

**NSCA NATIONAL  
CONFERENCE  
RESEARCH ABSTRACT  
SUBMISSION &  
PRESENTATION  
GUIDELINES**

**2020**

### **General Information**

The National Strength and Conditioning Association (NSCA) is pleased to make a call for research abstract submissions for presentation at the 2020 National Conference. Research abstract presentations are an opportunity to present current research findings to researchers and strength and conditioning professionals at the NSCA National Conference. The research abstracts are the largest portion of the scientific programs presented every year at the National Conference. The NSCA encourages all researchers and students to submit their abstracts for consideration to the 2020 National Conference.

### **Submission Deadline**

The abstract submission deadline is **March 2, 2020**. Late submissions will not be accepted.

### **Notification**

Submitting authors will receive notification of acceptance or rejection of their research abstract by **May 1, 2020**. If you do not receive notification by May 1, please contact [abstracts@nsca.com](mailto:abstracts@nsca.com).

### **Language**

All abstracts must be written in English.

### **Cost**

There is no cost to submit an abstract, but due to costs incurred by the NSCA, all accepted abstracts are expected to be presented.

### **Failure to Present**

Failure to present an accepted abstract may result in disqualification from presentations at future NSCA conferences.

### **Presentation Format**

Research abstracts can be presented in either a podium or poster. Due to a limited number of available podium presentations, all requests for podium presentations cannot be accommodated.

### **Presentation Dates**

Podium and poster presentations occur on all three days of the conference (Thursday, Friday, and Saturday). Podium presentations typically occur in the morning with poster presentations occurring in two blocks each day.

### **Publication of Abstracts**

Accepted abstracts, that are presented, will be published in an electronic supplement to the *Journal of Strength and Conditioning Research* (date to be determined). The NSCA encourages all research abstract presenters to submit the completed manuscript of their presented research for consideration in the *Journal of Strength and Conditioning Research*.

## Research Abstract Submission Guidelines

- Abstracts must be original research studies that are unpublished.
- Abstracts may not have been previously presented (except at an NSCA regional or state conference).
- All data collection must be completed at the time of submission. Incomplete data collection will not be accepted.
- Do not submit abstracts containing data currently in press. In the event that data contained in an accepted abstract is published (paper, electronic, or other format) prior to the abstract's submission to the National Conference, the abstract will be withdrawn.
- Case studies (involving clinical cases, rare circumstances, adverse events, etc.) will only be considered on an individual basis.
- The first author of the research abstract is considered the *primary author* and must present the abstract. However, all authors must approve the abstract prior to submission.
- One person may be the primary author on a maximum of two abstracts (only one may be submitted as a podium presentation).
- All abstract presenters must pay for their conference registration and all other fees associated with travel.
- Abstracts may only be submitted online.
- For questions, please email the NSCA at [abstracts@nsca.com](mailto:abstracts@nsca.com).

## Subject Categories

There are twelve (12) available categories for research abstracts:

- |   |  |
|---|--|
| 1. Biochemistry / Endocrinology           | 7. Nutrition / Ergogenic Aids          |
| 2. Biomechanics / Neuromuscular           | 8. Resistance Training / Periodization |
| 3. Body Composition                       | 9. Social and Behavioral Science       |
| 4. Endurance Training / Cardiorespiratory | 10. Special Populations                |
| 5. Fitness / Health                       | 11. Speed / Power Development          |
| 6. Flexibility / Stretching               | 12. Tactical Strength and Conditioning |

## Use of Human and Animal Subjects

All research studies that include data recorded from human participants must comply with the Declaration of Helsinki and the US Department of Health and Human Services Policy for the Protection of Human Research Subjects (US Code, Title 45, Part 46 Protection of Human Subjects). All animal studies must comply with the Public Health Service Policy on Humane Care and Use of Laboratory Animals.

## Abstract Formatting Specifications

- All abstract submissions must be formatted correctly (see examples below) and include original research-based data to allow for a thorough review. Abstracts that do not meet these criteria will not be accepted.
- The body of the abstract cannot exceed 3,500 characters (including spaces) when there is no figure or table included. When there is a figure or table associated with the abstract, the text cannot exceed 3,000 characters (including spaces).

## Figures and Tables

- Abstracts may contain either one figure or one table, but not both. Abstracts submitted with more than one figure or table will have both images removed.
- Any figure or table must pertain to the abstract for the purpose of visualizing data and must be referred to in the text of the abstract. Figures or tables that do not pertain to the abstract will be removed.
- Figures or tables must be concise. It is at the discretion of the NSCA if a figure or table is too big, and if so, it will be removed. Additional text that should be in the abstract may not be substituted in the figure or table.

- The resolution of the figure or table must be adequate for reprinting (i.e., = 150 dpi).
- Including a figure or table does not replace any of the required sections (i.e., purpose, methods, results, etc.).
- No photos or pictures are allowed – only a figure or a table.
- The figure or table must be an image file (.jpg, .gif, and .png are accepted). PDF and PowerPoint are not acceptable.

### Required Information

- Abstracts/submissions must contain the following:
  - Long title (in ALL CAPS) cannot exceed 150 characters (including spaces).
  - Short title cannot exceed 10 words.
  - Language: English.
  - Abstracts must contain the following labeled sections: PURPOSE, METHODS, RESULTS, CONCLUSIONS, and PRACTICAL APPLICATIONS. These section labels must appear in all capital letters on the abstract.
  - Acknowledgements should be included to denote funding sources and/or conflicts of interest when applicable.
- Abstracts/submissions cannot contain the following:
  - Advertising. Research abstracts should be non-biased, free from solicitations, and should not contain demonstrations of products for the purpose of sales.
  - Author(s) degrees (MS, PhD, etc.) or credentials (CSCS, FNCSA, etc.).
- The following information will be asked during the submission process:
  - All authors' names.
    - If the primary/presenting author is submitting for award consideration, they must be an NSCA Member (professional or student).
    - If an author is NSCA certified, their NSCA ID Number must be entered to automatically record NSCA CEUs. If the authors NSCA ID Number is not entered, the author must self-report the CEUs.
  - All authors' primary institutions/laboratories (institution/laboratory name, city, state).
  - All authors' professional mailing address, email address, and phone number.
  - Desired presentation format (i.e., podium or poster).
    - Due to limited availability, not all podium requests can be accommodated.
  - Abstract subject category.
  - If the abstract is being considered for a Student Research Award (see below).

### Brand Names (updated for 2020)

- Brand names may only be used in the METHODS section to describe testing procedures when necessary and/or in the ACKNOWLEDGEMENTS section to describe funding or disclose any financial relationships.
- Brand names cannot appear in the title (short or long).
- Brand names may not be used for promotional purposes. It is at the discretion of the NSCA to determine if the use of the brand name is for descriptive or promotional purposes.
- The NSCA reserves the right to replace any brand name with a generic name without notice.

### Example Abstract with Figure or Table

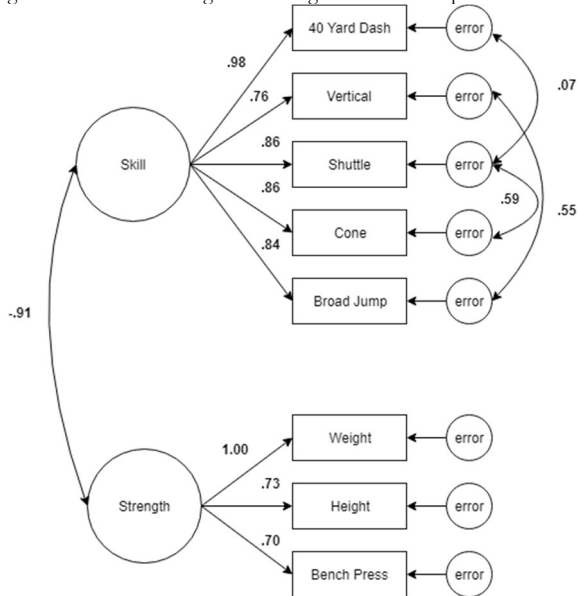
#### CONSTRUCTING AND IMPLEMENTING A CONFIRMATORY FACTOR MODEL USING SKILL AND STRENGTH FOR NFL COMBINE MEASURES

K. Allen<sup>1</sup>, C. Thomas, R. Herron<sup>2</sup>, J. Cook, G. Ryan<sup>3</sup>

<sup>1</sup>The University of Southern Mississippi, <sup>2</sup>United States Sports Academy, <sup>3</sup>Georgia Southern University

The National Football League (NFL) annually invites a select-group of potential players to perform in a scouting combine. A major component of the combine is a battery of anthropometric measurements and performance-based assessments that include a 40-yd dash, 20-yd shuttle, vertical jump, broad jump, 225lb bench-press repetitions, and 3-cone drill. However, it is less understood how these assessments relate to when/if the athlete is drafted to a team. **PURPOSE:** The purpose of this study was to investigate how combine results can be factorially grouped to best predict draft pick order using NFL combine data from 2013-2017. **METHODS:** To investigate the constructs and structure of the combine results, an exploratory factor analysis (EFA) was conducted. This analysis used data from 2013-2015 with Quarterbacks and Kickers excluded. The EFA using a principal-axis factor extraction was conducted with the scree plot and Parallel analysis recommending a two-factor solution. For interpretation of the two factors, an oblique rotation was used, and the component loadings indicated two factors, Skill and Strength. A Confirmatory Factor Analysis (CFA) was done using the data from 2016-2017. After the CFA, an ordinal regression was run using the factor scores for Skill and Strength, to predict which round the player would be drafted in. **RESULTS:** The EFA using a principal-axis factor extraction recommended a two-factor solution for the data. The CFA yielded the same two-factor model which fit the data,  $\chi^2 (df = 17) = 184.253$ , Comparative Fit Index (CFI) = 0.959. The two-factor model confirmed that Skill and Strength were latent variables that could be determined from combine measures (see Figure 1). An ordinal regression using the factors to predict which round a player would be drafted in had good fit with the deviance goodness-of-fit test,  $\chi^2(4191) = 2215.327$ ,  $p = 1.00$  and the final model over the intercept-only model was  $\chi^2(2) = 16.206$ ,  $p < .001$ . Concluding that a decrease in Skill was associated with a decrease in the odds of being drafted in Round 1, with an odds ratio of .417 (95% CI [.274, .635], Wald  $\chi^2(1) = 16.553$ ,  $p < .001$ ). A decrease in Strength was associated with a decrease in the odds of being drafted in Round 1, with an odds ratio of .458 (95% CI [.304, .689], Wald  $\chi^2(1) = 16.553$ ,  $p < .001$ ). **CONCLUSION:** The CFA using Strength and Skill was a valid approach to determine performance in the NFL Combine over using only traditional measures. Using the factor scores may allow for a more accurate prediction of draft. When Strength and Skill measures decrease, the less likely the player is to be drafted in the initial rounds, when compared to being not-drafted. **PRACTICAL APPLICATIONS:** If use of factor scores and traditional NFL Combine measures can yield a better prediction of players draft pick, this could be useful for further preparation, assessment, and scouting for players prior to the draft, which could provide great insight for coaches and personnel managers.

Figure 1: Standardized Regression Weights for the Accepted Model



### **Podium Abstract Presentation Guidelines**

- All podium abstract presentations must be prepared in Microsoft PowerPoint.
- All presenters are required to upload their presentation to an NSCA Dropbox account by July 7, 2020 (11:59 PM Eastern Time). Dropbox account URL to be provided.
- Presenters should bring a back-up copy of their presentation on a USB drive.
- All presenters should check in with their session's moderator prior to presenting.
  - Moderators are assigned in 1-hour blocks (9:00 – 10:00 AM, 10:00 – 11:00 AM, etc.). Podium presenters should check-in with their moderator before the hour block of their presentation.
- Podium abstract presentations must be consistent with the contents of the accepted abstract, and include the following sections: purpose, methods, results, conclusions, and practical applications.
- Podium presentations are 10 – 12 minutes in duration with 3 – 5 minutes of questions from the audience and responses from the presenter.

# Example Podium Presentation

## 2019 Doctoral Student Outstanding Podium Presentation

Harry Dorrell - University of Lincoln (England)

**COMPARISON OF INDIVIDUAL AND GROUP-BASED LOAD-VELOCITY PROFILING AS A MEANS TO DICTATE TRAINING LOAD OVER A SIX-WEEK STRENGTH AND POWER INTERVENTION**

Harry F. Dorrell, Joseph M. Moore, & Thomas I. Gee

School of Sport and Exercise Science, University of Lincoln, Lincoln, UK

### Introduction

**The problem ...**

- How do we dictate optimal training load for targeted adaptation?
  - Day-to-day
  - Set-to-set

**The current solution ...**

- Percentage-based loading
  - Utilises a pre-established 1RM
  - Can be combined with autoregulatory methods (RPE/RIR) (Reilly et al., 2014)
  - No measure of individual adaptation over time
  - Relies on subjective measures of fatigue / readiness to train

### Introduction

**A potential alternative ...**

**Velocity-based loading: Group load-velocity profiling**

- Reliable over time (Goschke & Balke et al., 2019)
- Estimate 1RM (Goschke & Balke et al., 2014)
- Provides objective feedback to athlete and coach (Winkler et al., 2017)
- Group-based profiling vs. percentage-based training (Dorrell et al., 2018)
  - Significant increases in maximal strength
  - Significant increases in vertical jump
  - Significant reduction in required training volume

### Load-velocity profiling

### Load-velocity profiling

### Purpose

To compare the effects of two velocity-based loading methods over a six-week strength and power intervention in resistance trained males

**\*\* Individual profiling vs. Group profiling \*\***

### Methods

**19 resistance trained males**

- Age: 23.6 ± 3.7 years; stature: 1.82 ± 0.05 m; body mass: 92.2 ± 8.7 kg; 1RM/BM: 1.74 ± 0.25
- Inclusion criteria:
  - > 2 years resistance training experience (> 6 months continuous)
  - Proficient in back squat
  - Injury free
- Testing:
  - All participants completed two load-velocity profiles / 1RM
  - 50-100% 1RM, 5% increments
  - Series of jump assessments:
    - Countermovement jump (CMJ)
    - Static squat jump (SSJ)
    - Stamming broad jump (SBJ)

### Training programme

**Individual (ILVP) vs. group (GLVP)**

- Participants were strength matched before random allocation
- Interventions were equated in volume (sets x reps x relative load)
- Utilised real-time mean concentric velocity monitoring:
  - Load (set by set)
  - Repetitions (rep by rep)
- Standardised real-time feedback provided to all participants
- Velocity zones created from the standard error of the profile
- Velocity stop input at 20% below 'target velocity'

### Real-time load dictation

For both interventions:

- Load-velocity profile created
- Velocity of target reps used to indicate relative load
- 1RM estimated using this data
- Next "target" load calculated based on estimated 1RM
- Repeat process for all working sets

### Statistical analysis

- SPSS (22.0)
- Custom written MATLAB code
- Alpha level of significance ( $p \leq 0.05$ )

**Within-group analysis**

- Independent sample t-tests

**Between-group analysis**

- Paired sample t-tests
- Two-way mixed ANOVA
- Effect sizes

### Results

No significant inter-group differences present for any variables analysed, including body mass, 1-RM strength, or jump performance

	One	Two	%ΔR	p-value	ES
<b>ILVP:</b>					
Back squat (kg)	103.9 ± 24.7	104.8 ± 26.0	0.7	<0.05	0.08
CMJ (cm)	60.7 ± 7.5	41.2 ± 9.0	6.6	<0.05	0.32
SSJ (cm)	36.4 ± 6.8	38.2 ± 6.5	4.8	<0.05	0.25
SBJ (cm)	10.2 ± 3.0	10.7 ± 20.5	6.7	<0.05	0.32
<b>GLVP:</b>					
Back squat (kg)	103.8 ± 24.3	104.4 ± 25.2	7.0	<0.05	0.43
CMJ (cm)	56.2 ± 5.1	37.8 ± 5.3	4.3	<0.05	0.21
SSJ (cm)	32.8 ± 5.7	34.2 ± 6.7	4.3	<0.05	0.21
SBJ (cm)	8.9 ± 3.4	10.7 ± 3.4	3.3	<0.05	0.31

### Results

**Key points:**

- All participants within the ILVP intervention improved performance across all assessments
- All participants within the GLVP intervention improved performance for back squat only

### Conclusion

**Six weeks continuous ILVP resistance training:**

- Significant increase in free weight back squat: maximal strength (9.7%)
- Significant increase in jumping performance:
  - CMJ (6.6%)
  - SSJ (4.8%)
  - SBJ (9.7%)
- Despite no interaction effect – ILVP resulted in greater % increase and larger effect sizes when compared to GLVP across all variables
- No reduction in pre-programmed total training volume

### Practical applications

**The problem ...**

- How do we dictate optimal training load for targeted adaptation?

**The potential answer ...**

- Individual load-velocity profiling
  - Can be used with autoregulatory training population
  - Greater control over load prescription
  - Provides real-time feedback on performance
  - Resulted in positive adaptations across all variables assessed
  - Sensitive enough for set-by-set load adjustment
  - No more time consuming than traditional percentage / group-based methods ...?

**Thank you for listening**

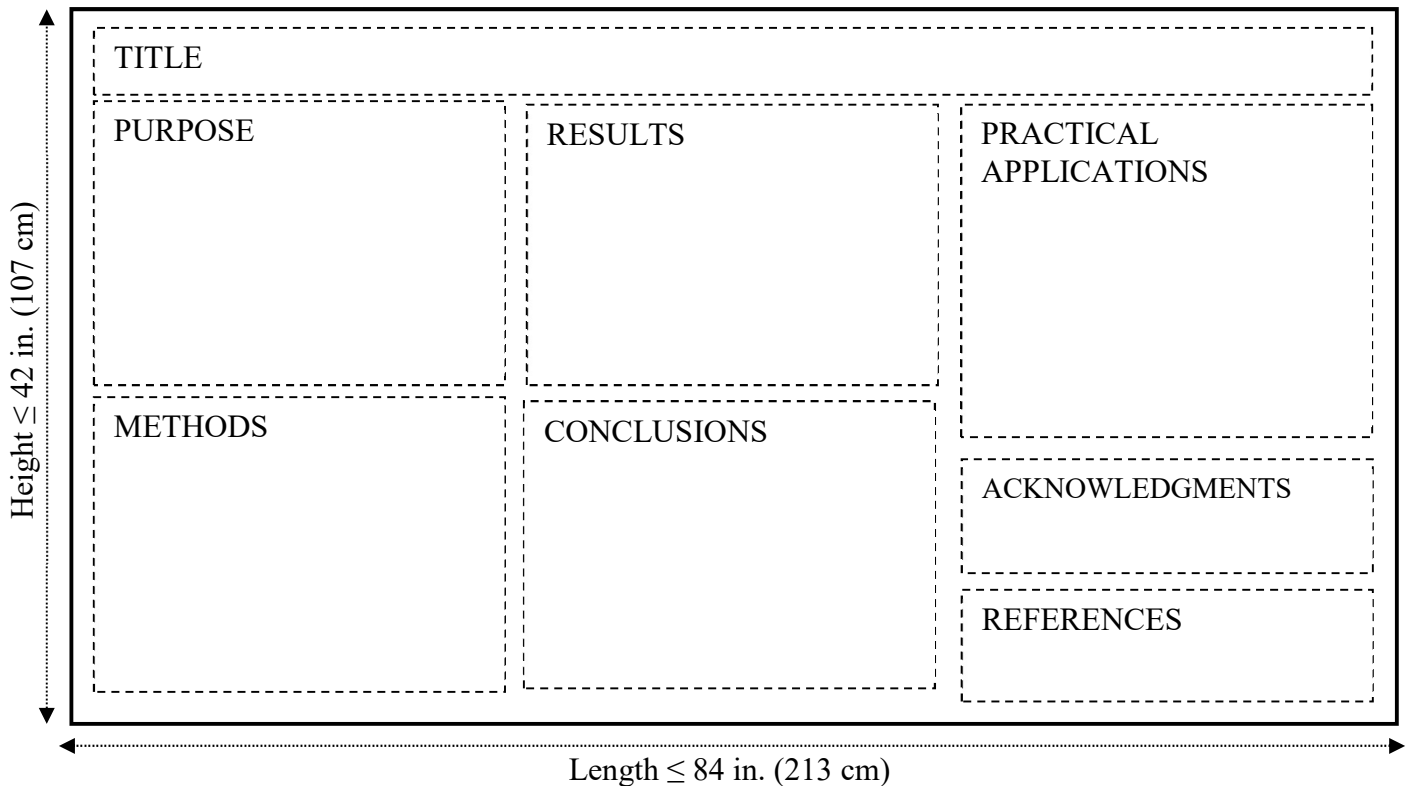
Harry F. Dorrell  
hdorrell@lincoln.ac.uk  
@harry\_dorrell



### Poster Abstract Presentation Guidelines

- All poster presentations should be printed on one uniform poster sheet with dimensions not exceeding 42 × 84 in. (107 × 213 cm) (height × width). Unless otherwise noted, the poster boards on which the posters are hung should be 48 × 96 in. (122 × 244 cm).
- Presenters are required to supply their own thumb tacks by which to hang their posters.
- Poster abstract presentations must be consistent with the contents of the accepted abstract, and include the following sections: purpose, methods, results, conclusions, and practical applications.
- The Research Committee recommends one of the two following layouts (Traditional Poster or #betterposter) as a general guideline for all poster presentations:

#### 1. Traditional Poster Design





Example of Traditional Poster Presentation  
 2019 Undergraduate Student Outstanding Poster Presentation Winner  
 Chelsie Zajac - Southern Illinois University Edwardsville

# SIUE

## Parameters of the Athlete Triad in Male NCAA Division I Athletes

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

Chelsie M. Zajac, Juan M. Marin, Shreshth S. Srivastava, Andrew M. Pevsler, Andrew R. Knap, Jennifer L. Sparrow, Bryan K. Smith, Maria Pavesio-del Valle, and Suzanne L. Gaultier  
 Department of Applied Health Sciences  
 Southern Illinois University Edwardsville, Edwardsville, IL

### Introduction

- Female athletes were first identified to develop a condition known as the "Female Athlete Triad", defined as having at least one of the following conditions: low energy availability (EA), abnormal menstrual cycle, or low bone mineral density (BMD).
- Although male athletes are also at risk of developing a similar condition characterized by low BMD, low EA, and/or reduced reproductive hormones, the triad has not been well studied in male athletes.

### Purpose

The purpose of this study was to assess BMD and EA in male NCAA division I athletes participating in leanness emphasizing sports (cross country and wrestling) and non-leanness emphasizing sports (soccer and basketball).

### Hypothesis

- EA and BMD will be lower in leanness emphasized sports (cross country and wrestling), compared to non-leanness sports (basketball and soccer).
- EA will be positively correlated with BMD.

### Methods

- 29 NCAA Division I SIUE male athletes (18-22 yr):
  - Soccer (n = 7), Cross Country (n = 5), Wrestling (n = 10), Basketball (n = 5)
- An early-season assessment was conducted (post 12 hr fast and abstinence from physical activity) and included:
  - Resting metabolic rate (RMR) test
  - A series of 3, 24-hour food intake recall interviews during the week of assessment
  - Actigraph, accelerometer used to monitor activity energy expenditure over the next 7d.
  - Dual energy X-Ray absorptiometry (DEXA) scan to assess BMD
- All data are presented as mean ± SEM. Data were analyzed using 1 factor ANOVA with Fisher's LSD post hoc comparisons. Pearson correlations were also performed.

### Results

	XC	Wrestling	Soccer	Basketball	Overall Sports
BMI (kg/m <sup>2</sup> )	20.6 ± 1.1 <sup>c</sup>	25.7 ± 1.5 <sup>a</sup>	23.1 ± 1.0 <sup>b</sup>	26.9 ± 1.0 <sup>b</sup>	24.9 ± 0.7
Total Body Mass (kg)	64.3 ± 5.4 <sup>c</sup>	77.7 ± 4.5 <sup>a</sup>	81.2 ± 4.3 <sup>b</sup>	92.8 ± 3.2 <sup>b</sup>	78.8 ± 2.8
Fat Mass (kg)	7.6 ± 1.0	10.7 ± 1.2	11.3 ± 1.5	11.1 ± 1.6	10.4 ± 0.7
Lean Mass (kg)	53.8 ± 2.7 <sup>c</sup>	63.4 ± 3.7 <sup>a</sup>	69.7 ± 2.9 <sup>b</sup>	77.2 ± 4.2 <sup>b</sup>	64.9 ± 2.2
Body Fat Percentage (%)	12.4 ± 1.2	14.1 ± 0.9	14.2 ± 1.2	12.4 ± 1.3	13.2 ± 0.6
Total Bone Mineral Density (g/cm <sup>3</sup> )	1.2 ± 0.07 <sup>c</sup>	1.4 ± 0.07 <sup>a</sup>	1.4 ± 0.07 <sup>b</sup>	1.6 ± 0.07 <sup>b</sup>	1.4 ± 0.0

Figure 1. Body composition measurements assessed via DEXA scan. \*Significantly different than basketball (p < 0.05). \*\*Significantly different than XC (p < 0.05).

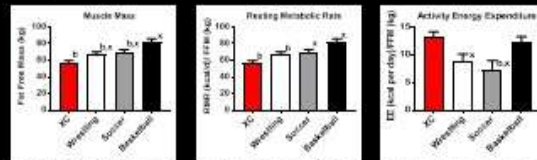


Figure 2. NSMANS returned for this team assessed via DEXA scan. NSMANS Fat free mass (FFM) = Total body mass - (fat mass - bone mass). \*Significantly different than basketball (p < 0.05). \*\*Significantly different than XC (p < 0.05).

Figure 3. Resting metabolic rate normalized to kg of FFM. The final 25 min of equally sized during the 25 min test was used to calculate RMR. (kcal/kg). \*Significantly different than basketball (p < 0.05). \*\*Significantly different than XC (p < 0.05).

Figure 4. Activity energy expenditure obtained from 7d of activity monitoring. Counts = 2 x 10<sup>6</sup> wear time and 3 weeks/day + 1 nonwear day to be included in sum. XC (n = 5), soccer (n = 4), wrestling (n = 9), basketball (n = 4). \*Significantly different than basketball (p < 0.05). \*\*Significantly different than XC (p < 0.05).

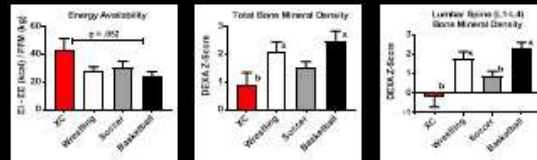


Figure 5. Energy availability normalized to fat free mass. EA = (Energy intake - activity energy expenditure) / fat free mass (kg). The threshold for low EA < 30 kcal/kg FFM. XC (n = 5), soccer (n = 4), wrestling (n = 9), basketball (n = 4). No significant differences.

Figure 6. Total bone mineral density Z-score (compared to age and sex matched population data). \*Significantly different than basketball (p < 0.05). \*\*Significantly different than XC (p < 0.05).

Figure 7. Leanness score (DEXA Z-score) based on total density Z-score (compared to age and sex matched population data). \*Significantly different than basketball (p < 0.05). \*\*Significantly different than XC (p < 0.05).

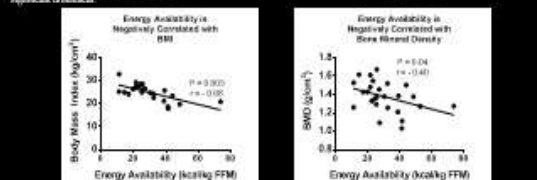


Figure 8. Energy availability, normalized to FFM, is negatively correlated with BMI. P < 0.05.

Figure 9. Energy availability, normalized to FFM, is positively correlated with BMD. P < 0.05.

### Summary/Conclusions

- Despite having the lowest total BMD and RMR per kg of FFM, XC runners had the greatest EA.
- In contrast, basketball players had the greatest total BMD and RMR per kg FFM, but the lowest EA.
- In contrast to our hypothesis, EA was negatively correlated with total BMD, thus athletes with the highest EA had the lowest BMD.
- EA was also negatively correlated with BMI, suggesting that the larger the athlete, the more likely he was to have low EA.
- It is not surprising that the athletes with the greatest mass had the greatest total BMD.
- It is known that collegiate athletes in general struggle to take in enough calories. These data indicate that the athletes with the greatest mass had the greatest daily energy requirement that resulted in largest deficits in EA.
- It has been suggested that aspects of the MAT, including low BMD, reduced RMR and reproductive hormones are more dependent on total energy expended during exercise, rather than EA, which may in part explain why XC runners had the lowest BMD.

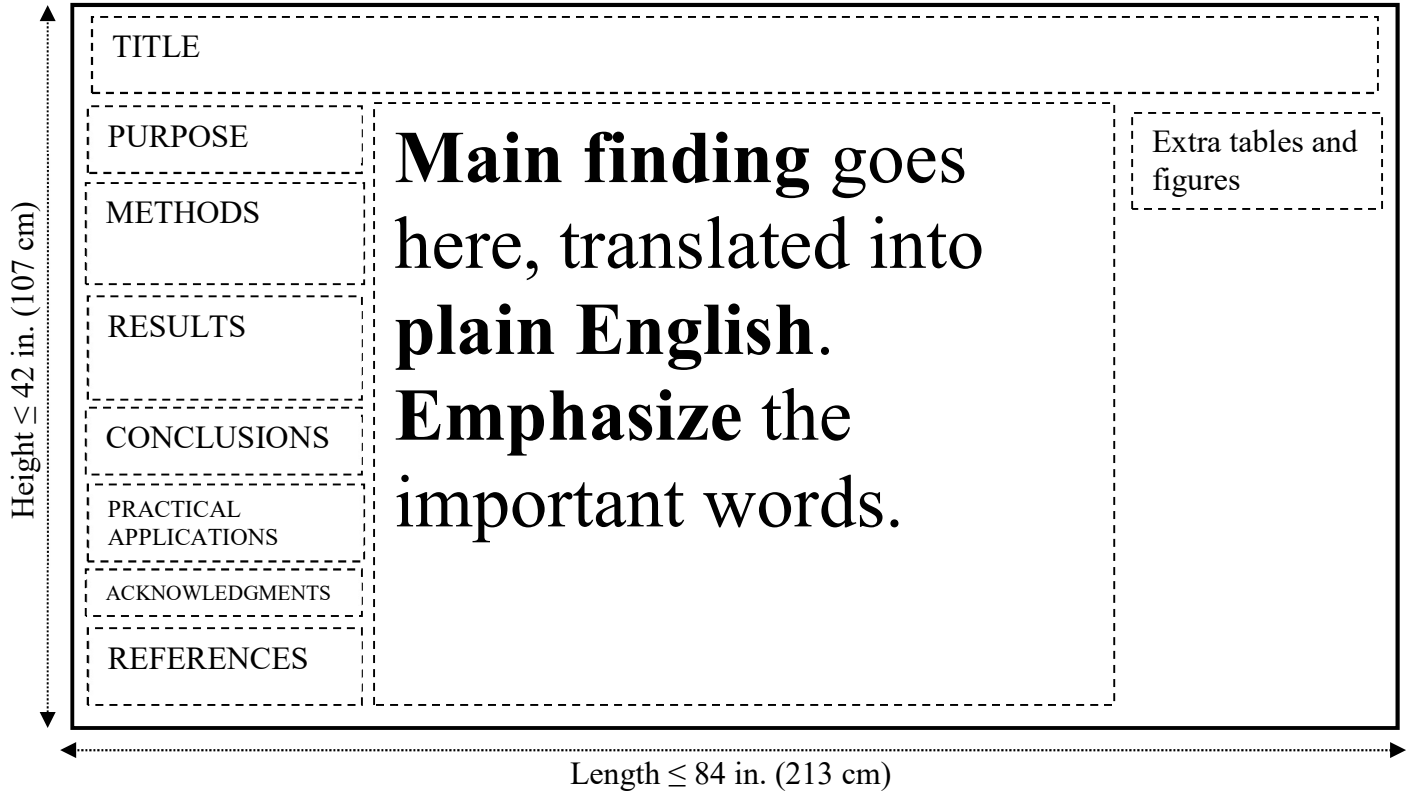
### Future Research

- Future presentations will include averaged data from two assessments per athlete, attained early and mid season respective to their practiced sport.
- In addition, future presentations will include reproductive hormone levels including total and free testosterone, steroid hormone binding globulin (SHBG) luteinizing hormone (LH), and follicle stimulating hormone (FSH)

### Acknowledgements

Supported by:  
 SIUE School of Education, Health, and Human Behavior Dean's Grant  
 SIUE Undergraduate Research and Creative Activities Associate Program

## 2. #betterposter design



More information on #betterposter design can be found at <https://www.youtube.com/watch?v=1RwJbhkCA58>

Example of #betterposter design  
Adrien Buttram – University of North Georgia

**LONGITUDINAL BODY COMPOSITION  
CHANGES OF NCAA DIVISION-1 FEMALE  
GYMNASTS**

A.M. Buttram<sup>1</sup>, R.L. Herron<sup>2</sup>,  
S.G. Reddy<sup>1</sup>, and J.C. Casey<sup>2</sup>  
<sup>1</sup>University of North Georgia,  
<sup>2</sup>United States Sports Academy

**Introduction**

Body composition is an important component of physical fitness that has been shown to influence athletic performance and health. Body composition alterations may occur for a multitude of reasons including the strength and conditioning program, nutrition program, and the stress of the competitive season. Sports with increased focus on aesthetics, such as gymnastics, may require increased attention to body composition changes to ensure optimal health and performance. Some sports have shown a trend of BF% decreases and FFM increases from pre- to postseason. While others have demonstrated little or no change. Limited research is currently available examining body composition changes during preparatory and competitive seasons in female athletes, especially NCAA female gymnasts.


**Methods**

All participants (n = 10) were NCAA Division-1 female gymnasts at the time of each data collection session.

Participants visited the laboratory for testing periodically throughout two competitive seasons.

Each visit body mass (BM) was measured with a calibrated digital scale and body fat percentage (BF%), fat mass (FM), and fat-free mass (FFM) were measured with air displacement plethysmography (BODPOD).

**MONITORING  
LONGITUDINAL  
CHANGES IN BODY  
COMPOSITION IS USEFUL  
FOR ATHLETES AND  
STRENGTH AND  
CONDITIONING SPECIALISTS.**



**Results**

**Table 1.** Body size and composition throughout the Preparatory and Competitive Seasons (Mean ± SD).


Season	Time	BW	BF%	FM	FFM
Season 1	Aug	58.5 ± 4.7	20.4 ± 3.5	11.9 ± 2.3	46.6 ± 4.2
	Oct	59.9 ± 5.1*	19.4 ± 3.5	11.6 ± 2.3	48.2 ± 4.7*
	Jan	59.8 ± 4.9*	18.6 ± 4.5	11.2 ± 2.9	48.7 ± 4.8*
Season 2	Mar	60.1 ± 4.7*	18.9 ± 4.0	11.4 ± 2.7	48.7 ± 4.5*
	Sep	60.9 ± 3.8*	20.4 ± 3.9	12.4 ± 2.6	48.5 ± 3.8*
	Nov	60.7 ± 3.5*	19.2 ± 4.6	11.6 ± 2.6	49.1 ± 4.9*†


BW, FM, and FFM reported in kg.  
\*Significantly greater than August (p < 0.05)  
†Significantly greater than October (p < 0.05)

BW significantly increased between August and October (p = 0.008) of season 1 but subsequently remained constant thereafter. FFM significantly increased from August to October (p < 0.001) of season 1 and from October to November (p = 0.045) of season 2. There were no other statistical differences found.

**Conclusion & Practical Applications**

Monitoring longitudinal changes in body composition can be useful for athletes and strength and conditioning specialists. This investigation indicated that during the preparatory and competitive phases, female gymnasts can be expected to maintain their FM and BF% while, during the preparatory period, increasing and subsequently maintaining BW and FFM. Female gymnasts with substantial body composition changes, while previously at "normal ranges", should be identified and provided appropriate intervention.





Take a picture to  
download the full abstract.



### **Abstract Review Process**

The Scientific Programs Subcommittee is responsible for reviewing the NSCA Research Abstracts to assure that the correct formatting has been applied and to solicit blinded external review(s) for scientific content. Abstracts that do not meet the previously stated formatting criteria will be rejected. The Scientific Programs Subcommittee may solicit a blinded external review. The abstract may be externally reviewed for scientific content, appropriate methodology, correct statistical analysis, proper interpretation of results, and contribution to the field of strength and conditioning. If a reviewer suggests that an abstract be rejected, the Scientific Programs Subcommittee will independently re-review the abstract in question. In this case, the Scientific Program Subcommittee will have final authority to accept or reject the abstract.

### **Student Award Consideration**

Any student author who wishes to submit a research abstract for award consideration must be a Student or Professional Member of the NSCA at the time the abstract is submitted. Each student may only submit one (1) abstract for award consideration.

### **Student Research Award Description**

The NSCA awards outstanding research efforts by students through the NSCA Student Research Awards. Five awards are given each year:

1. Doctoral Student Research Award for outstanding *podium* abstract presentation
2. Doctoral Student Research Award for outstanding *poster* abstract presentation
3. Master's Student Research Award for outstanding *podium* abstract presentation
4. Master's Student Research Award for outstanding *poster* abstract presentation
5. Undergraduate Student Research Award for outstanding *poster* abstract presentation

### **Preliminary Judging for Student Awards**

The top ten (10) master's podium and top ten (10) doctoral podium submissions after the initial review period will be selected to be judged at the National Conference. The top ten (10) doctoral posters, top ten (10) master's posters, and top five (5) undergraduate posters after the initial review period will be selected to be judged at the National Conference. Students selected to be judged at the National Conference will be notified of their selection.

### **Student Research Award Criteria**

- Each student award applicant must be a current Student or Professional NSCA Member at the time the abstract is submitted.
- A student can be the primary author on a maximum of 2 abstracts; however, only 1 abstract can be eligible for the student award.
- The candidate must be enrolled as a full-time student at the time of abstract submission *or* have completed his/her degree no more than 1-year prior to the NSCA National Conference.
- The abstract must be submitted according to the required specifications (*see above*) and the "Student Award" option must be selected.
- The presentation guidelines (either podium or poster) must be met as stated in this document.
- Student award candidates must attend the NSCA National Conference to present their research.
- Winners will be announced at the NSCA Awards Banquet on the Friday evening of the conference, as well as through NSCA's social media channels.
- Case studies are not eligible for award consideration.

### Student Award Judging Criteria

Below are five (5) basic questions and additional sub-questions that are used by the judges to evaluate the student award candidates. Each question is answered with a Likert scale response on evaluation sheets, with spaces for judges' comments. The points are tallied and the comments are considered, narrowing the candidates for consideration. In the event of a tie, an overall subjective score provided by the judges from 1 – 100 will be considered.

1. Was the presentation knowledgeable and professional?
  - a. For podium presentations – were the slides readable?
  - b. For poster presentations – was the poster readable?
  - c. How involved was the student with this project?
    - i. Did the student provide well-informed responses to the questions?
    - ii. How knowledgeable was the student about this project?
  - d. How well did the authors follow the guidelines for abstract presentations (component parts)?
2. Was the introduction/literature review sufficient and relevant?
3. Was the study well designed?
  - a. Was the purpose clearly stated?
  - b. Did the methodology address the research question?
  - c. Were the statistical procedures appropriate?
  - d. Were the conclusions valid based on the results of the study?
4. What was the scientific impact of the research?
5. How well did the student *bridge the gap* with the practical application section?

### Submission Checklist

- Abstract is written in English.
- Research study is original and has not been previously published or presented.
- All required sections are provided and labeled.
  - PURPOSE, METHODS, RESULTS, CONCLUSIONS, and PRACTICAL APPLICATIONS.
- All data are completed and present at the time of submission.
- No brand names are included (only permitted in METHODS and/or ACKNOWLEDGEMENTS sections to describe procedures).
- No brand names appear in the long or short title.
- Any funding is described in the acknowledgements section.
- Any potential conflicts of interest are described in the acknowledgements section.