

Deconstructing the Oura Ring Sleep & Readiness Scores with Comparisons to the Fitbit Sleep Score

By Paul M. Richardson

Research Journey & Agenda



Motivation



Objectives



Methods



Related Work



Data



Results



Oura Ring vs. Fitbit



Sensors packages are identical
in capability.

Oura Ring
Launched on
Kickstarter



2015

2016



Fitbit User

Oura Ring User



2018

2019



Fitbit Sleep Score

Fitbit Readiness
Score



2021

Heart Rate Variability (HRV) & HRV Balance Score

- HRV is a measure of the variation in time between heartbeats.
 - A measure of various stressors on the autonomic nervous system (ANS)
 - The greater the time between beats suggests a lower stress level.
 - The lower the time between beats the higher the user's stress level
- HRV Balance Score
 - HRV trend as a rolling average over a two week period compared to a three month baseline

Fit bit charge 4 & Oura ring comparison. (Did the Fitbit steal Oura's graph template?). Shows problem I have been having with the Oura saying I'm up earlier than actual.

Oura Ring While Playing Sports? (e.g. basketball)?

Not wearing oura during my workouts - is this affecting my scores much?

I have a FitBit charge 3. Would the Oura ring add any value?

Why does Oura think I'm awake while Fitbit detects deep sleep?

Data from Fitbit to Oura

 **r/ouraring** · Posted by u/augie crazy86 1 year ago

HUGE discrepancy with Fitbit

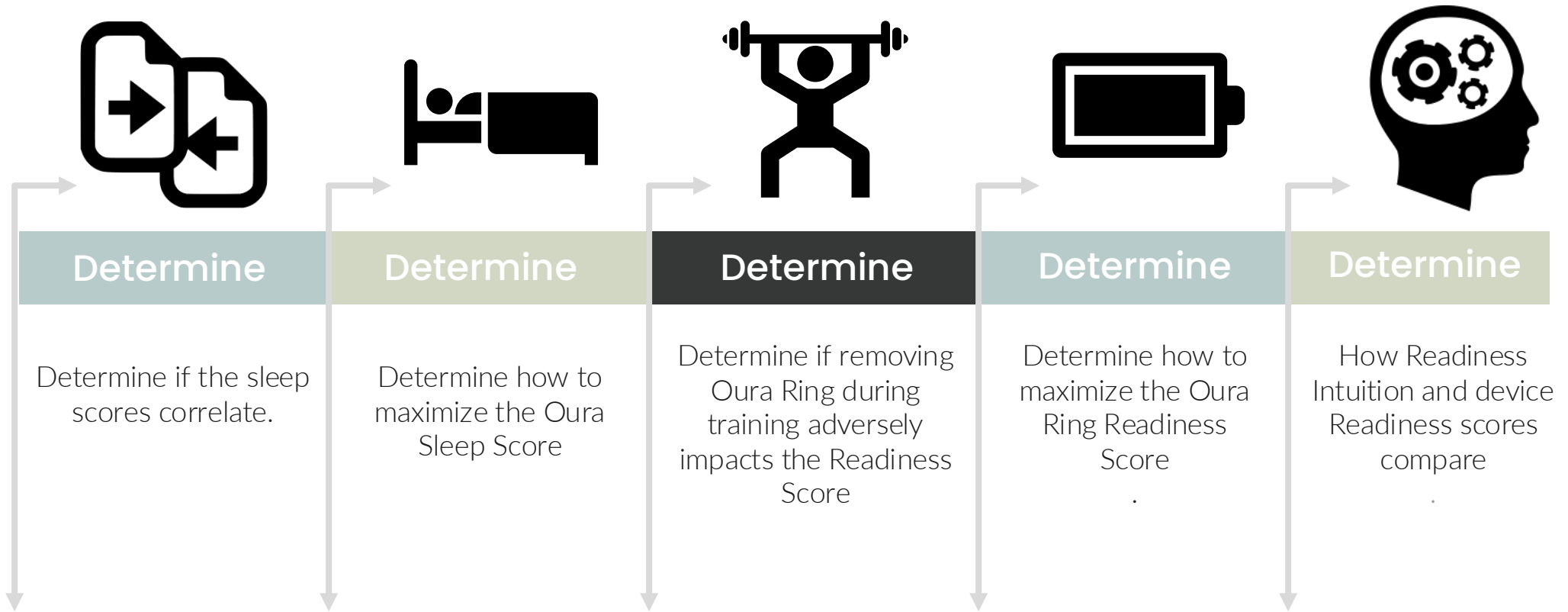
Fitbit + Oura

Oura and Fitbit

Oura Ring should be asking you how you feel (optional) in the morning.

Questions from reddit posts.....

Research Objectives

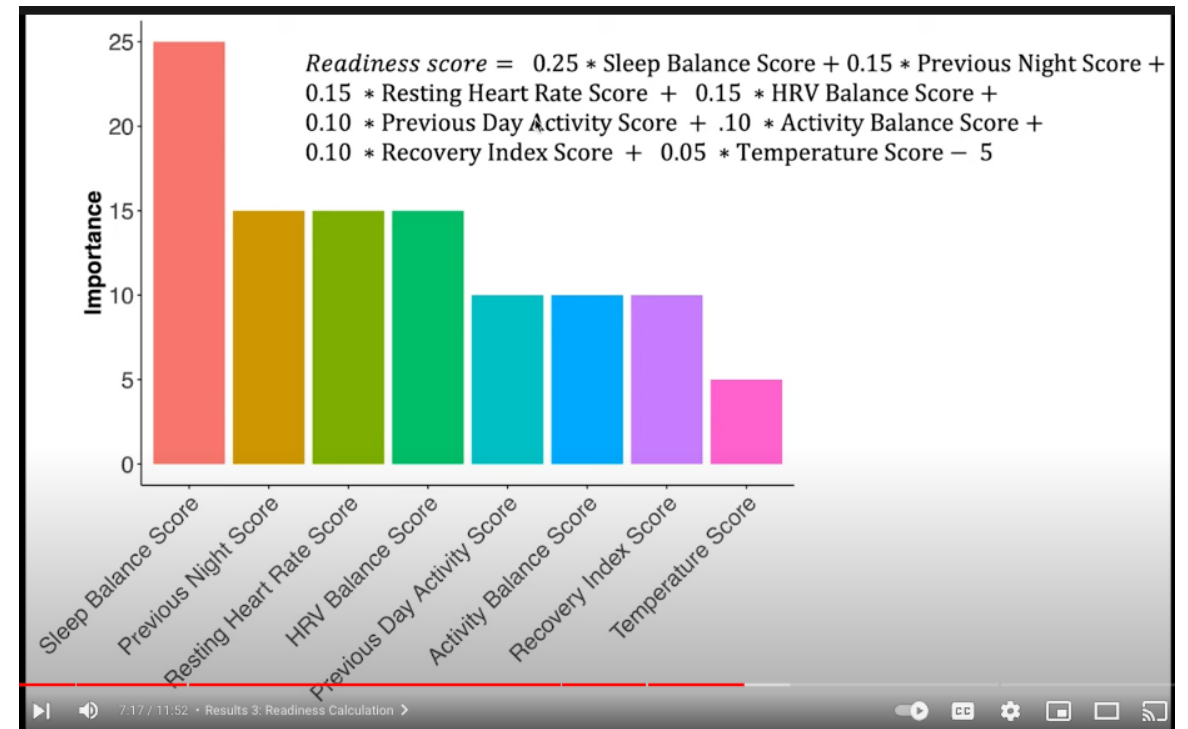


Related Work

- Accuracy : Polysomnography (PSG) vs. Standard Actigraphy
 - Challenged with Sensitivity vs. Specificity
- The Quantified Scientist review of the Readiness Score



Rob Ter Horst, Post Doctoral Researcher
The Quantified Scientist - YouTube



Methods

1

Directly compare sleep score data between the devices

2

Machine Learning Model Development

3

Feature Importance using Permutation Feature Importance and Shapley Additive Explanations

4

Survey of daily user score vs. device score

OBJECTIVES

Determine if the sleep scores correlate.

Determine how to maximize the Oura Sleep Score

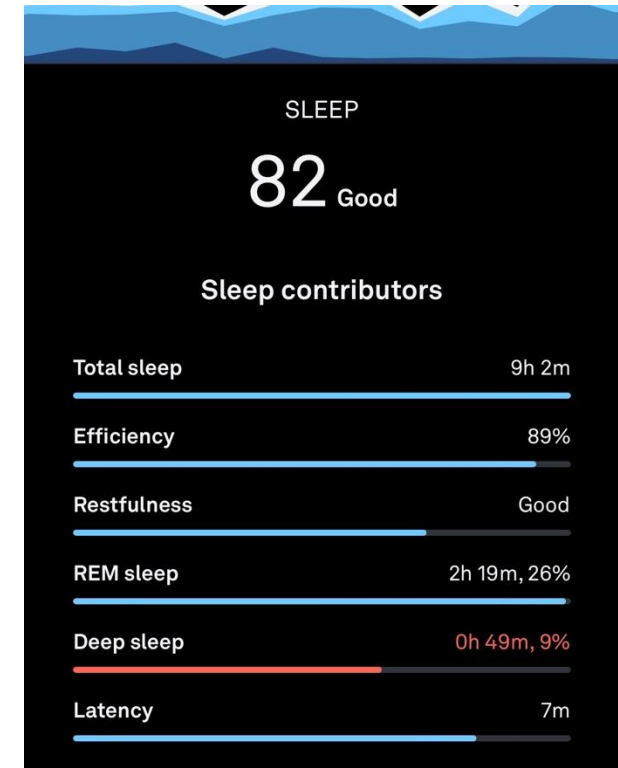
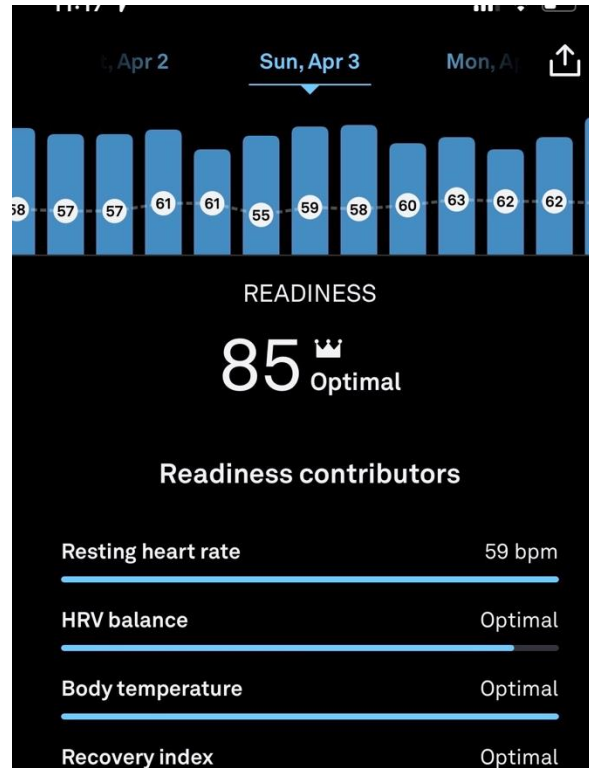
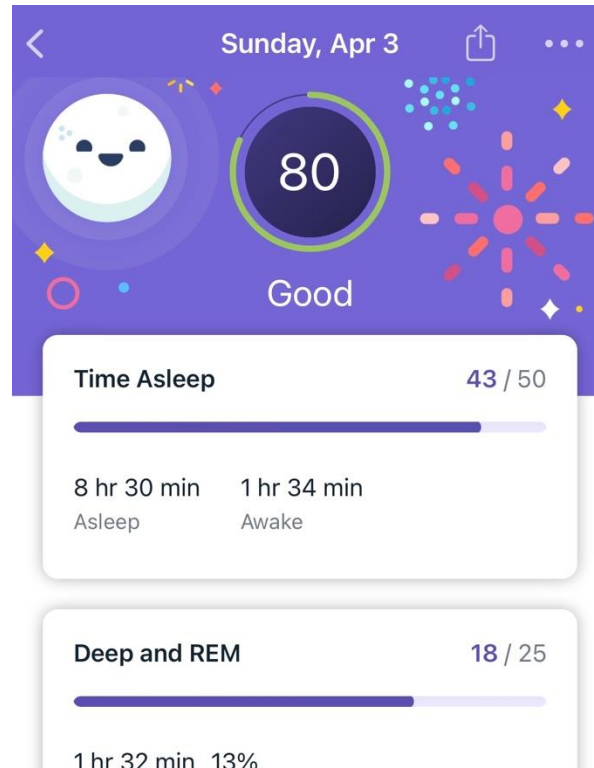
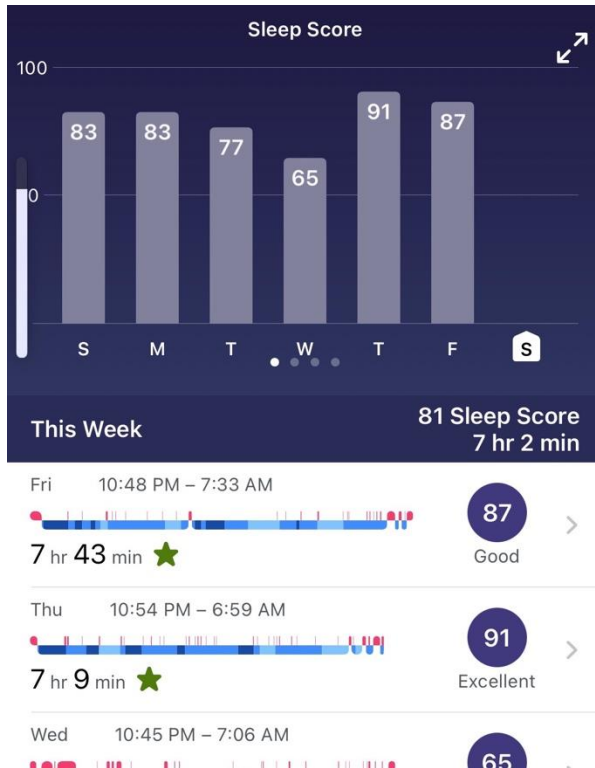
Determine if removing Oura Ring during training adversely impacts the Readiness Score

How readiness intuition and device readiness scores compare

How Readiness Intuition and device Readiness scores compare

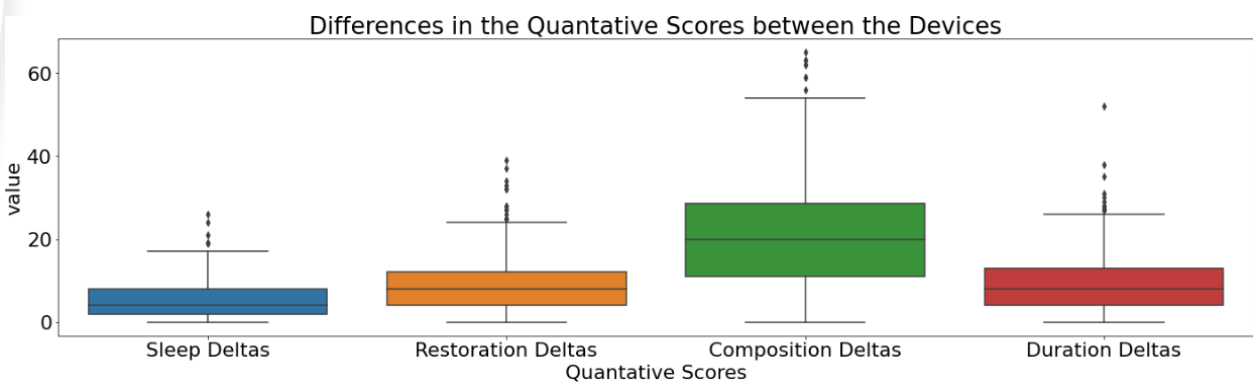
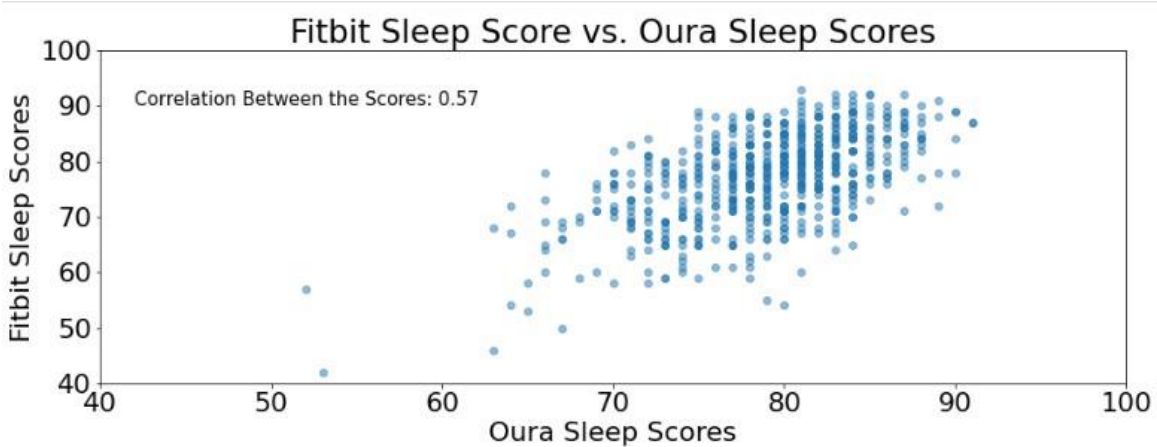
Data

- 2 years of Oura and Fitbit Data – 1 user w/ simultaneous use
- Semi-structured data directly available user portals
- Standard data preparation – units of measure, dates, incomplete records
- Scores composed of other scores



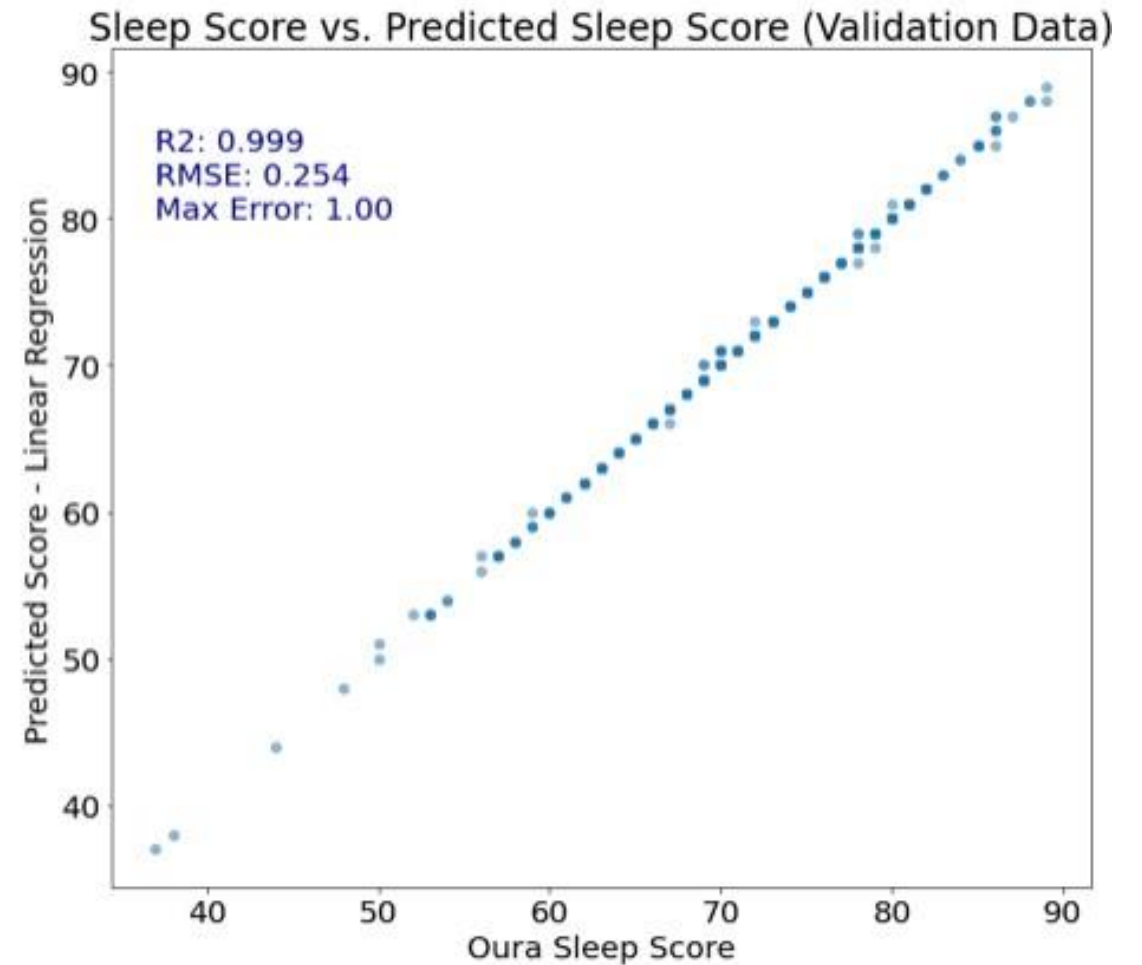
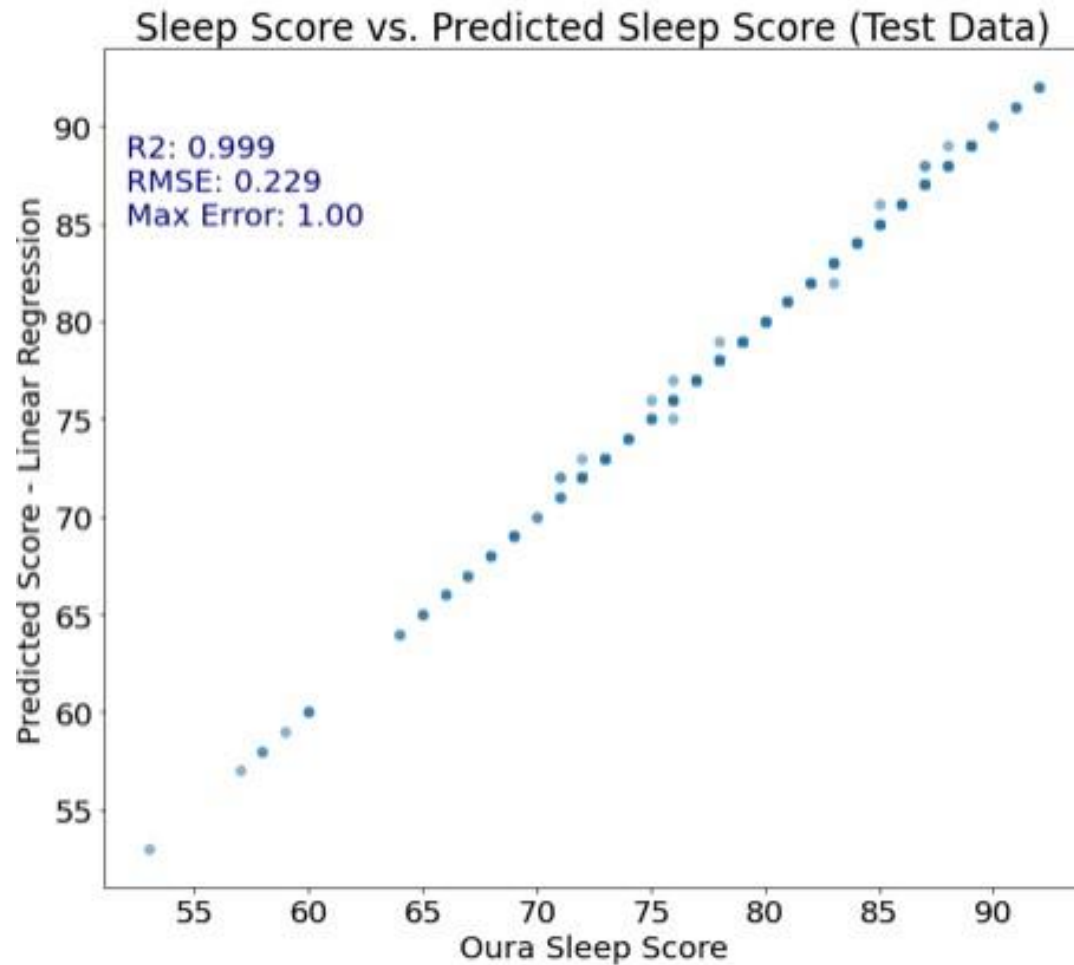
Results: Sleep Score Comparison

Factor	Correlation
Revitalization Score	0.13
Composition Score	0.20
Duration Score	0.61
Sleep Score	0.57
Deep Sleep	0.17



Sleep Score Model Performance

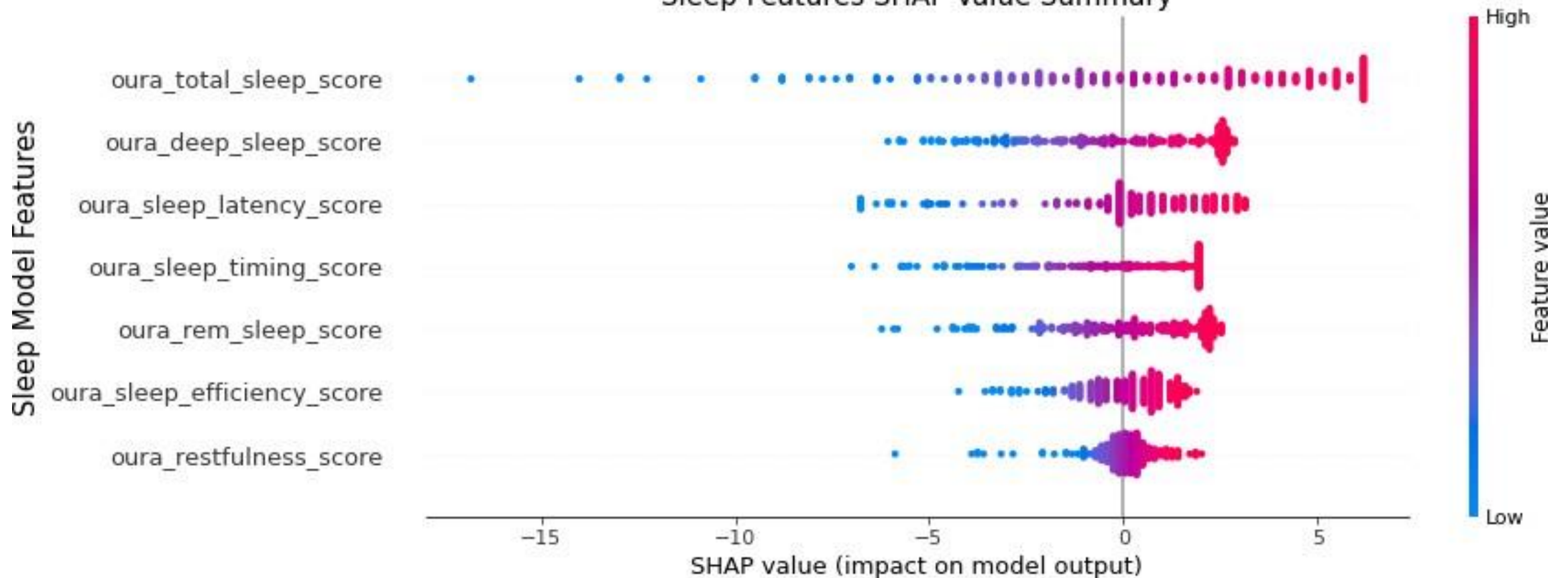
Oura Test Data vs. Oura Validation Data



Results: Readiness Feature Importance

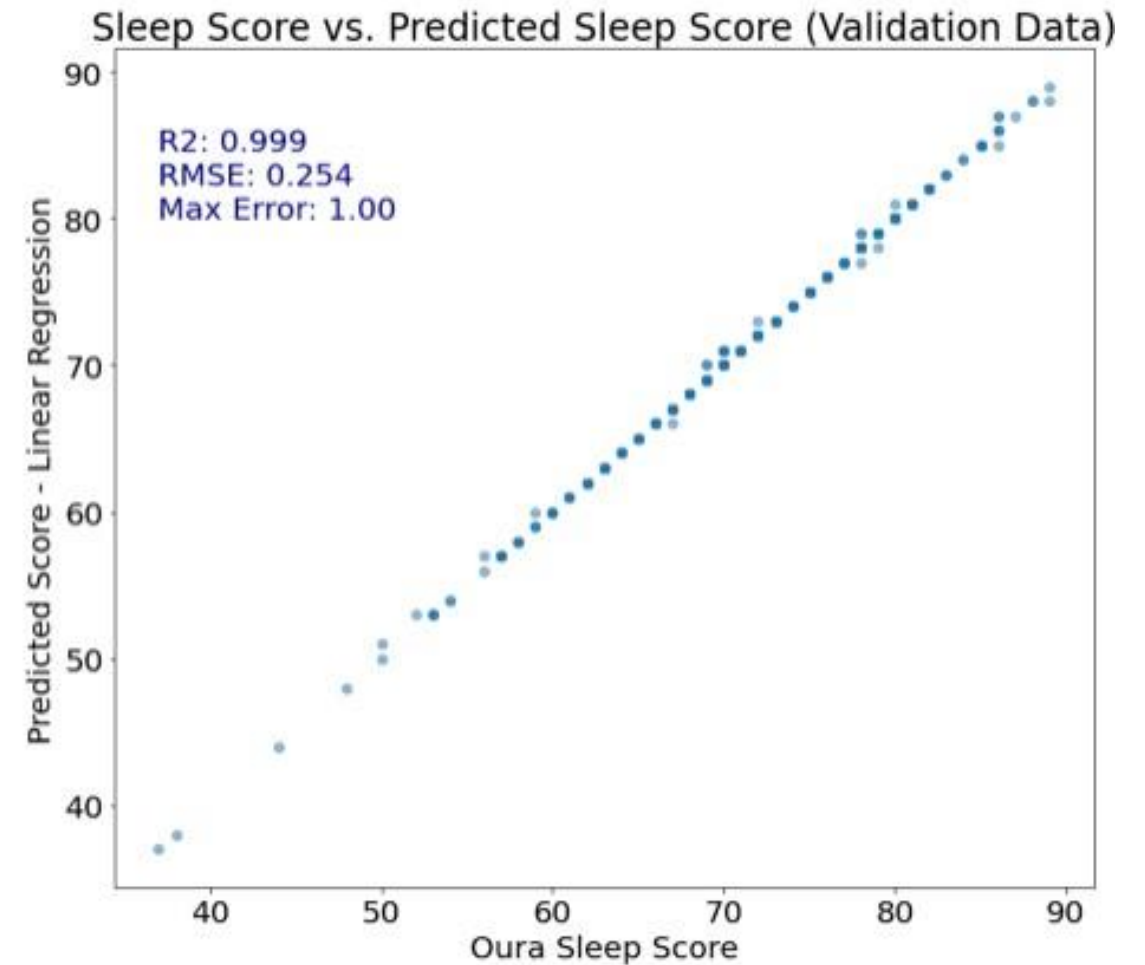
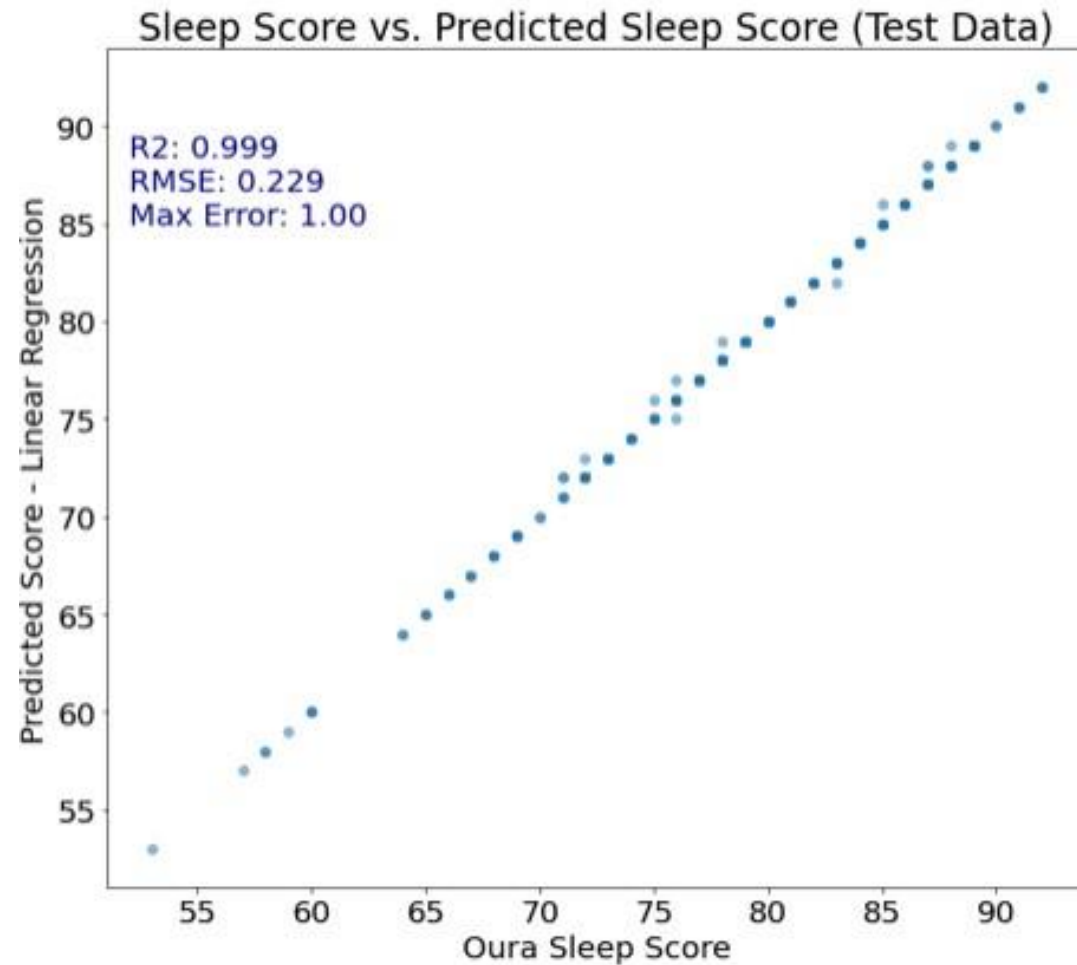
- Plenty of sleep
- Deep Sleep
- Fall asleep quickly

Sleep Features SHAP Value Summary



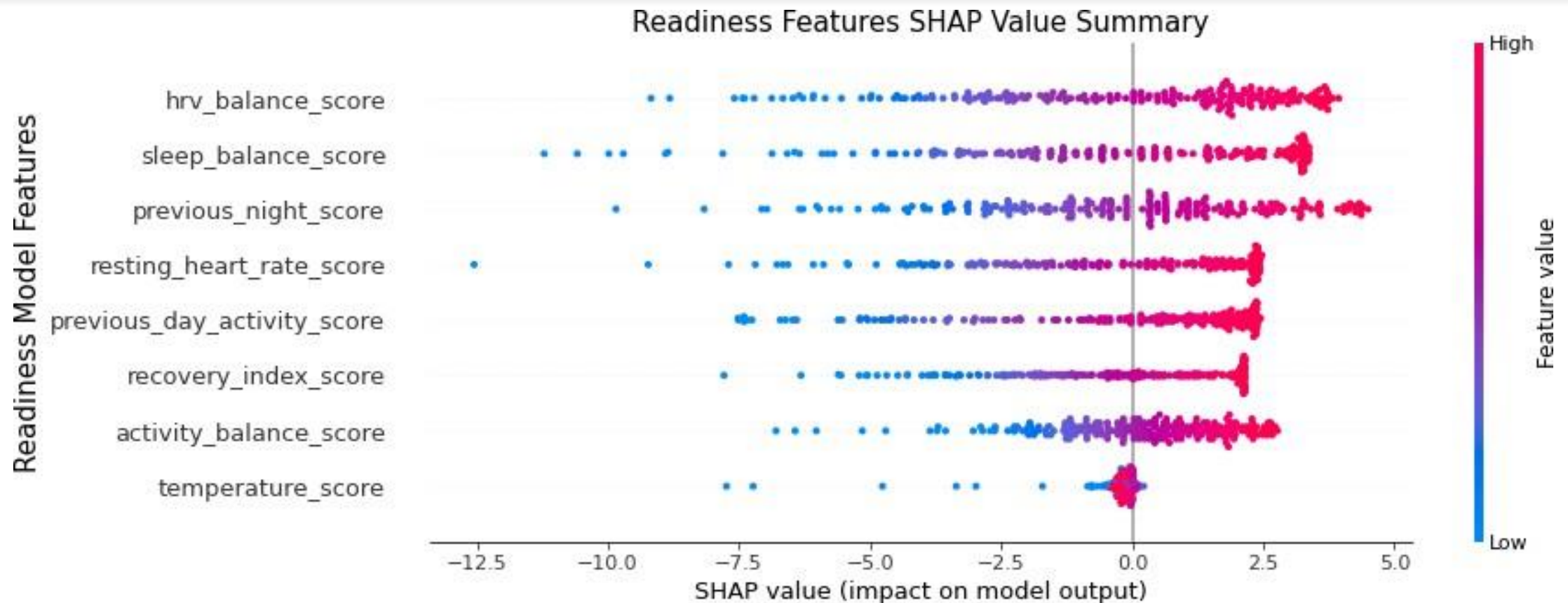
Readiness Score Model Performance

Oura Test Data vs. Oura Validation Data



Results: Readiness Feature Importance

- Manage Stress
- Routinely get sleep
- Get a good night's sleep

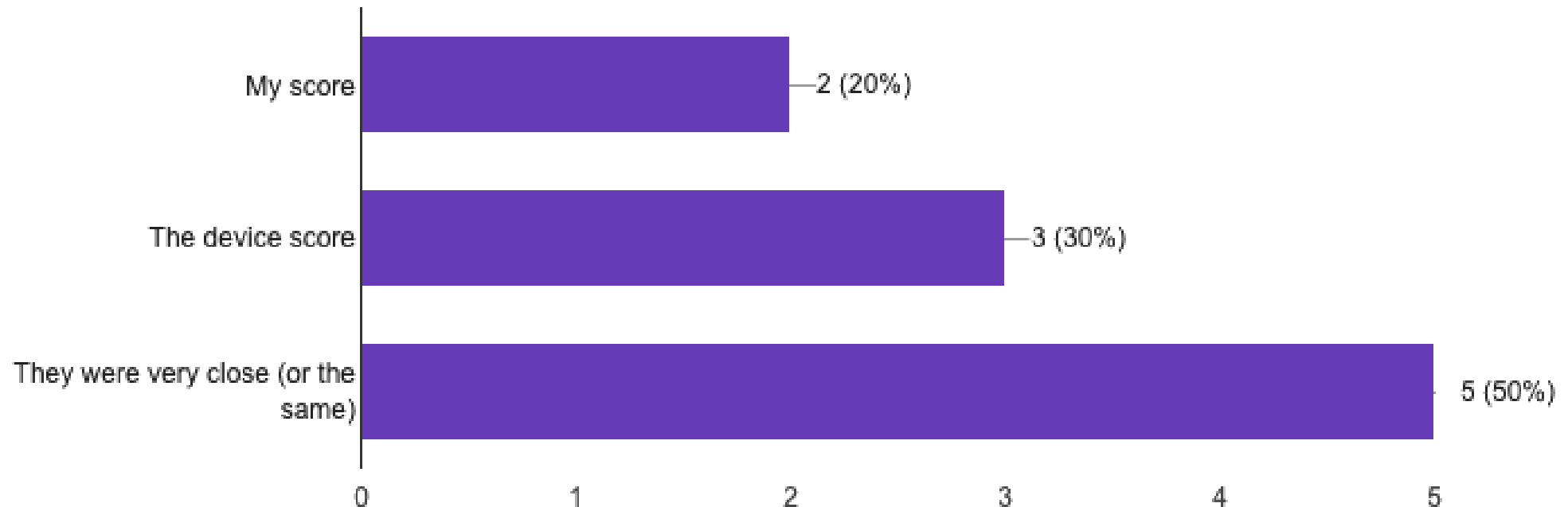


Results: Readiness Intuition vs. Devices Intuition Score

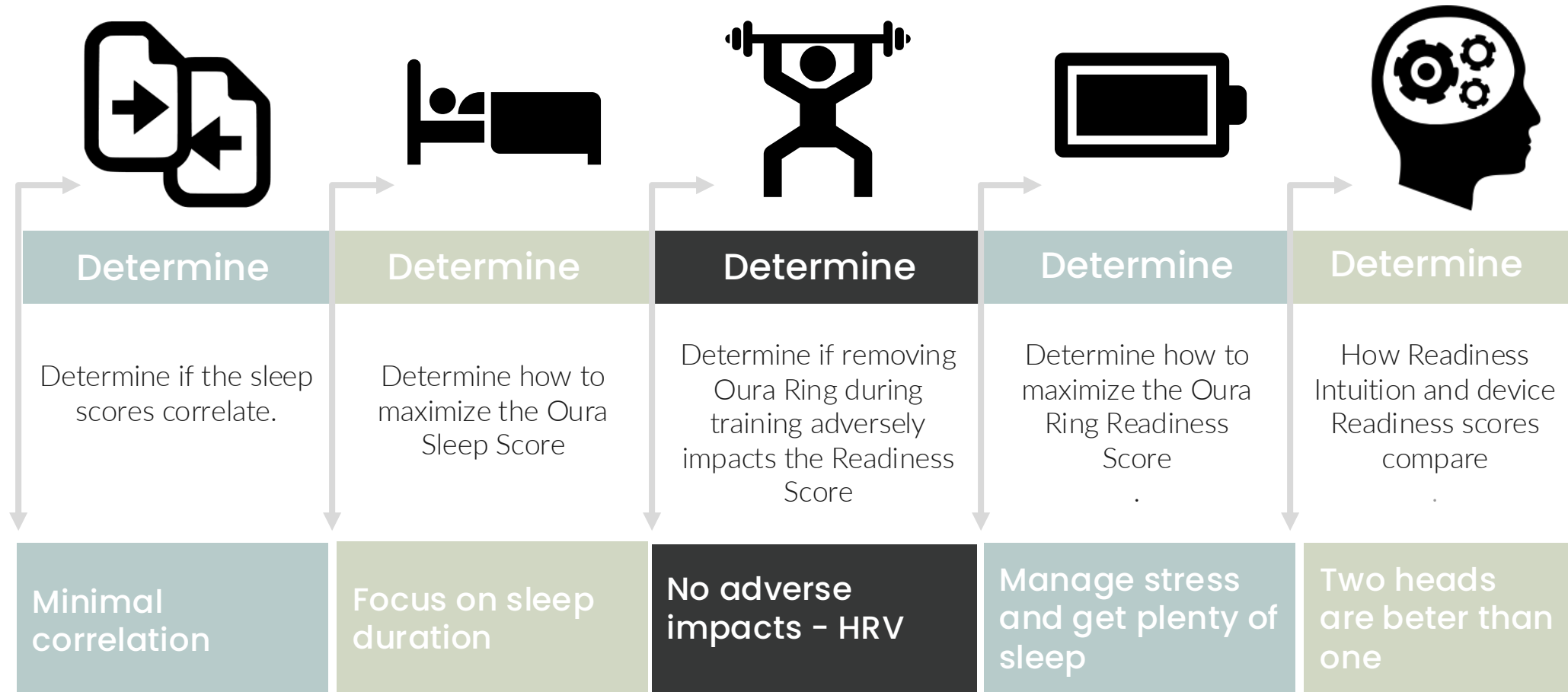
- High scores in spite of allergies – sinus pressure headache
- Reluctant to give too give high scores
- "My Score" mostly in alignment

What readiness score more accurately reflected your 'readiness' for the day?

10 responses



Research Objectives



Back Up Slides



Oura Ring to Fitbit Sleep Model Mapping

Score	Equation
Oura Duration Score	Oura Duration Score = Oura Duration Score
Fitbit Duration Score	Fitbit Duration Score = (Fitbit Duration Score / 50) * 100
Oura Quality Score	Oura Quality Score = (Oura REM Sleep Score + Oura Deep Sleep Score) / 200
Fitbit Quality Score	Fitbit Quality Score = (Fitbit Quality Score / 25) * 100
Oura Restoration Score	Oura Restoration Score = (Oura Restfulness Score + Oura Resting Heart Rate Score) / 200
Fitbit Restoration Score	Fitbit Restoration Score = (Fitbit Restoration Score / 25) * 100

Device Sensors

Sensor	Monitors	Fitbit Charge 4	Oura Ring Gen 2	Oura Ring Gen 3
3-Axis Accelerometer	Motion	X	X	X
Infrared sensors	Heart rate and oxygen saturation	X	X	X
Red sensors	Heart rate and oxygen saturation	X	X	-
Green sensors	Heart rate	X	X	-
Temperature	Body temperature	X	X	X
Altimeters	Changes in altitude	X	X	X