Omegawave: an emerging technology and application in professional baseball pitchers

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Background

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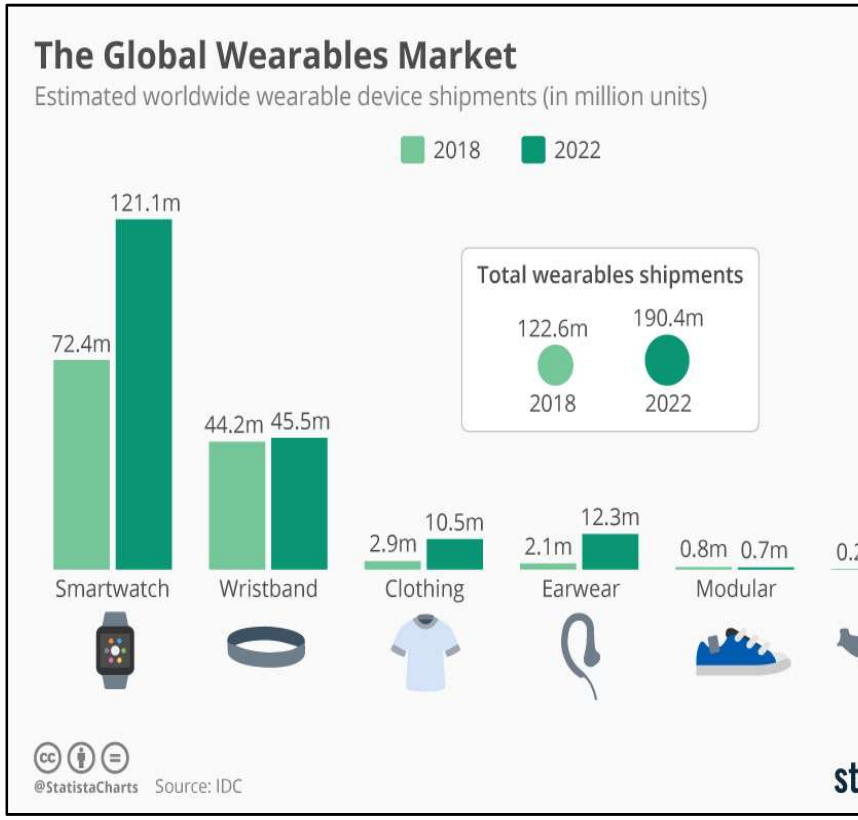
orts performance devices, especially
earables have become increasingly
mmon

ey have the potential to be used to adjust
d improve performance

mmon metrics include sleep, heart-rate,
art-rate variability and steps.

megawave" was an early digital device
at could be worn prior to practice or
mpetition to determine "readiness"



“Omegawave” (Uusimaa, Finland)

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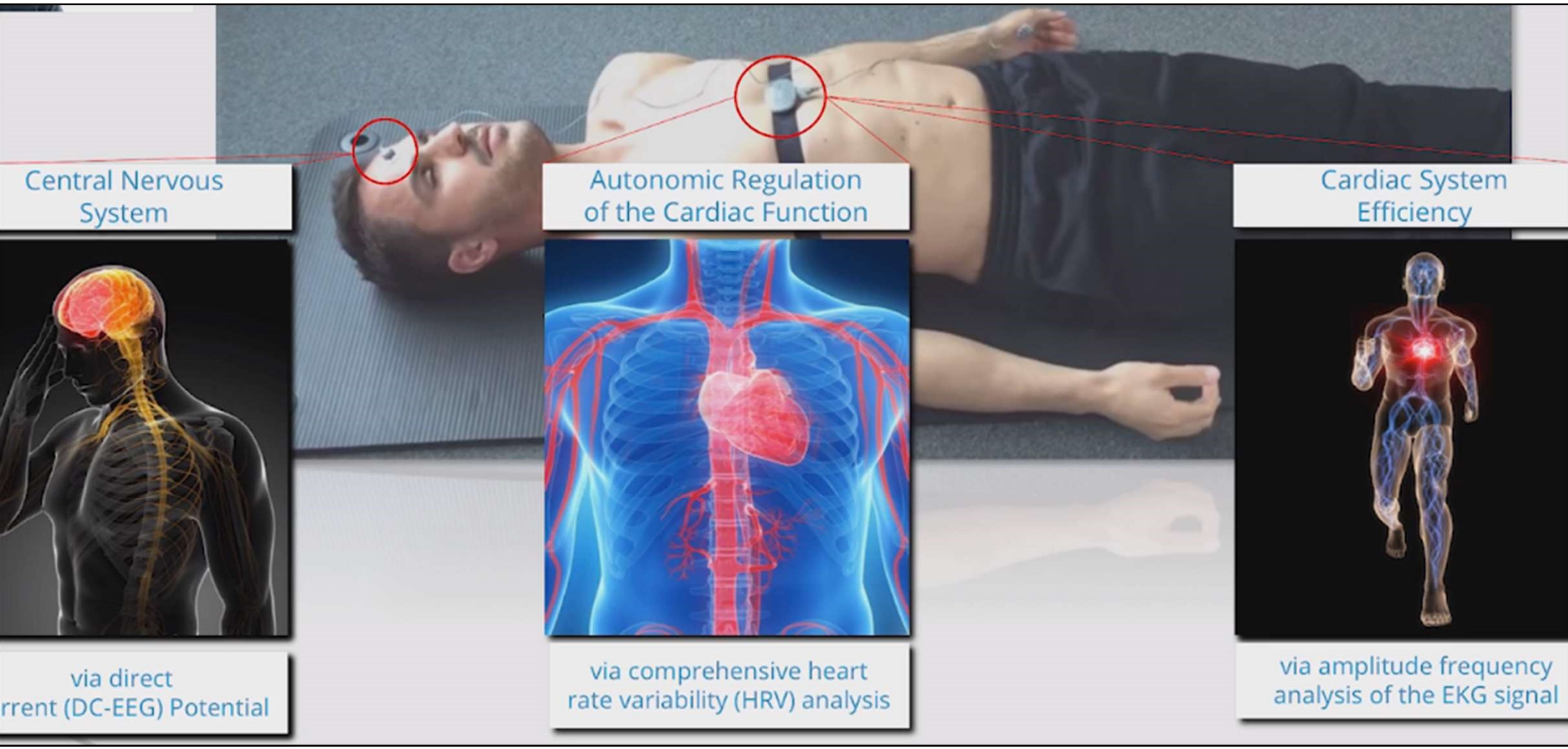
ack box proprietary formula that provides an overall readiness metric by combining…



negawave in Other Sports

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- Popular in English Premier League (EPL) soccer
- We had experience from Major League Soccer (MLS)
- Games are infrequent (1-2 / week)
- Formula purports to determine “readiness” to train
- Advertised to provide a way to optimize performance while avoiding injuries and overtraining.
- Trainers and coaches adjusted workload based on non-validated outputs
  - Self-fulfilling prophesy

n we predict readiness to pitch?

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An age old question in baseball:

- Are some starting pitchers ready on 3 days rest?
- Would a 6 man rotation be good for some pitchers and harmful for others?
- If a reliever went 2 innings last night, can he go again today?
- Is there a better way to find out that he just doesn't have it today other than putting him on the mound?
- Does he risk injury if we put him out there on short rest?

Hypotheses

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- Omegawave readiness correlates with in-game performance
- Omegawave ready pitchers perform better than those who are not ready
- Omegawave readiness predicts a day when pitchers are most ready to return to the mound.

Materials & Methods

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- Prospective randomized double-blind study (RCT)
- 20 professional minor league pitchers enrolled. 1 excluded due to injury and re-assignment.
- 19 pitchers (22.2 ± 1.9 age) from minor league teams (A- and AA) completed the study.
- Daily use from May to Sept during the 2016 season.
- Players, trainers and coaches did not have access to the data for the durati of the 2016 season.

Metrics

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najor categories:

- Stress
- Fatigue
- Adaptation reserves
- CNS

ues range from 1-7.

- 1-2 is poor readiness
- 3-5 is average
- 6-7 is top readiness.

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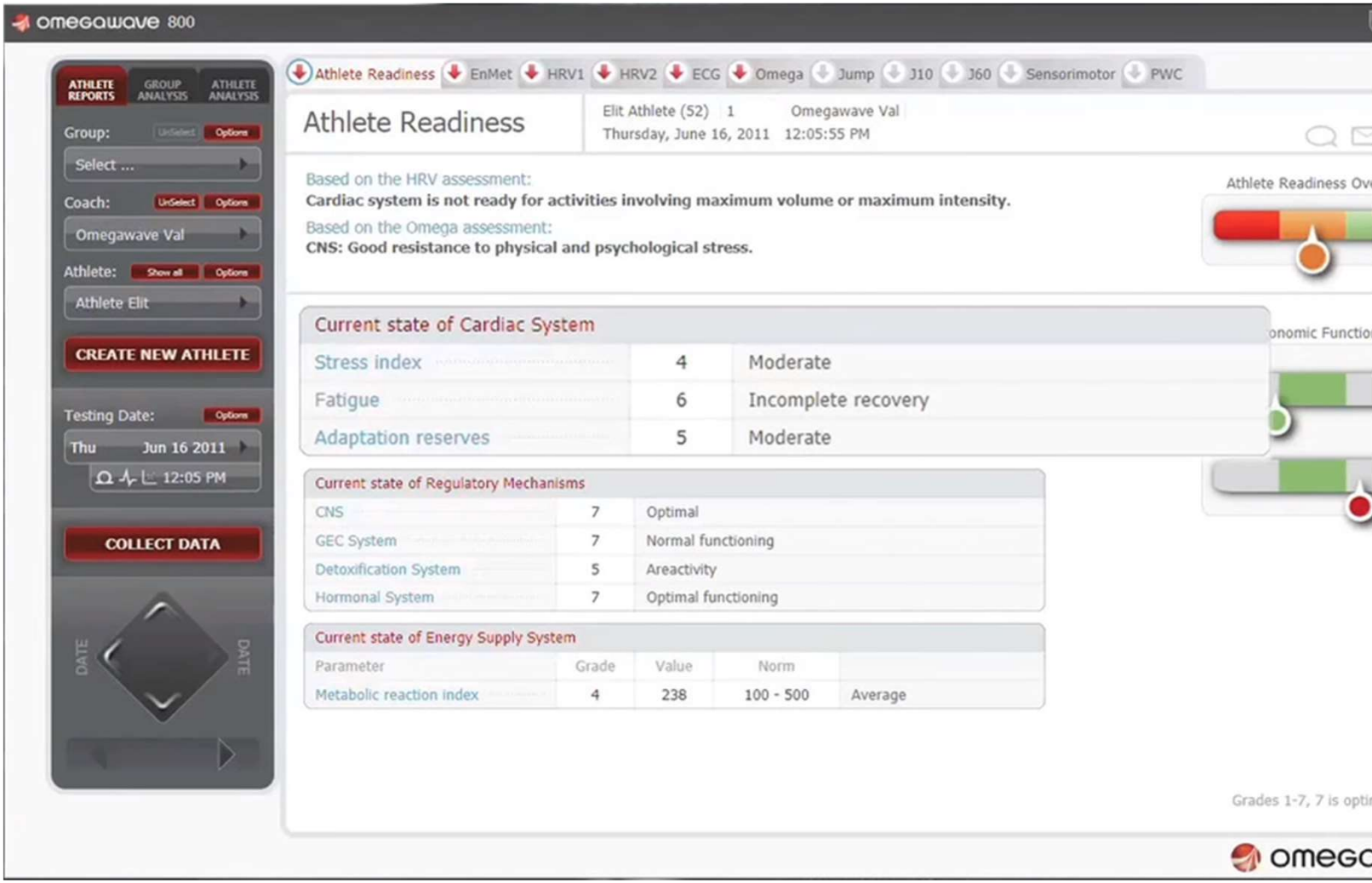

Results: Readiness levels

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21 daily readings were obtained.

55 readings (16.8%) were collected on game days in which a pitcher made an appearance.

eiling Effect? (75% were in the “Top Readiness” category).

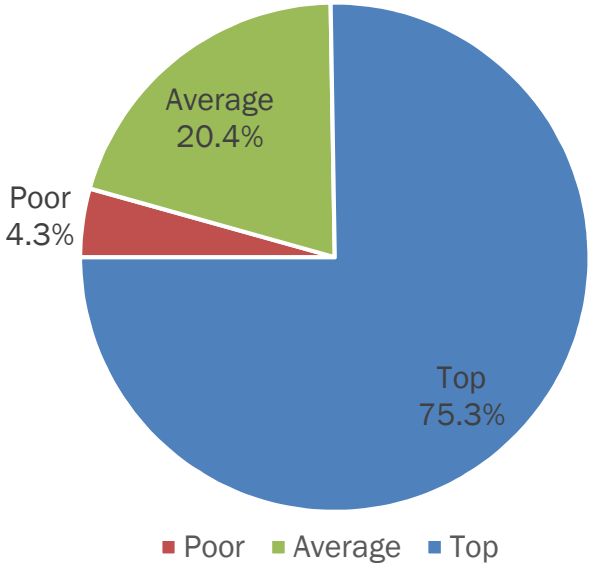
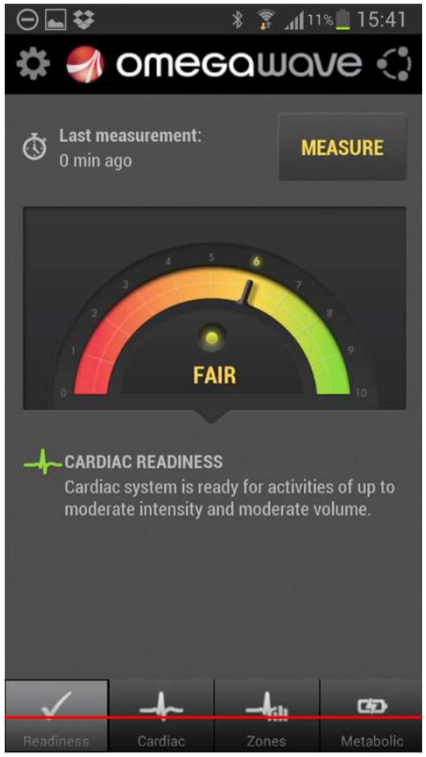


Figure 1: Distribution of Omegawave readings deemed Top Readiness (greater than 5), Average Readiness (3-5), Poor Readiness (1-2).



sults: Ready or Not, Here I Come

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No performance differences between starting pitchers who were Omegawave ready vs not Omegawave ready ($p > 0.05$)

Starting pitchers with Top Readiness did not pitch better than starting pitchers with fewer categories read as greater than 5

Relief pitchers who were Omegawave ready had lower ($p < 0.05$) ERA, SLG, and OOPS than relief pitchers who were not Omegawave ready.

	Starting Pitchers			Relief Pitchers		
Statistic	Ready (n=14)	Not Ready (n=77)	p-value	Ready (n=11)	Not Ready (n=53)	p-val
IP	5.0±1.5	4.8±1.6	0.664	2.3±1.1	3.0±1.1	0.08
PA/IP	4.8±2.1	4.6±1.4	0.752	3.9±0.9	4.1±1.0	0.29
Pitch Count	78.6±17.9	77.7±17.1	0.862	15.5±4.2	16.8±6.9	0.31
ERA	4.33±11.69	4.29±11.12	0.810	1.08±2.77	3.38±6.40	0.01
WHIP	1.29±1.64	1.36±1.40	0.998	1.00±0.86	1.14±0.937	0.46
K/9	7.4±4.2	7.9±4.7	0.353	9.7±3.7	8.9±6.3	0.52
OBP	0.335±0.180	0.349±0.173	0.732	0.287±0.210	0.315±0.419	0.33
SLG	0.536±0.450	0.467±0.286	0.388	0.195±0.190	0.396±0.343	0.00
OOPS	0.871±0.620	0.816±0.463	0.601	0.483±0.340	0.711±0.647	0.02
MPH	89.4±2.4	90.2±2.6	0.270	88.4±3.4	89.4±2.7	0.28

Table 1: Starting and relief pitcher statistics when Omegawave ready compared to when not Omegawave ready. (IP = innings pitched, PA/IP = plate appearances per innings pitched, ERA = earned run average, WHIP = walks plus hits divided by innings pitched, K/9 = strikeouts per nine innings, OBP = opponent on base percentage, SLG = opponent slugging percentage, OOPS = opponent on base plus slugging percentage, MPH = average miles per hour, * = significance)

sults: Predicting Day to Pitch

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On no specific day after an appearance ($p > 0.05$) were pitchers found to be significantly more Omegawave ready than any other day

More relief pitchers were Omegawave ready ($p = 0.01$) than starting pitchers on day 5 after an appearance

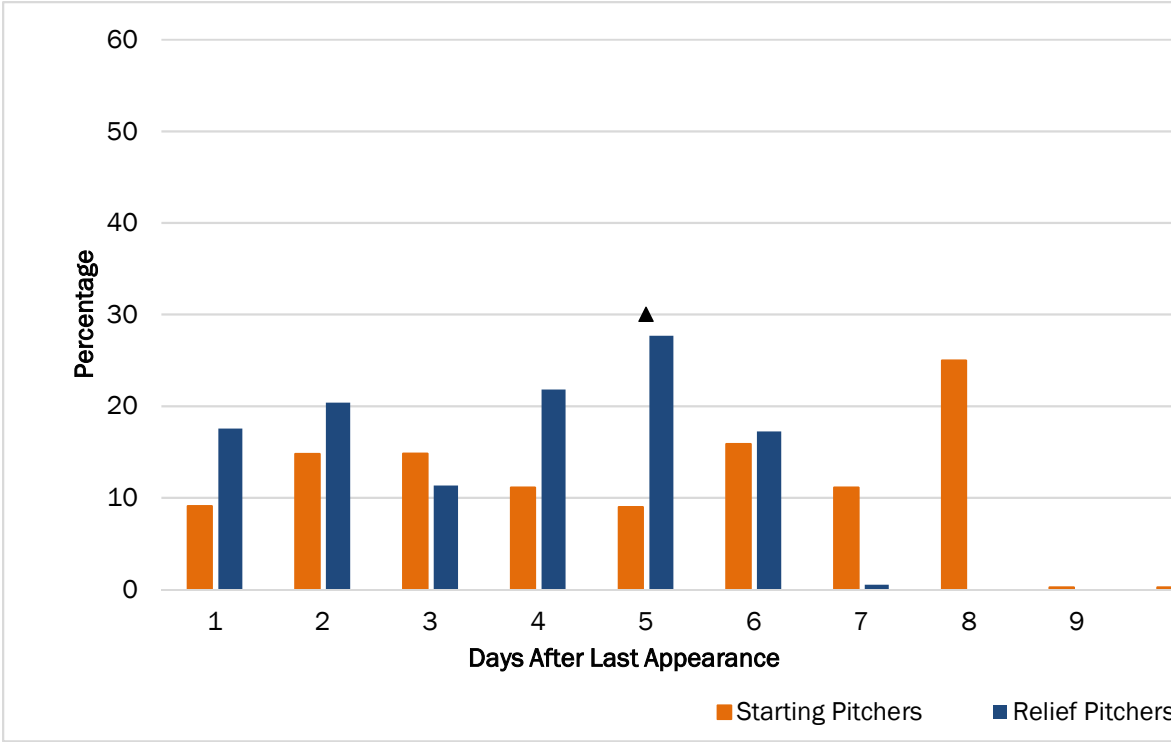

Figure 2: Percentage of starting pitchers and relief pitchers that were Omegawave ready at day after last appearing in a game (▲ = significance).

Limitations to Study

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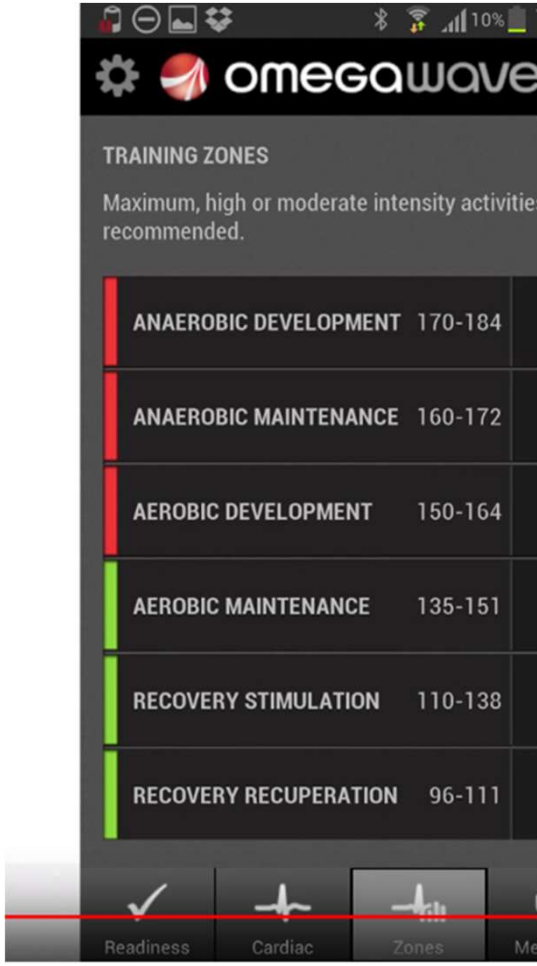
- No performance comparisons made to control players who did not use the product
- Relatively small sample (20 devices)
- Pitching in the minor leagues is more variable than in MLB
- Unable to determine if Omegawave can predict injury
  - Only 1 player injured in the duration of study
- Lack of subjective player reported readiness measures collected



Conclusions

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Proof of Concept: Randomized controlled studies of emerging technologies and devices can be done in professional baseball.

Starting pitchers who were deemed “Omegawave ready” did not pitch better than their “not Omegawave ready” counterparts

Relief pitchers who were Omegawave ready had lower OBP, ERA, SLG, and OOPS than relief pitchers who were not Omegawave ready.

The Omegawave readiness level of a starting pitcher on a given game day did not correlate to their performance.

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