



THE OHIO STATE UNIVERSITY

CONITY

MEASURE. INFORM. OPTIMIZE.

Sensor-based assessment of Low Back
Function in Military Settings

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Disclosures

Jon Dufour has no relevant, real, or apparent personal or professional financial relationships with proprietary entities that produce healthcare goods and services.

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Impact of Spine Disorders on U.S. Military

33%

Of all military
personnel have low
back or neck pain

Bounds et al., 2024

#1

Reason service
members
seek care

Yuan et al., 2024

A leading
cause of

Fitness, duty, and
mobility restrictions

Medical evacuation
from combat zones

Medical discharge

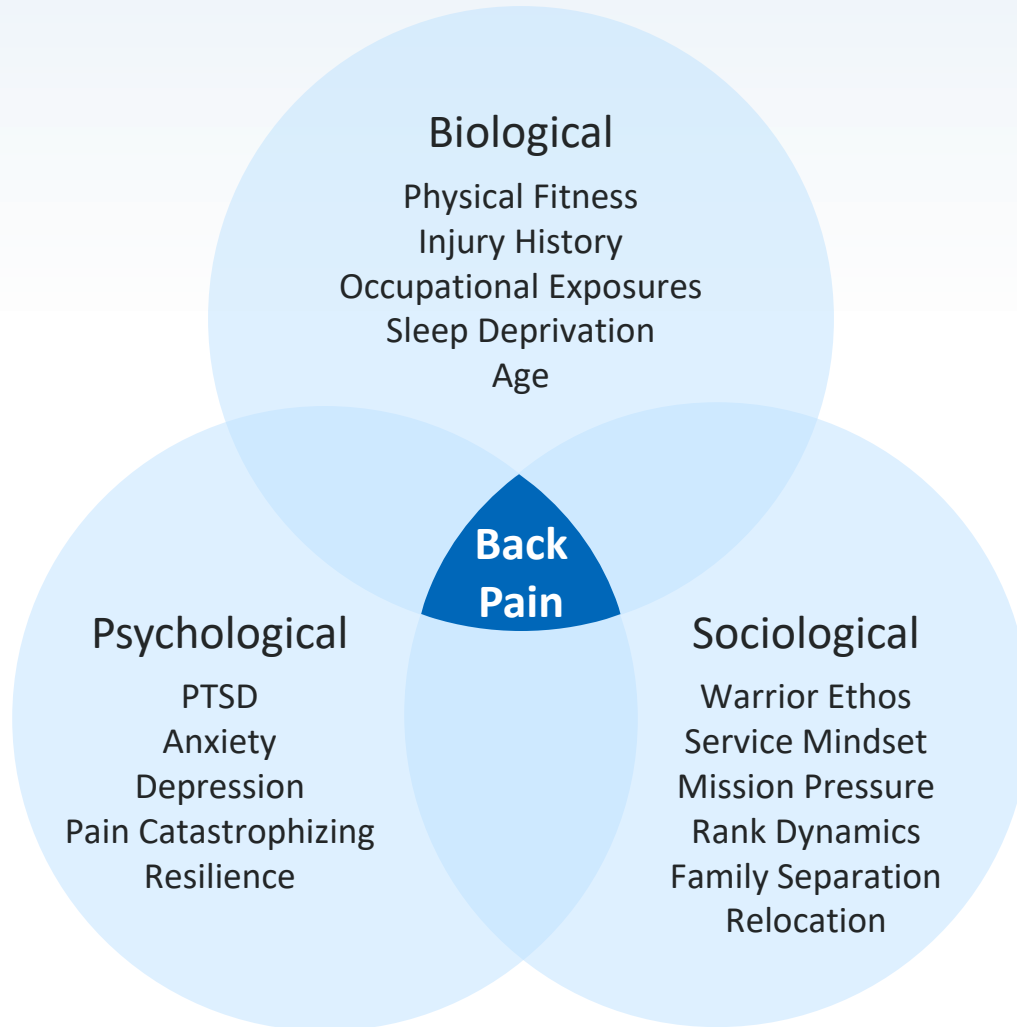
Roy et al., 2022

Molloy et al., 2020

Yuan et al., 2024

Lincoln et al., 2002

Spine Disorders are Complex



The Biopsychosocial Model
Waddell, 1987

Often compound
over decades

Average chronic
symptoms last 7 years

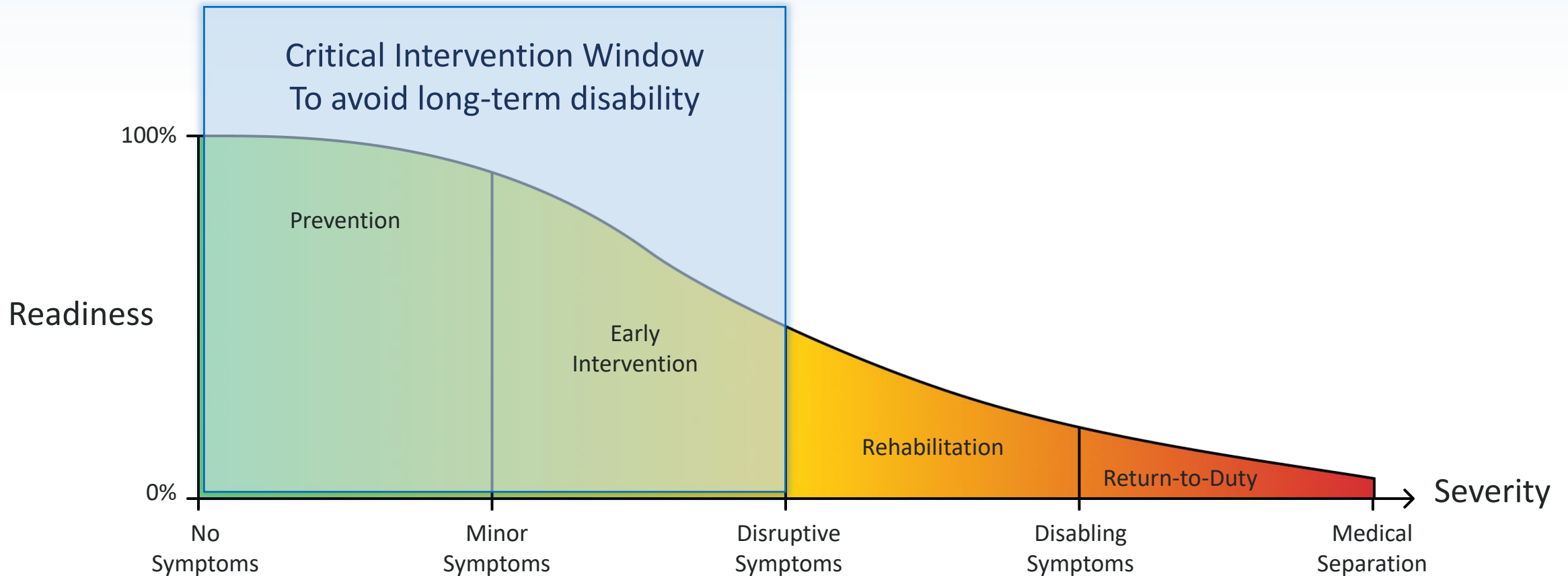
Goode et al., 2010

Treatments rarely cure chronic
spine disorders

Buchbinder et al., 2018
Cashin et al., 2025

Paradigm Shift

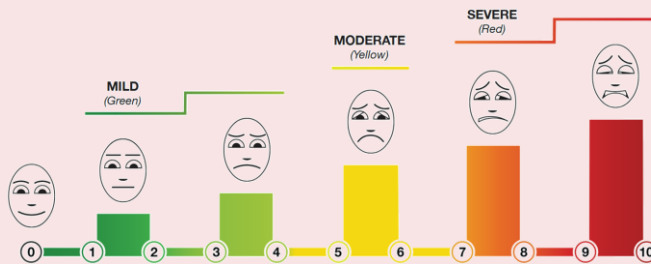
From treating chronic pain to preserving long-term readiness



Problem

Reliable metrics are lacking to inform intervention decisions

Low Back and Neck Disorders



Wait for Problem / React
Patient-Reported Pain

Heart Disease



Routine Prevention / Early Intervention
Blood Pressure, Lipids, ECG

Diabetes



Routine Prevention / Early Intervention
Hemoglobin A1C

30+ Years of Research → Foundational Insight

Spine disorders produce a measurable Motion Signature™

Influenced by
changes in:

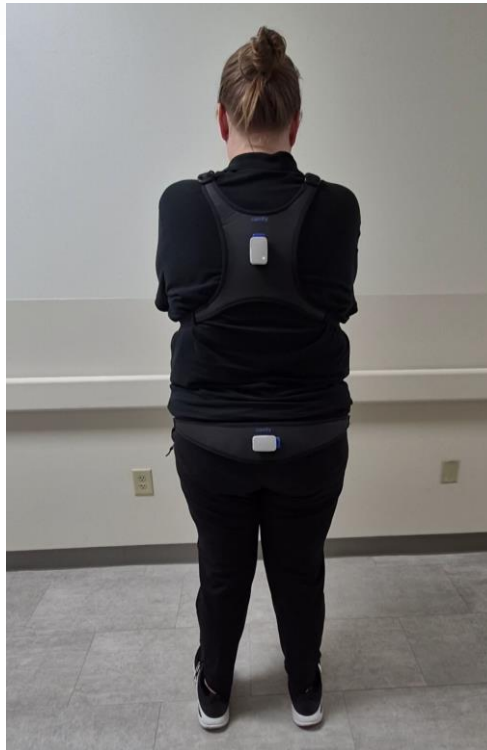
Pain

Muscle Atrophy

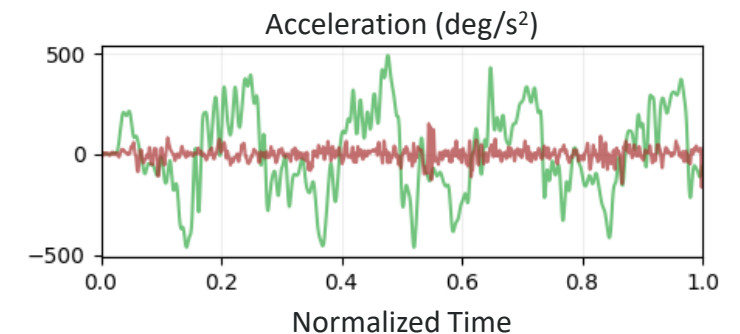
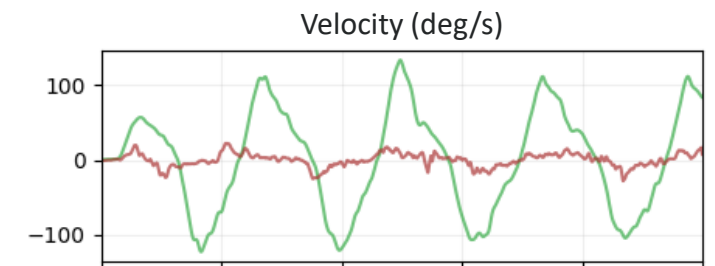
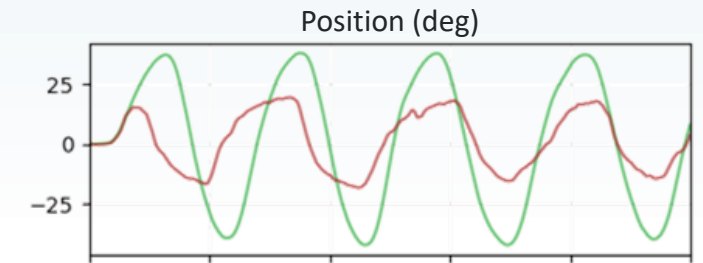
Motor Control

Fear Avoidance

Asymptomatic Control



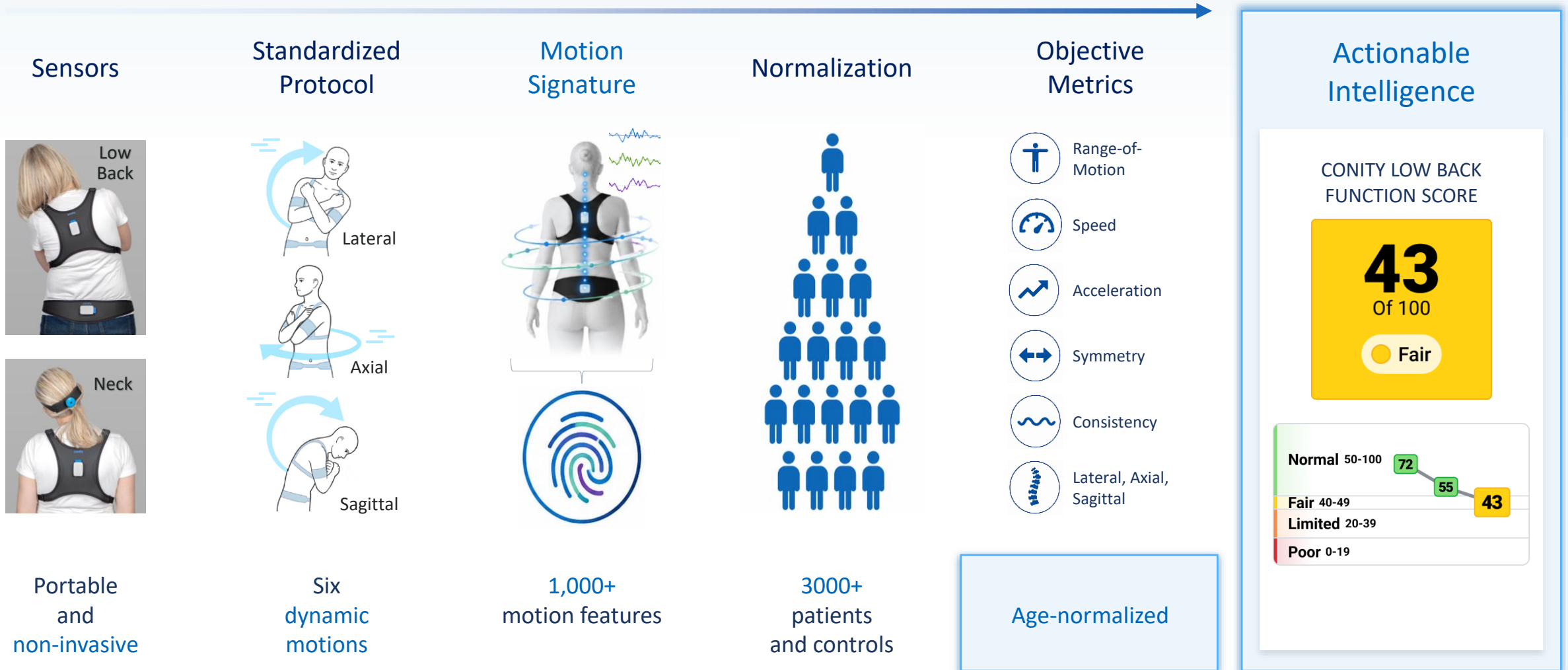
Patient



Spine dynamics are critical

Conity Solution – Motion Assessment

Actionable intelligence about warfighter spine function – in 6 minutes



Conity Solution – Decision Support

Supports decisions across the prevention-to-care continuum



Conity Solution – Scientific Validation

Sensor Accuracy

99%

Aurand et al., 2017

Discriminative Ability

85%

Mageswaran et al., 2023

Repeatability

84%

Hani et al., 2022

Prognostic Accuracy

75%

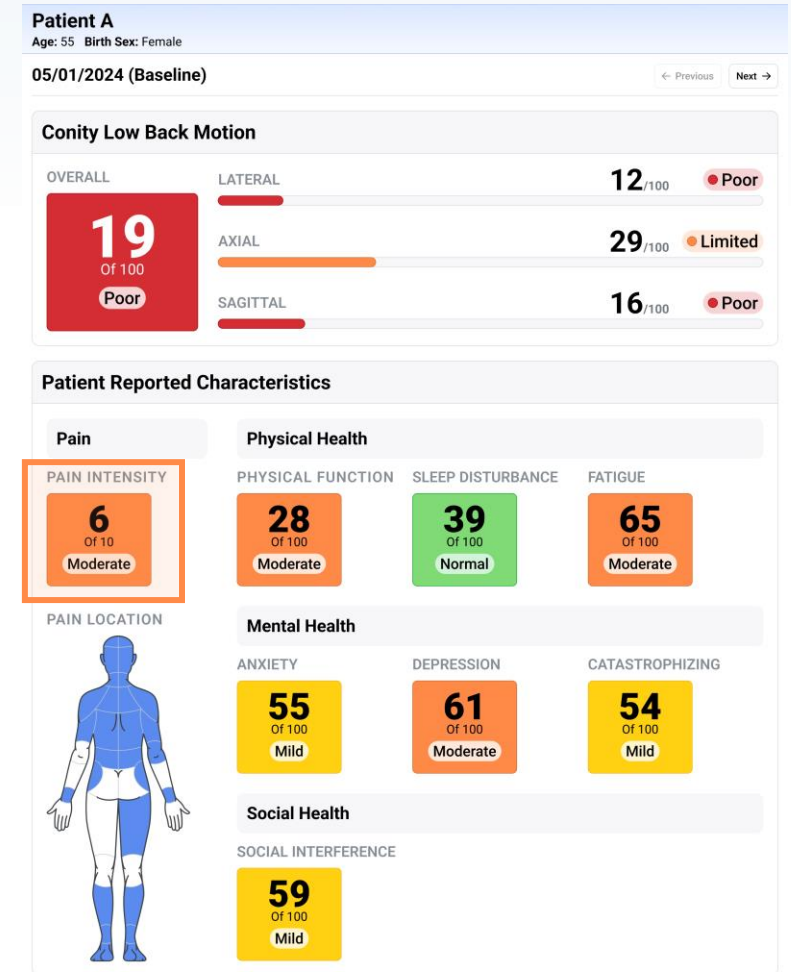
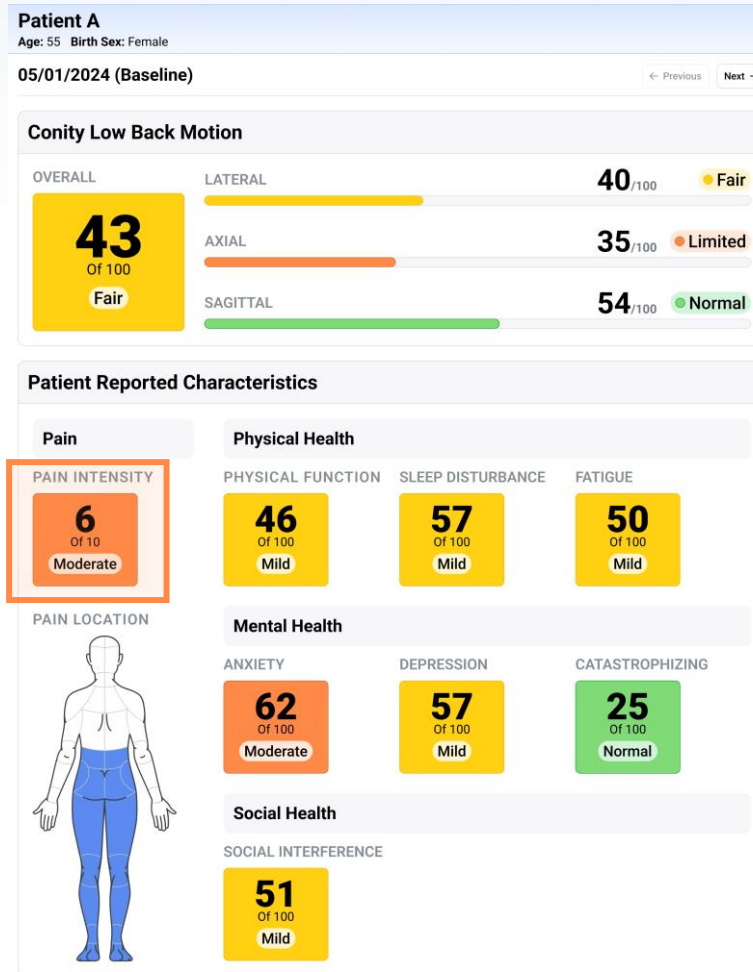
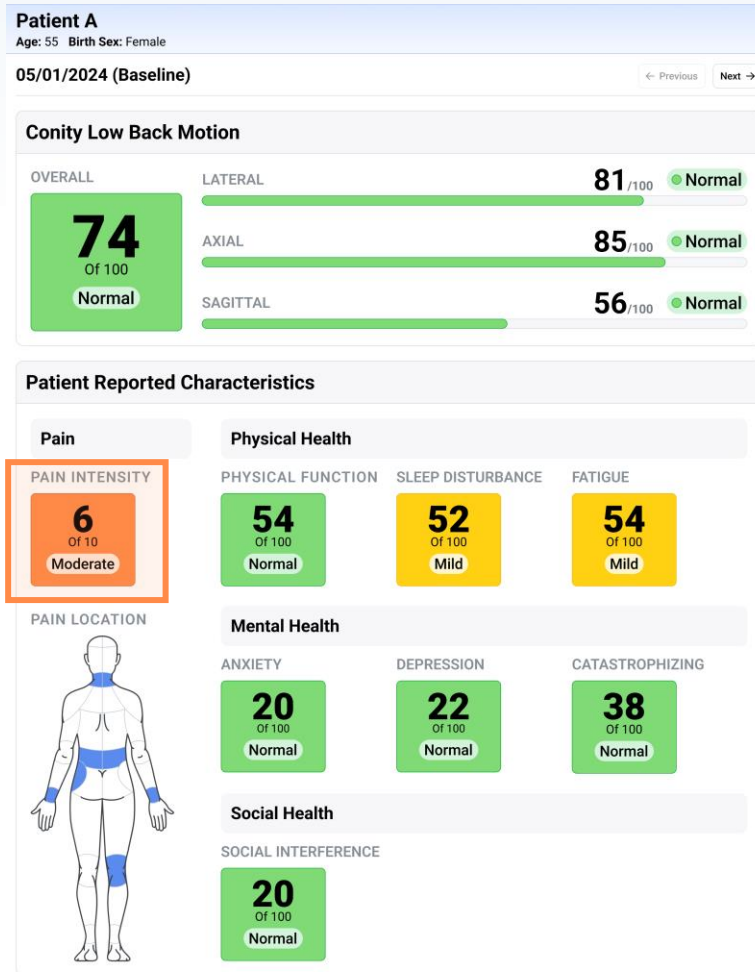
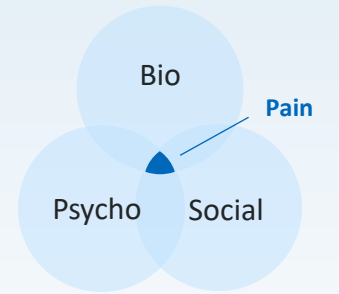


NATIONAL INSTITUTES OF HEALTH

Multiple multi-site clinical trials with 2000+ patients

Conity Solution – Comprehensive Reports

Objective function complements patient-reported outcomes



Military Studies



OBJECTIVE

Determine whether Conity works in real operational military settings



7 Military Sites

Holloman AFB, Eglin AFB, Joint Base Langley-Eustis, Wright-Patterson AFB, Seymour Johnson AFB, Marine Corps Base Quantico, Uniformed Services University



216

Service
Members



98%

Active Duty

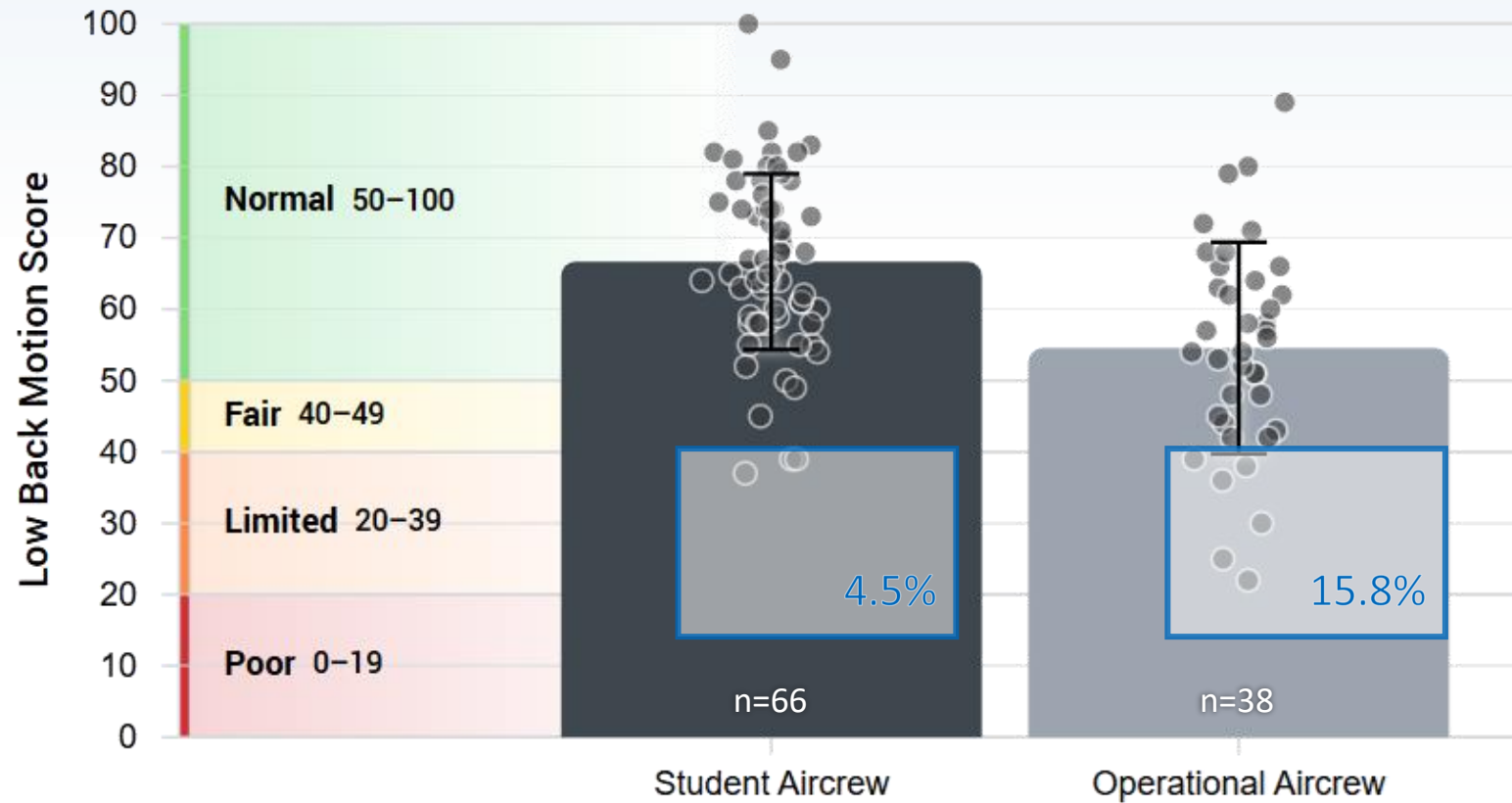


CDMRP

Funded

Military Studies

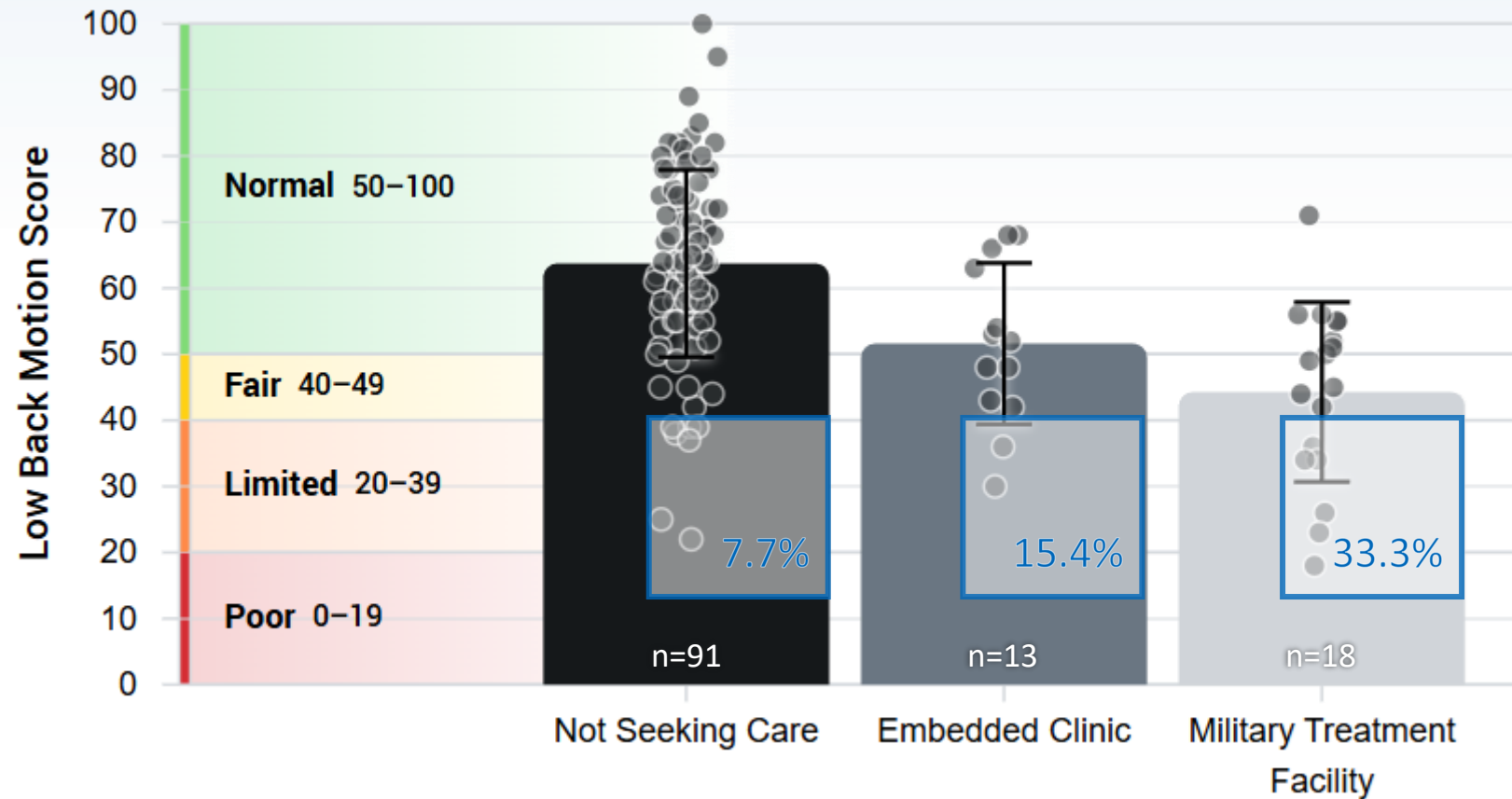
Student vs. Operational Aircrew



INSIGHT

Operational flying was associated with lower low back function

Military Studies Prevention-to-Care Continuum



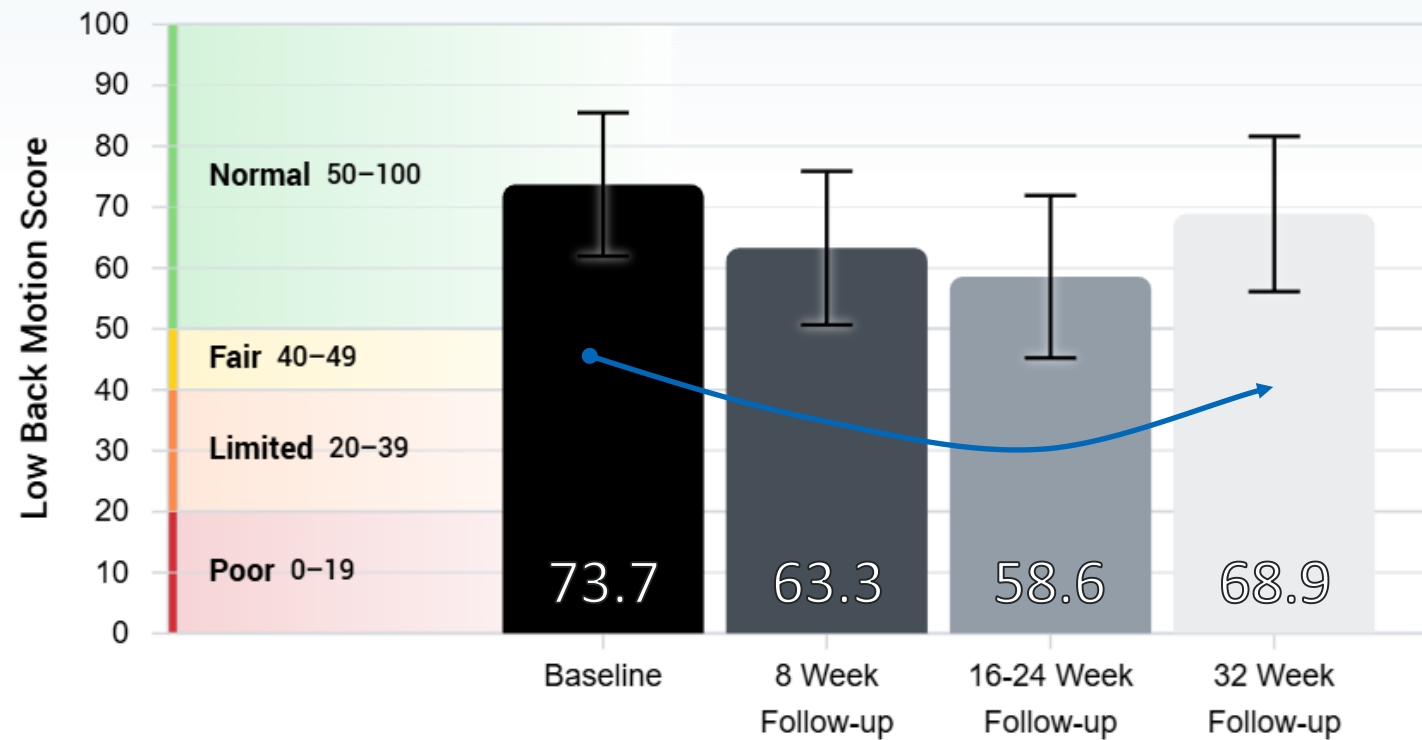
INSIGHT

Objective assessments identified impairment – even before warfighters sought care

Military Studies

F-35 Basic Course training

(1st Eglin Cohort, n=7 Students)



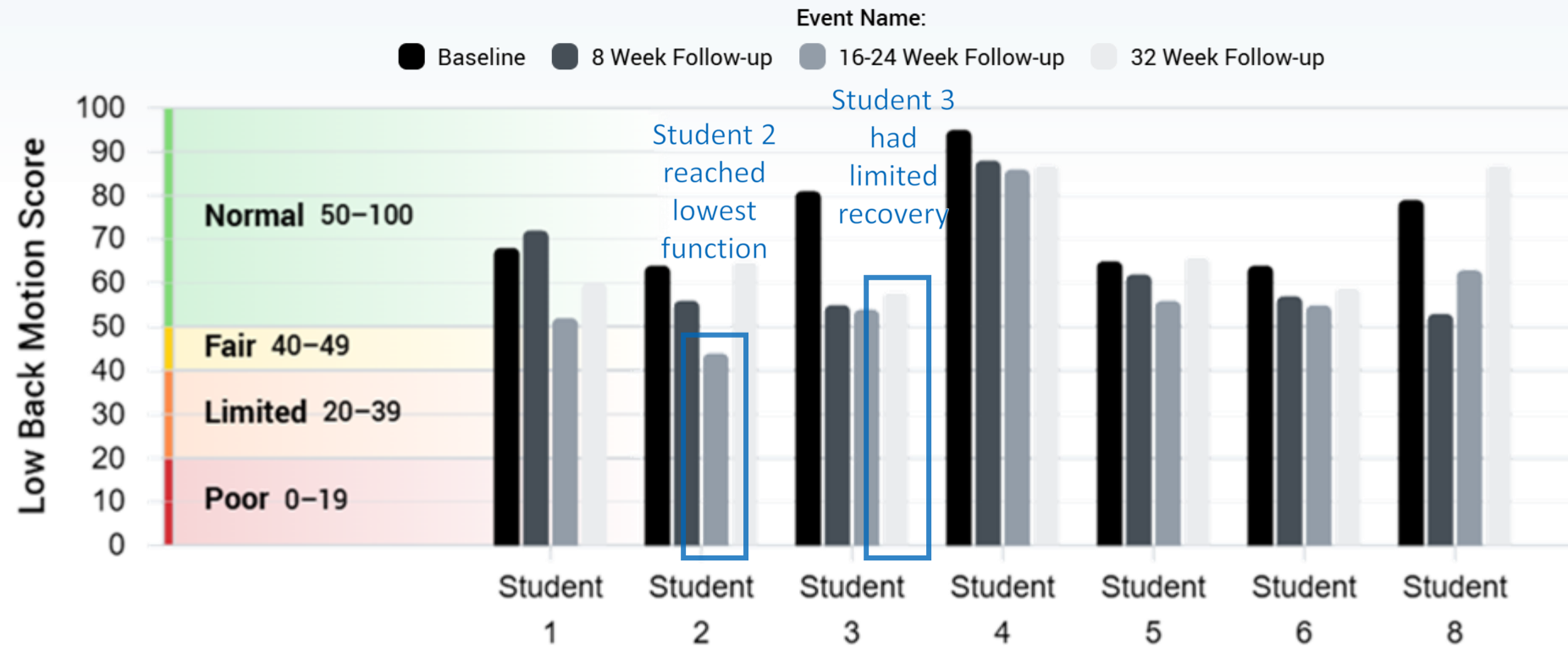
INSIGHT

Low back function decreased over most of the training curriculum, then partially recovered

Military Studies

F-35 Basic Course training

(1st Eglin Cohort, n=7 Students)



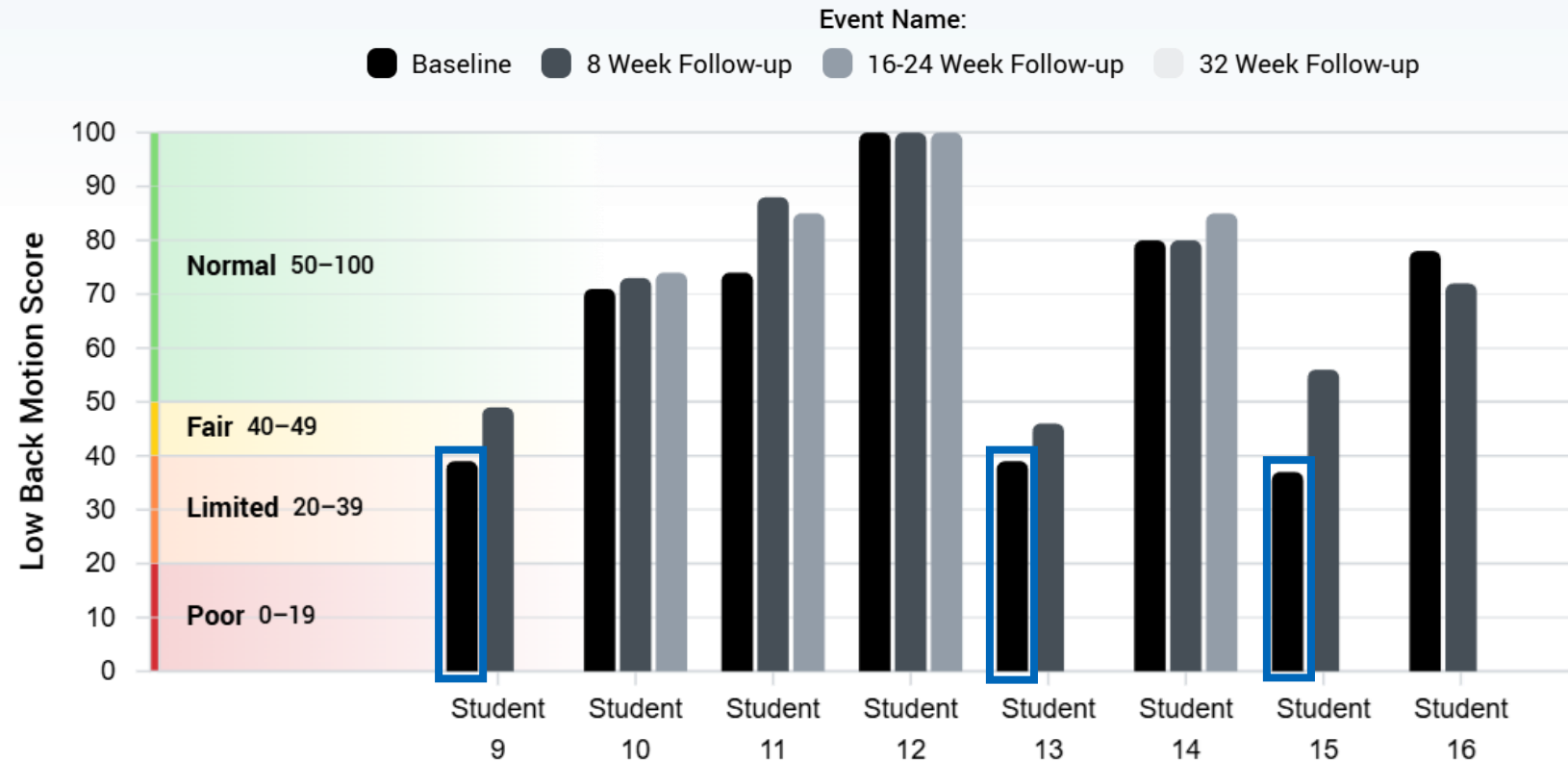
INSIGHT

Students followed similar trends – but meaningful individual differences emerged

Military Studies

F-35 Basic Course training

(2nd Eglin Cohort, n=8 Students)



INSIGHT

The second student cohort differed from the first, with many students starting impaired

Next Steps

Prospective studies with operational outcomes

FDA clearance

Increase manufacturing scale

Operational transition



Travel / Charging



Sensor



Harnesses

Conclusions



CONITY

Transforms spine motion into actionable intelligence to support warfighter health and readiness

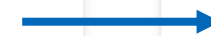
Measure.

Objective spine
function in
six minutes



Inform.

Identify impairment
and track changes
over time



Optimize.

Improve training and
interventions to
increase readiness

Questions

What questions can I answer?

Feedback?

Where should we be focusing our attention?

References

Military Statistics

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Conity Validation

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