
NSCA
COACHES
CONFERENCE 2023
JANUARY 4 – 6, 2023
Charlotte, NC & Online | 2.0 CEUs
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CONFLICT OF INTEREST STATEMENT

I have no actual or potential conflict of interest in relation to this presentation.

MMA Training Revisited – Applying the Latest Research

INTRODUCTION

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  - FIGHT SCIENCE LABORATORY, NOVA SOUTHEASTERN UNIVERSITY

- DIRECTOR OF PERFORMANCE – KILL CLIFF FIGHT CLUB
  - SPORTS SCIENCE, S&C, SPORTS NUTRITION, SPORTS MEDICINE

MMA Training Revisited – Applying the Latest Research

OBJECTIVES

This is the research focused Lecture; Hands-on session will be later today*

- Identify laboratory techniques necessary for making weight safely in MMA
- Describe research to support strength and conditioning, nutrition, and performance parameters in MMA
- Provide structure and guidance on how to integrate research/laboratory techniques into building world champion MMA fighters

MMA Training Revisited – Applying the Latest Research

OUTLINE

TOPICS AND APPLICATION:

- WEIGHT “CUTTING” / SPORTS NUTRITION RESEARCH
- GENETICS / SPORTS PSYCHOLOGY RESEARCH*
- SPORTS SCIENCE TECHNOLOGY RESEARCH
- STRENGTH AND CONDITIONING RESEARCH

MMA Training Revisited – Applying the Latest Research

KILL CLIFF FIGHT CLUB










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WEIGHT "CUTTING" / SPORTS NUTRITION RESEARCH

INTRODUCTION VIDEO – ANATOMY OF A FIGHTER

- Activity:
- 8 weeks _____
- 3 weeks _____
- 1 week _____
- 24 hours pre _____
- **Weigh-In 170 lbs.**
- 24 hours post (fight weight) _____

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WEIGHT "CUTTING" / SPORTS NUTRITION RESEARCH

"Ideal" vs Real

135	Body Weight (LBS.)	Percent Body Fat %
8 Weeks Pre-	147.2	8.1
3 Weeks Pre-	144.1	7.1
1 Week Pre-	141.3	5.6
Weigh-in	136	
24-36 hrs. Post-	142.6	

145	Body Weight (LBS.)	Percent Body Fat %
8 Weeks Pre-	165.5	11.2
3 Weeks Pre-	161.2	9.7
1 Week Pre-	157.6	7.4
Weigh-in	145	
24-36 hrs. Post-	158.6	

155	Body Weight (LBS.)	Percent Body Fat %
8 Weeks Pre-	175.5	9.2
3 Weeks Pre-	171.2	7.7
1 Week Pre-	168.4	6.4
Weigh-in	155.5	
24-36 hrs. Post-	169	

170	Body Weight (LBS.)	Percent Body Fat %
8 Weeks Pre-	194.5	6.2
3 Weeks Pre-	185.1	4.7
1 Week Pre-	182.4	3.4
Weigh-in	170	
24-36 hrs. Post-	184.1	

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WEIGHT "CUTTING" / SPORTS NUTRITION RESEARCH

"Ideal" vs Real cont.

185	Body Weight (LBS.)	Percent Body Fat %
8 Weeks Pre-	206.2	7.9
3 Weeks Pre-	203.1	6.9
1 Week Pre-	201.3	4.6
Weigh-in	186	
24-36 hrs. Post-	204.6	

205	Body Weight (LBS.)	Percent Body Fat %
8 Weeks Pre-	235.5	11.1
3 Weeks Pre-	226.2	9.9
1 Week Pre-	218.6	7.6
Weigh-in	204.5	
24-36 hrs. Post-	224.2	

265	Body Weight (LBS.)	Percent Body Fat %
8 Weeks Pre-	295.5	14.2
3 Weeks Pre-	287.3	13.7
1 Week Pre-	278.4	12.1
Weigh-in	265.5	
24-36 hrs. Post-	284.8	

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WEIGHT "CUTTING" / SPORTS NUTRITION RESEARCH

"Ideal" vs Real cont.

Percent (%) Weight Change				
72 Hours Before	−6.7	±	2.3	a,b,d
48 Hours Before	−5.7	±	2.1	a,c,d
24 Hours Before	−4.4	±	2.9	b,c,d
Post-Weigh-In	9.7	±	4.0	a,b,c

Percentage Weight Changes Each Weigh-In Day (Random Effects).
Data are Means ± SD. [a] Significantly different from 24 h pre-weigh-in, $p < 0.001$. [b] Significantly different from 48 h pre-weigh-in, $p < 0.001$. [c] Significantly different from 72 h pre-weigh-in, $p < 0.001$. [d] Significantly different from post-weigh-in weight, $p < 0.001$.

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WEIGHT "CUTTING" / SPORTS NUTRITION **Laboratory Techniques and Application**

UFC MIDDLEWEIGHT @ 213 Lbs, 13% Body Fat (27.7 lbs), 66% TBW	
213 lbs -10.66 lbs 202.34 lbs	(Determined 8%)
Fighter Now 202, 70% Water	**(Each Fat % dropped, .9% Water Up)**
202.34 lbs -3.34 lbs 199 lbs	(High Volume = Some Lean Tissue Drop)
Fighter Now 199, 70% Water	**(13 lbs. over)**
199 lbs -1.5 lbs 197.5 lbs	(Approximately 100 g CHO Liver; 450-500 g CHO Skeletal Muscle; Reducing CHO Fight Week-200 g; 1:3 Glycogen-H20 600 g)
Fighter Now 197.5, 69% Water	**(11.5 lbs. over)**
	~5.8% Drop H20 (Anything Under 6%)

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GENETICS / SPORTS PSYCHOLOGY RESEARCH

Worrier vs Warrior Background

- Dopamine signaling in the prefrontal cortex has been shown to moderate aggression levels
- A functional single-nucleotide polymorphism (SNP) in the catechol-O-methyltransferase (COMT) gene relates to dopamine levels and allele types considered the “warrior” and the “worrier” genotypes
- It is currently unclear if genetic differences in dopamine levels related to participation in combat sports

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GENETICS / SPORTS PSYCHOLOGY RESEARCH

Worrier vs Warrior Methods

‘Warrior’ ‘Worrier’ Gene (COM-T)

- N=21 MMA vs N=41 Controls
- Warrior (GG)- Pain Threshold, Stress, Processing Stimuli
- To control for circadian fluctuations in cortisol secretion, participants were tested between 2:00-5:00 pm
- 1 mL of saliva was collected into two 1.5 mL polyethylene centrifuge tubes using a passive salivation technique
- Saliva was stored and analyzed

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GENETICS / SPORTS PSYCHOLOGY RESEARCH

Worrier vs Warrior Results

‘Warrior’ ‘Worrier’ Gene (COM-T)

- Between group tests showed that there was a significant difference in GG genotype frequencies between the MMA group (52.4%) and the non-athlete group (19.5%), (U = 240, p = 0.003)
- There is an increase in the “warrior” genotype in MMA fighters relative to control group
- This is the first study to report COMT genotype frequencies in combat and non-combat sport athletes
- Practical Application and Story

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GENETICS / SPORTS PSYCHOLOGY RESEARCH

Psychological Characteristics and Biomarkers Methods

- 10 professional MMA fighters (M age = 29.6, SD = 1.65), and a control group that consisted of 11 professional non-contact sport athletes (e.g. runners, swimmers etc..) (M age = 32.27, SD = 7.58)
- Neurobehavioral Testing: Neurobehavioral performance motion was Assessed using the NIH Toolbox Emotion and Cognition batteries.
- MMA fighters and epigenetics: an analysis of miRNA expression via. Extracted RNA (disease and treatment)

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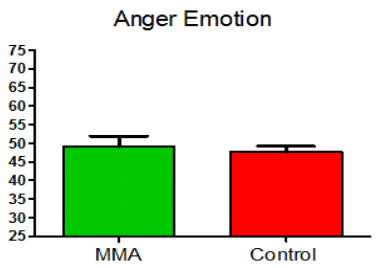
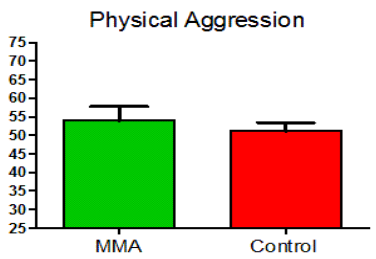
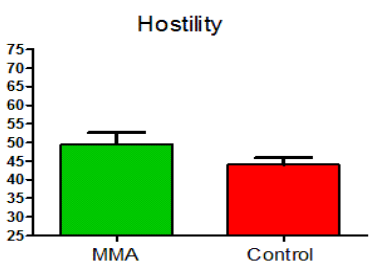
GENETICS / SPORTS PSYCHOLOGY RESEARCH

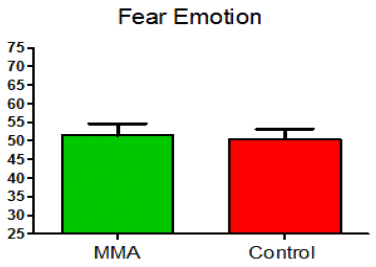
Psychological Characteristics and Biomarkers Results

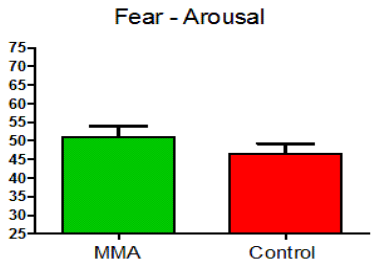
Negative Emotions

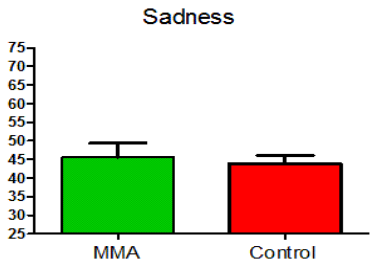




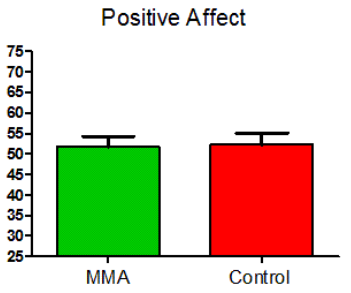


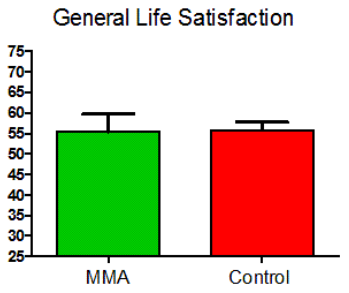


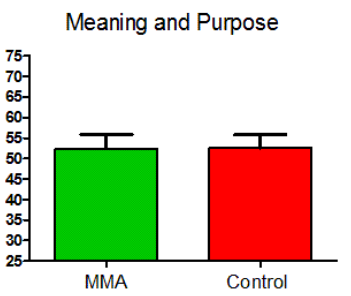




Positive Emotions







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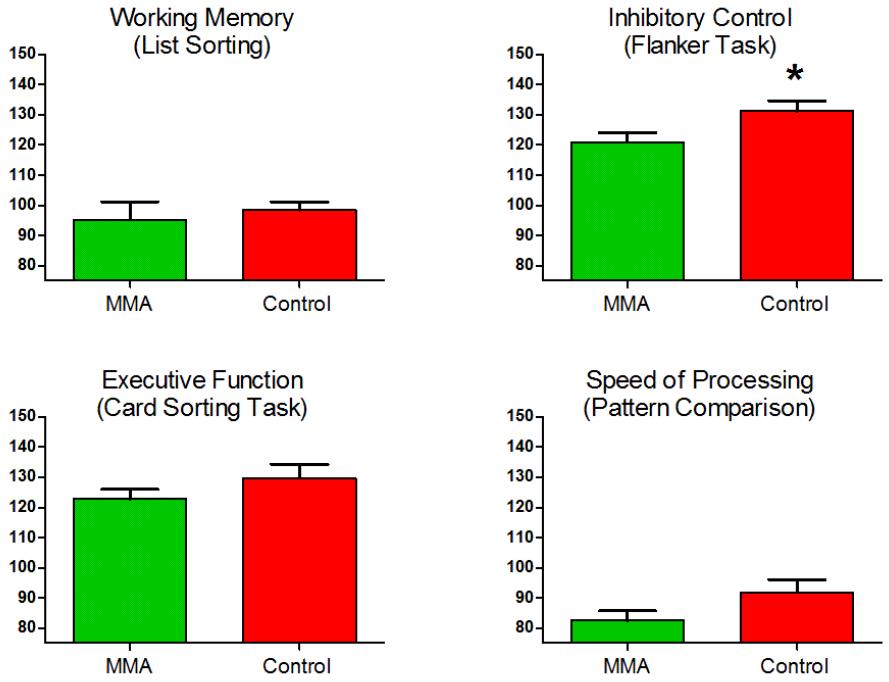
GENETICS / SPORTS PSYCHOLOGY RESEARCH

Psychological Characteristics and Biomarkers Results



- fighters show differential expression of several miRNAs for cancers, chronic inflammatory responses, and autoimmune diseases ($p \leq 0.05$)

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GENETICS / SPORTS PSYCHOLOGY RESEARCH

Psychological Characteristics Cont.

- Dark Triad subscales
- Psychopathy, Machiavellianism and Narcissism were non-significant
- Controls had a significantly higher Trait Anxiety when compared to MMA
- Difficulties in Emotion Regulation Scale (DERS-18) , MMA significantly lower ’strategy’ (More resilient)

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SPORTS SCIENCE TECHNOLOGY RESEARCH

Sleep - TUF

- N=8 (TUF)
- 6 Weeks, Training 1-2 x day
- Sleep Latency ($p \leq 0.036$)
  - HR, Injury, Power
- Sleep Efficiency ($p \leq 0.003$)
  - HR
- Sleep Onset(s) ($p \leq 0.049$)
  - Sessions

	Vertical Jump	Prowler Push	Vo2 Max	HRR	Pull Ups	Injuries	Missed Sessions
Total Sleep Time							
r	.191	-.135	-.126	.191	.669	.155	-.146
p	.651	.750	.765	.651	.070	.741	.755
Sleep Latency							
r	-.787*	.776*	-.860**	-.739*	-.370	-.457	-.789*
p	.020	.024	.006	.036	.366	.303	.035
Sleep Efficiency							
r	-.137	.539	-.543	-.891**	-.685	-.628	-.633
p	.745	.168	.164	.003	.061	.131	.127
Onset Variances							
r	.593	-.640	.472	.710*	.219	.682	.788*
p	.121	.087	.238	.049	.602	.091	.035

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SPORTS SCIENCE TECHNOLOGY RESEARCH

GPS Vector Elite

Schedule:

In-Camp	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
	MMA	Sparring (Stand-Up)	Wrestling	Sparring (MMA)	BJJ	Fight Simulations	
	Kickboxing	Technique	S&C	Technique	S&C		

MMA Training Revisited – Applying the Latest Research

SPORTS SCIENCE TECHNOLOGY RESEARCH

GPS Data Sparring Days (In-Camp)

- Table 1: Stand-Up Sparring

Athlete (Minutes)	Player Load	Player Load per Minute	Maximum Heart Rate	Average Heart Rate
Grappler/Wrestler N=9	595 ± 24	6.3 ±1	214 ±12	158 ±11
Striker/Stand-up N=9	515 ± 17	5.9 ±1	204 ±5	144 ±15

- Table 2: MMA Sparring

Athlete (Minutes)	Player Load	Player Load per Minute	Maximum Heart Rate	Average Heart Rate
Grappler/Wrestler N=9	455 ±10	5.45 ±1	213 ±11	156 ±9
Striker/Stand-up N=9	525 ±11	5.67 ±1	203 ±12	149 ±10

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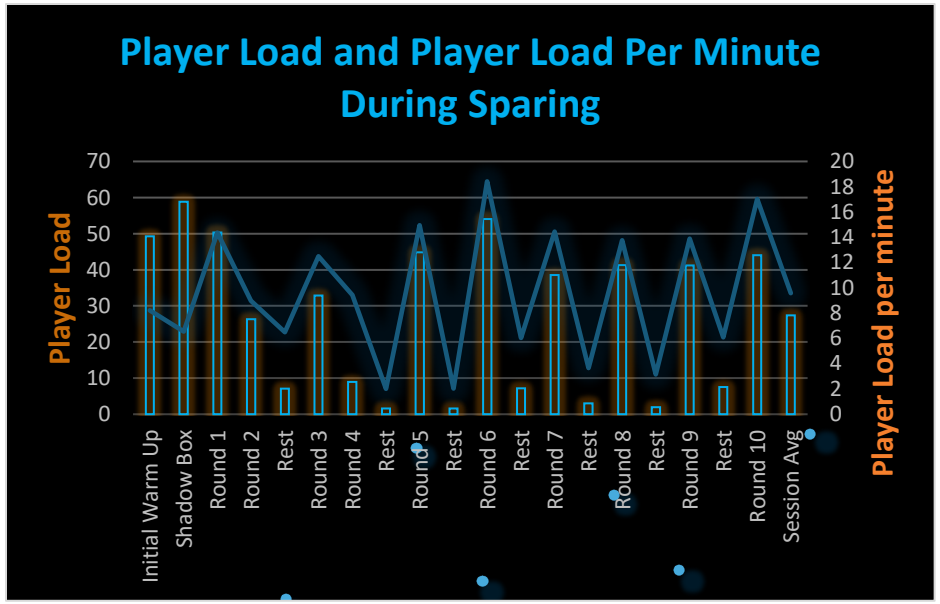
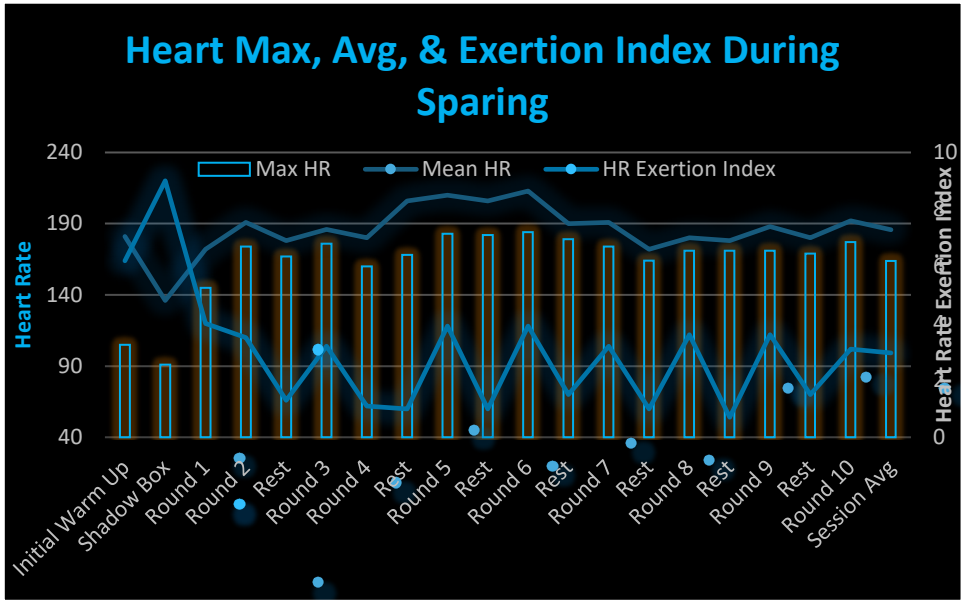
SPORTS SCIENCE TECHNOLOGY RESEARCH

GPS Data Sparring Days:

Session Total for Player Load and Heart Rate								
Day	Time	Player Load	Player Load/min	Peak Player Load	Max HR	Mean HR	Min HR	HR Exertion Index
1	62	542.47	8.811	9.2	213	131	62	87.2
2	61	877.53	14.873	8.2	205	144	86	62.9





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STRENGTH AND CONDITIONING RESEARCH

2-2-3 CONTRAST SETS VS LINEAR PERIODIZATION

- Methods
- PAPE
- Within Subjects (In-camp), 6 weeks (Post Testing 2 weeks prior to competition)
- Wingate (Peak Power, Fatigue Factor), Broad Jump, 3-RM

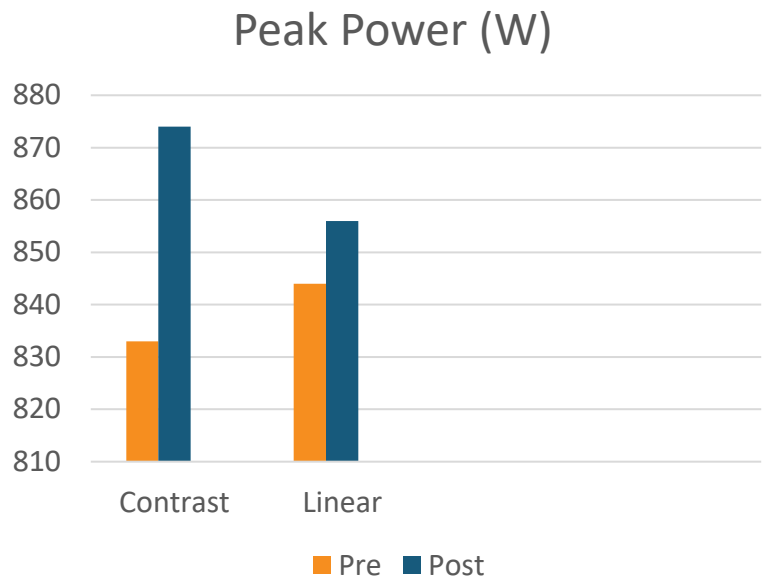
Example:

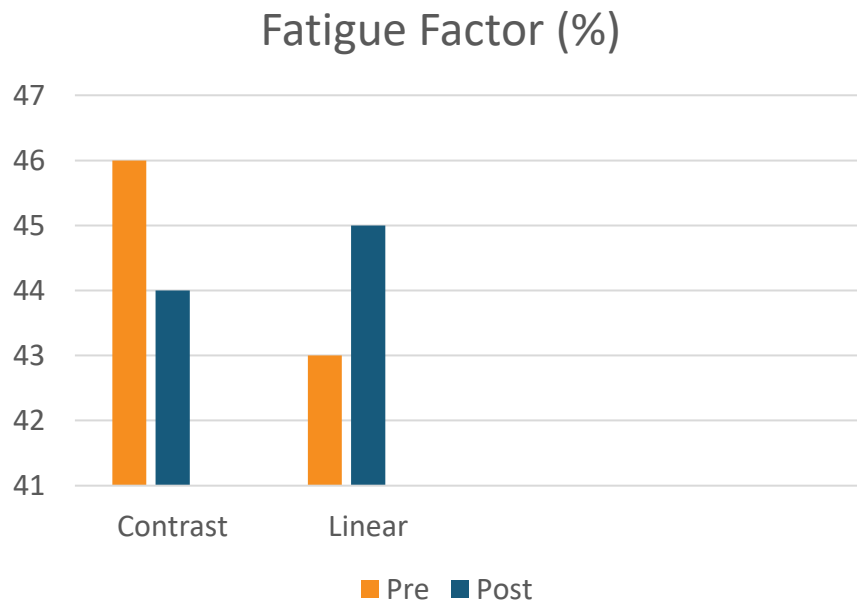
- Zercher Squat
  - Force Plate CM Jumps
- Floor Press
  - MB CH Pass
- Cossack SQ
- Tri Extension
- Pallof Press

MMA Training Revisited – Applying the Latest Research

STRENGTH AND CONDITIONING RESEARCH

2-2-3 CONTRAST SETS VS LINEAR PERIODIZATION Results





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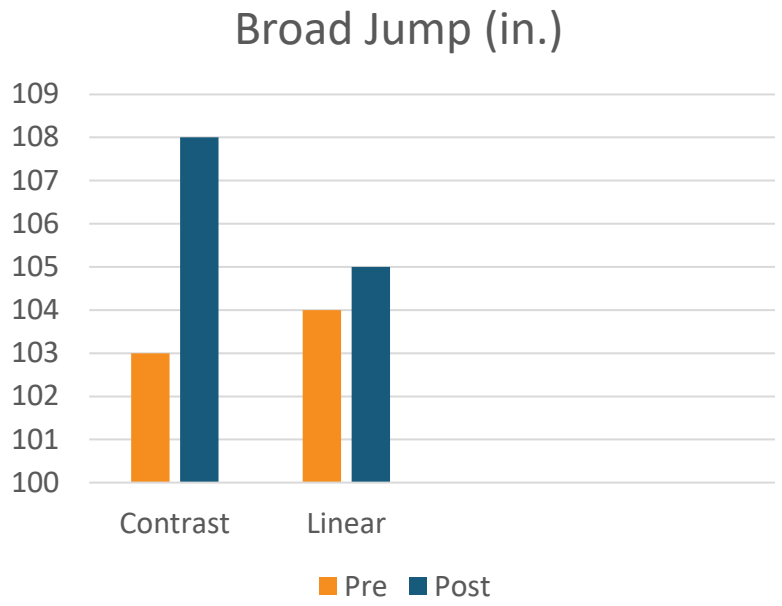
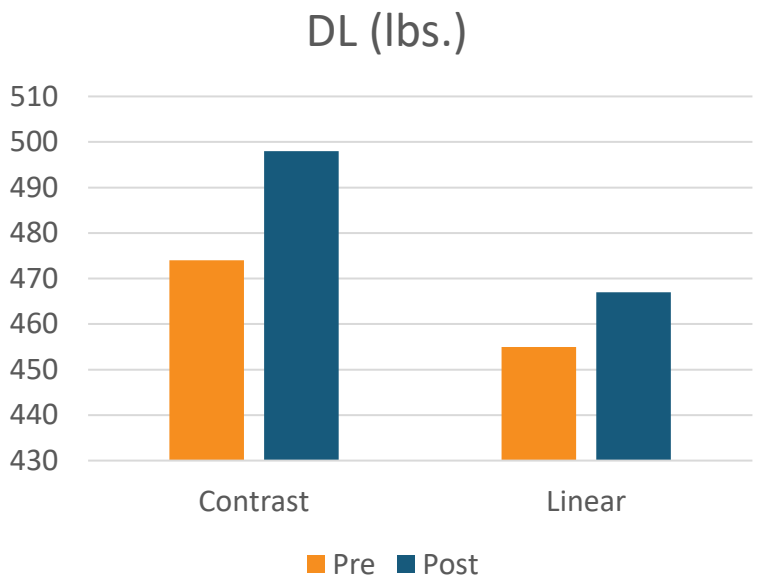
STRENGTH AND CONDITIONING RESEARCH

2-2-3 CONTRAST SETS VS LINEAR PERIODIZATION Results





Questions

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