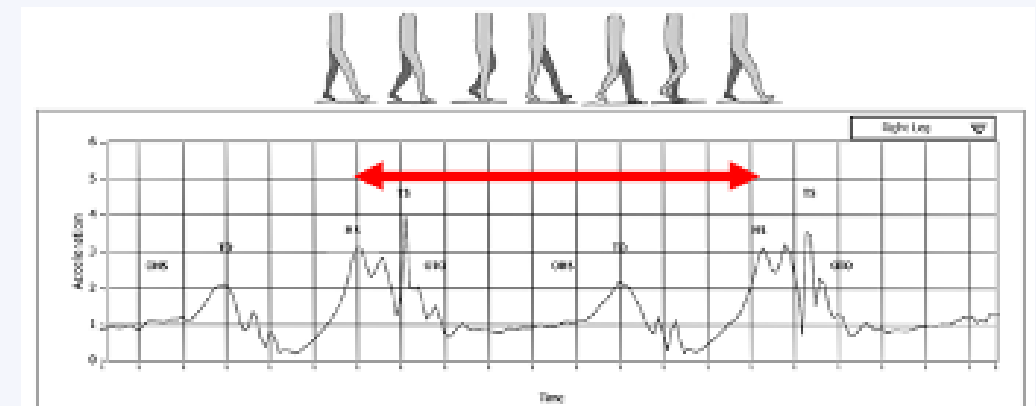
Gait Results

From the BKG we determine key reliable indicators grouped into your stride, stability, power and symmetry.

POWER

Power is the measurement of the force that an individual is walking. We display two distinct forces; Striking Force and Pushing Force.
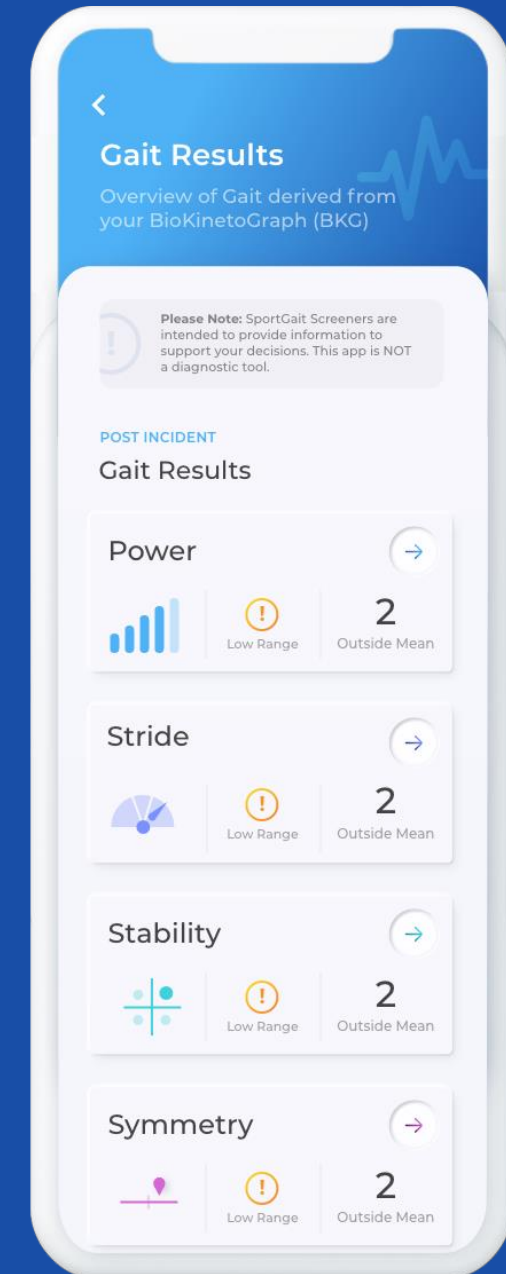
STRIDE

We measure the different elements of your stride. We display four distinct measurements; Stride Time, Stance Phase, Swing Phase, and Double Stance Phase.

STABILITY

Your ability to regulate balance control while walking. We display three distinct measurements: Sway (Side to Side), Sway (Front to Back) and Support Variabilities.

SYMMETRY

Your ability to maintain regularity, consistency and evenness between your left and right side while walking. We measure Power, Stride and Stability.

Power

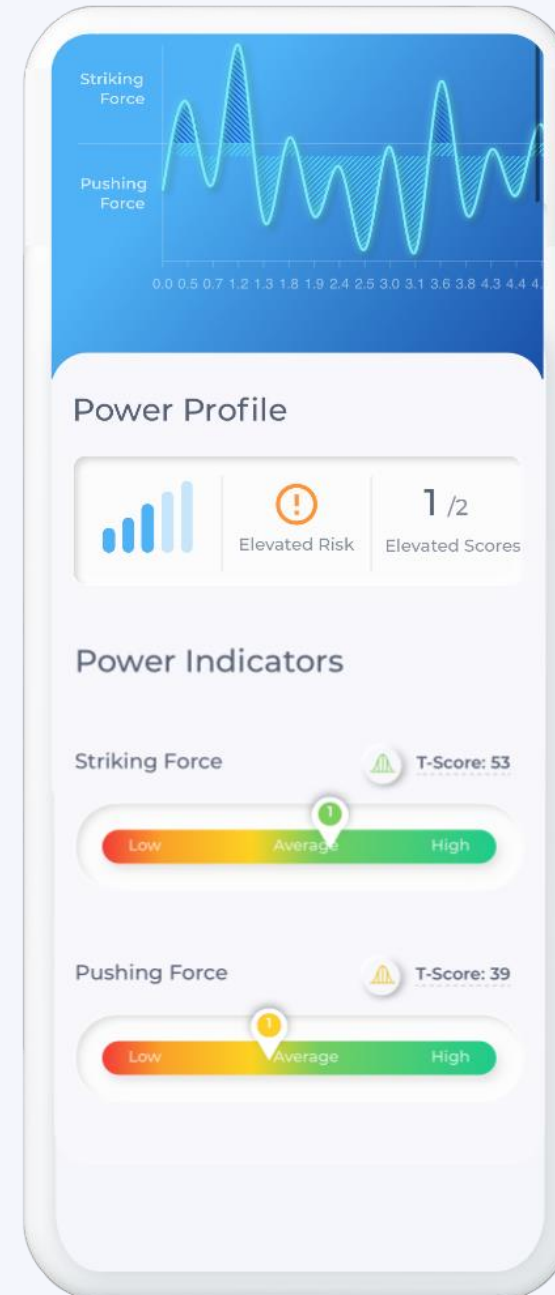Power is the measurement of the force that an individual is walking. We display two distinct forces:

STRIKING FORCE

The total amount of energy produced when the heel hits the ground

PUSHING FORCE

The total amount of energy generated to lift your foot off the ground, propelling your body forward

GRAPH:
This graph shows your actual walk, indicating your striking force and pushing force over time.

Stride

We measure the different elements of your stride. We display four distinct measurements:

STRIDE TIME

The average time to complete the full gait cycle on one side, from one heel contact to the next
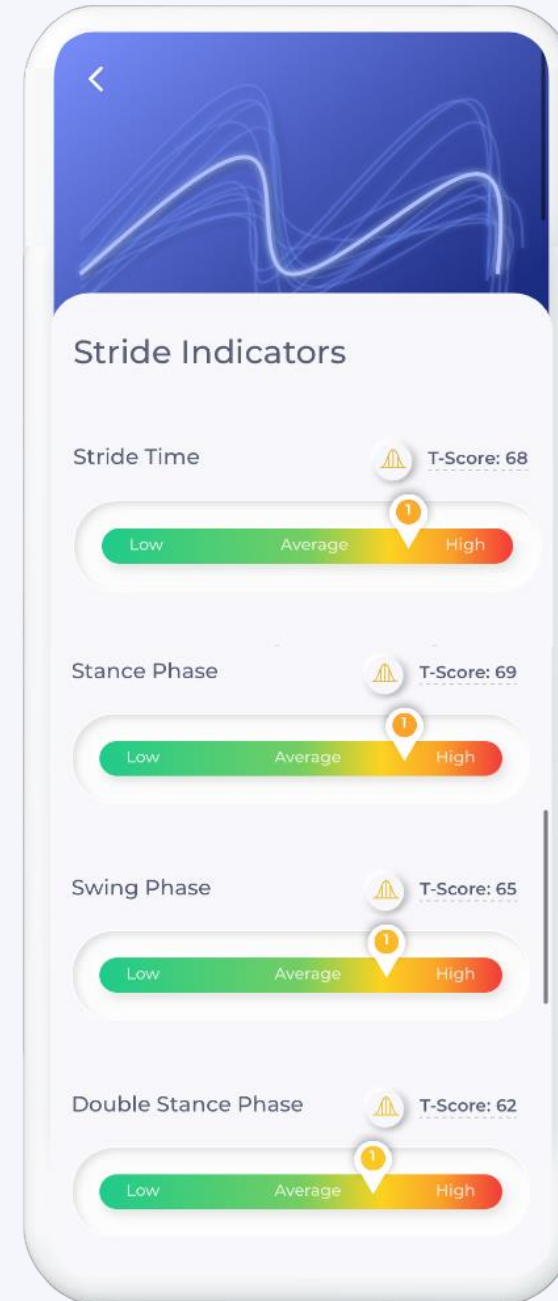
STANCE PHASE

Begins when one foot first contacts the ground and ends when the same foot leaves the ground

SWING PHASE

Begins when one foot leaves the ground and ends when the same foot contacts the ground

DOUBLE STANCE PHASE

The amount of time that both feet are on the ground simultaneously while walking

Stride Indicators

Stride Time — T-Score: 68
Low · Average · High

Stance Phase — T-Score: 69
Low · Average · High

Swing Phase — T-Score: 65
Low · Average · High

Double Stance Phase — T-Score: 62
Low · Average · High

GRAPH:
This graph shows your average stride cycle. The bright line indicates your average and the faint lines are your actual calculations.

Stability

Your ability to regulate balance control while walking. We display three distinct measurements:
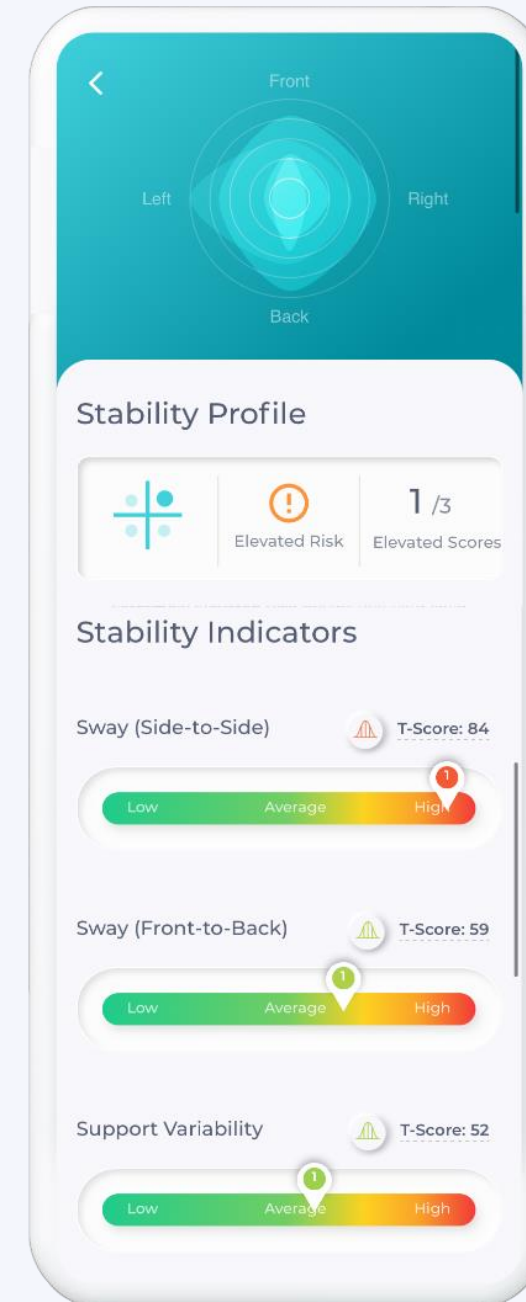
SWAY (SIDE TO SIDE)

The average time to complete the full gait cycle on one side, from one heel contact to the next

SWAY (FRONT TO BACK)

Begins when one foot first contacts the ground and ends when the same foot leaves the ground

SUPPORT VARIABILITIES

Begins when one foot leaves the ground and ends when the same foot contacts the ground

GRAPH:
This graph shows the overhead view of your walk, indicating your stability as you walk.

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Symmetry

Your ability to maintain regularity, consistency and evenness between your left and right side while walking.
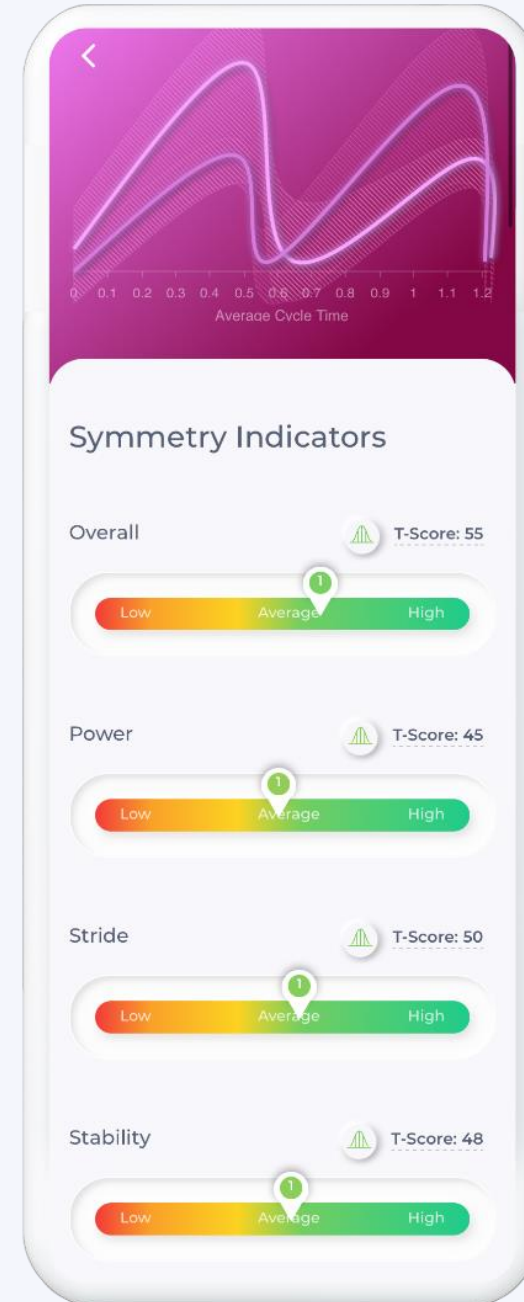
POWER

We measure if the force you exert while walking favors one side or another

STRIDE

We measure if your strides are equally uniform

STABILITY

We measure if you maintain balance or whether you favor one side or another

GRAPH:
This graph shows the differences in symmetry with your walk over time. The bright line is your left side and the darker one is your right side.

Try it Out!

Enter Login Code: RingsideDoc

- 2 weeks to download
- Free for the year

Conclusion

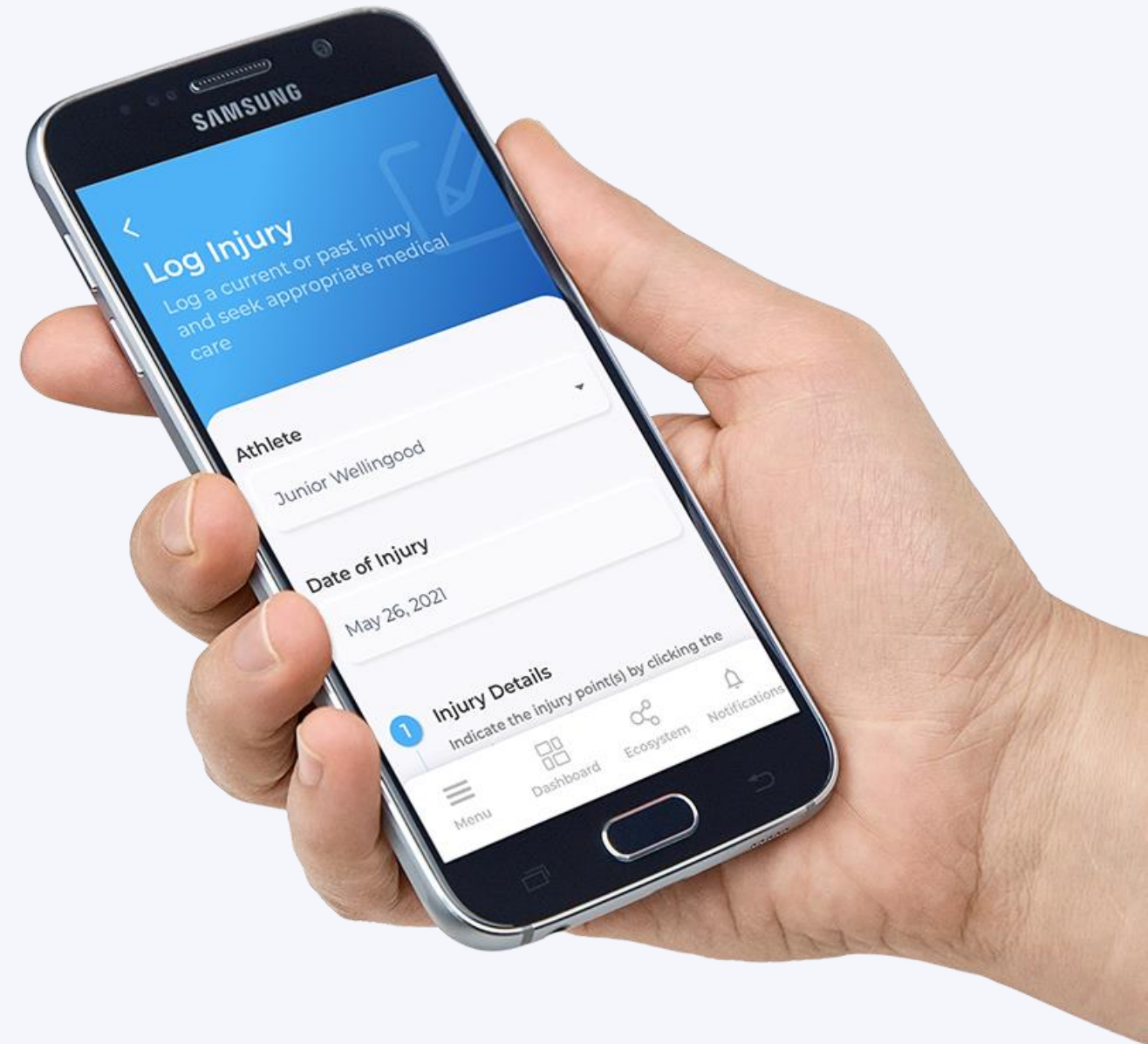Concussion is a Clinical Decision

WITH AN ACCURATE TOOL LIKE SPORTGAIT YOU CAN

→ Track if your health over time

→ Track your recovery

BEING APP-BASED, YOU CAN TRACK RECOVERY REMOTELY

WITH SPORTGAIT

→ Medical providers will get quick and accurate information from anywhere

→ You will gain *peace of mind*

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