

2018

## The relationship between internal training load variables during a taper and elite weightlifting success

Joseph O. C. Coyne  
*Edith Cowan University*

Greg Haff  
*Edith Cowan University*

A. J. Coutts

Robert U. Newton  
*Edith Cowan University*

Sophia Nimphius  
*Edith Cowan University*

Follow this and additional works at: <https://ro.ecu.edu.au/ecuworkspost2013>



Part of the [Sports Sciences Commons](#)

---

Coyne, J. O. C., Haff, G. G., Coutts, A. J., Newton, R. U., & Nimphius, S. (2018, July). *The relationship between internal training load variables during a taper and elite weightlifting success* [Paper presentation]. National Strength & Conditioning Association National Conference, Indianapolis, IN, U.S.

This Presentation is posted at Research Online.  
<https://ro.ecu.edu.au/ecuworkspost2013/10402>

# Conference Podium Presentation

NSCA NATIONAL CONFERENCE 2018

## THE RELATIONSHIP BETWEEN INTERNAL TRAINING LOAD VARIABLES DURING A TAPER AND ELITE WEIGHTLIFTING SUCCESS

JOSEPH D.C. COYNE, G. GREGORY HAFF, AARON J. COUTTS, ROBERT U. NEWTON & SOPHIA NIMPHIUS

1

NSCA NATIONAL CONFERENCE 2018

### INTRODUCTION

RECENT COMMENTARY ON PERIODIZATION SUGGESTS THAT EXTERNAL TRAINING LOAD (TL) MAY BE INADEQUATE TO FULLY ACCOUNT FOR THE MULTI-FACTORIAL INTERACTION AN ATHLETE HAS IN BOTH TRAINING AND OUTSIDE ENVIRONMENTS.

2

NSCA NATIONAL CONFERENCE 2018

### INTRODUCTION

SESSIONAL RATINGS OF PERCEIVED EXERTION (S-RPE):

- MAY ENCOMPASS THIS MULTI-FACTORIAL INTERACTION
- IS RECOMMENDED AS A PRIMARY MEASURE OF TRAINING LOAD IN SYSTEMATIC REVIEWS OF LITERATURE

HOWEVER THERE IS LITTLE RESEARCH ON S-RPE AND OTHER INTERNAL TRAINING LOAD VARIABLES BEING USED FOR PERFORMANCE PURPOSES

3

NSCA NATIONAL CONFERENCE 2018

### PURPOSE

THIS STUDY AIMED TO DETERMINE IF MEANINGFUL DIFFERENCES IN INTERNAL TL VARIABLES BEFORE A MAJOR COMPETITION WERE RELATED TO ELITE WEIGHTLIFTING SUCCESS

4

NSCA NATIONAL CONFERENCE 2018

### METHODS

**PARTICIPANTS**

- ELITE WEIGHTLIFTERS N=28
- 26.0 ± 3.2 YEARS, 162.2 ± 11.3CM, 72.2 ± 23.8KG
- PREVIOUS 12 MONTH PERSONAL BEST TOTAL 76.9 ± 2.7% WORLD RECORD TOTAL
- HAD TO COMPLETE A SUCCESSFUL LIFT IN BOTH SNATCH AND CLEAN & JERK
- 7 DROPOUTS - 2 (DATA COLLECTION) + 5 (FAILED TO POST COMPETITION TOTAL)

5

NSCA NATIONAL CONFERENCE 2018

### METHODS

**PROCEDURES**

- 8 WEEK DURATION
- S-RPE (CR-10) MULTIPLIED BY TOTAL SESSION DURATION
- INJURY & ILLNESS INCIDENTS ALSO RECORDED
- COLLECTED INDIVIDUALLY AFTER EVERY SESSION

6

NSCA NATIONAL CONFERENCE 2018

### METHODS

**PROCEDURES**

- TL MEASURES EXPRESSED AS EWMA
- $EWMA_{today} = Load_{today} \times A_t + ((1 - A_t) \times EWMA_{yesterday})$
- ACUTE TL (A, 7 DAYS)  $A_t = 2/(2t + 1)$
- CHRONIC (28 DAYS) - ACUTE TL (C-A)
- ACUTE, CHRONIC WORKLOAD RATIO (ACWR)
- MAGNITUDE OF CHANGE & VOLATILITY (STANDARD DEVIATION) OF EACH MEASURE IN LAST 21 DAYS

7

NSCA NATIONAL CONFERENCE 2018

### METHODS

**PROCEDURES**

- % TRAINING AFFECTED BY INJURY/ILLNESS
- LAST 42 DAYS VS LAST 14 DAYS

8

NSCA NATIONAL CONFERENCE 2018

### METHODS

**PROCEDURES**

- TL & INJURY/ILLNESS DATA COMPARED TO COMPETITION TOTAL (OLYMPIC TRIALS)
- COMPETITION TOTAL EXPRESSED AS % 12 MONTH PB
- DIVIDED INTO SUCCESSFUL & NON-SUCCESSFUL GROUPS (SWC 0.2 STDEV)
- FURTHER DIVIDED INTO TOP 5 & BOTTOM 5

9

NSCA NATIONAL CONFERENCE 2018

### METHODS

**STATISTICAL ANALYSIS**

Unclear  
Possible increase  
Likely increase  
Unclear  
Clearly Total

10

NSCA NATIONAL CONFERENCE 2018

### RESULTS

	n	11DPO	p	30R	p	10R42	p	10R14	p
OVERALL	21	99.08 ± 2.90		95.64 ± 3.67		36.81 ± 43.54		32.65 ± 41.88	
SUCCESS	10	101.52 ± 1.73		97.69 ± 2.76		28.10 ± 48.90		28.57 ± 44.80	
UNSUCCESS	8	94.09 ± 1.67	0.00**	93.38 ± 3.24	0.01**	46.12 ± 48.86	0.43	29.29 ± 42.53	0.42
TOPS	5	102.84 ± 1.69		99.53 ± 1.60		16.79 ± 28.58		17.16 ± 34.48	
BOTTOMS	5	95.14 ± 1.29	0.00**	91.17 ± 2.63	0.00**	38.10 ± 51.26	0.4	25.71 ± 49.49	0.51

11DPO - PERCENTAGE OF 12 MONTH PERSONAL BEST TLW - PERCENTAGE OF WORLD RECORD TOTAL TLW42 - PERCENTAGE OF TRAINING AFFECTED BY INJURY IN LAST 42 DAYS. 10R42 - PERCENTAGE OF TRAINING AFFECTED BY INJURY IN LAST 14 DAYS. \* - P<0.05. \*\*P<0.01

11

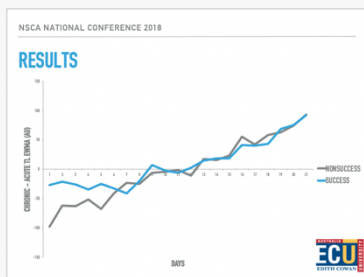
NSCA NATIONAL CONFERENCE 2018

### RESULTS

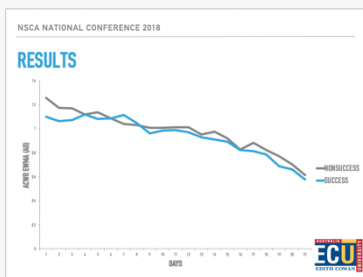
ACUTE TL (EWMA)

NON-SUCCESS  
SUCCESS

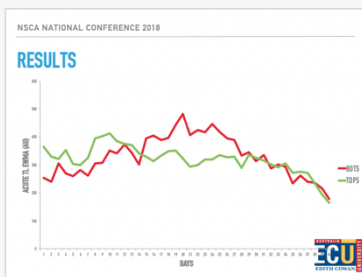
12



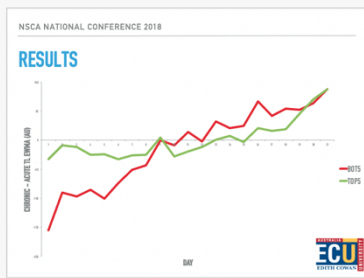
13



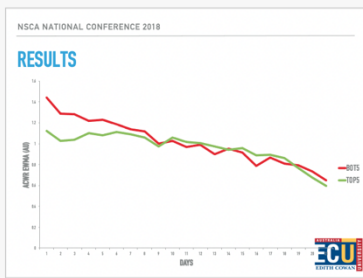
14



15



16



17

RESULTS

	SUCCESS - NONSUCCESS					TOP5 - BOTTOM5				
	jt	ES	DESC	MDEC	DESC	jt	ES	DESC	MDEC	DESC
A	-4.8	0.87	nil	48	possibly	-8.9	0.13	nil	44	possibly
C-A	-1.9	0.84	nil	41	possibly	-0.8	0.00	nil	38	possibly
ACWR	-5.8	0.72	small	52	possibly	-8.8	0.29	small	55	possibly
SBLA2	-18.8	-0.40	small	44	possibly	-21.9	-0.56	small	70	possibly
SBLTA	-18.7	-0.34	small	54	possibly	-18.4	-0.44	small	44	possibly

A - ACUTE TL, C-A - CHRONIC ACUTE TL, ACWR - ACUTE/CHRONIC WORKLOAD RATIO, SBLA2 - PERCENTAGE OF TRAINING AFFECTED BY INJURY IN LAST 42 DAYS, SBLTA - PERCENTAGE OF TRAINING AFFECTED BY INJURY IN LAST 14 DAYS, ES - EFFECT SIZE, MDEC - MAGNITUDE BASED INFERENCE PERCENTAGE OF PRACTICAL MEANING, DESC - DESCRIPTOR

18

RESULTS

	SUCCESS - NONSUCCESS					TOP5 - BOTTOM5				
	jt	ES	DESC	MDEC	DESC	jt	ES	DESC	MDEC	DESC
CHANG21 C-A	-18.8	0.55	small	54	possibly	-27.8	0.45	moderate	74	possibly
CHANG21 C-A	-22.7	0.52	small	75	likely	-44.5	0.76	moderate	68	likely
CHANG21 ACWR	-14.3	0.73	moderate	86	likely	-25.3	1.36	large	94	likely
STREY21 A	-17.2	0.34	small	61	possibly	-37.4	0.72	moderate	77	likely
STREY21 C-A	-28.7	0.54	small	74	likely	-53.8	0.95	moderate	68	likely
STREY21 ACWR	-21.1	0.7	moderate	85	likely	-23.8	1.2	large	93	likely

A - ACUTE TL, C-A - CHRONIC ACUTE TL, ACWR - ACUTE/CHRONIC WORKLOAD RATIO, SBLA2 - PERCENTAGE OF TRAINING AFFECTED BY INJURY IN LAST 42 DAYS, SBLTA - PERCENTAGE OF TRAINING AFFECTED BY INJURY IN LAST 14 DAYS, ES - EFFECT SIZE, MDEC - MAGNITUDE BASED INFERENCE PERCENTAGE OF PRACTICAL MEANING, DESC - DESCRIPTOR

19

CONCLUSIONS

WHEN USING EWMA TO CALCULATE TL VARIABLES, WEIGHTLIFTING SUCCESS MAY BE RELATED TO A LOWER AMOUNT OF CHANGE & VOLATILITY IN ACWR AND C-A IN THE LAST 21 DAYS BEFORE COMPETITION.

20

CONCLUSIONS

ADDITIONALLY, A LOWER ACWR AND A LOWER AMOUNT OF TRAINING SESSIONS AFFECTED BY INJURY APPEAR TO BE FACTORS FOR SUCCESSFUL PERFORMANCE.

21

PRACTICAL APPLICATIONS

PRACTITIONERS MAY USE THIS RESEARCH TO HELP INFORM THE ULTIMATE PERIOD LEADING INTO AN IMPORTANT COMPETITION ALTHOUGH THE APPLICATION OF THIS DATA TO OTHER SPORTS BESIDES WEIGHTLIFTING REQUIRES FURTHER CONSIDERATION.

22

Coyne JOC, Haff, GG, Coutts, AJ, Newton, RU & Nimphius, S. The relationship between internal training load variables during a taper and elite weightlifting success. *National Strength & Conditioning Association National Conference; July 2018; Indianapolis, IN, U.S.*