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The Effects of Participation in Marching Band on Physical Activity and Physical Fitness in College Aged Men and Women

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Welcome!

The Effects of Participation in Marching Band on Physical Activity and Physical Fitness in College Aged Men and Women

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Outline

- Introduction
- Background Information
- Purpose and Hypotheses
- Methods
- Results
- Discussion
- Limitations
- Future Research

Kristen and Joe

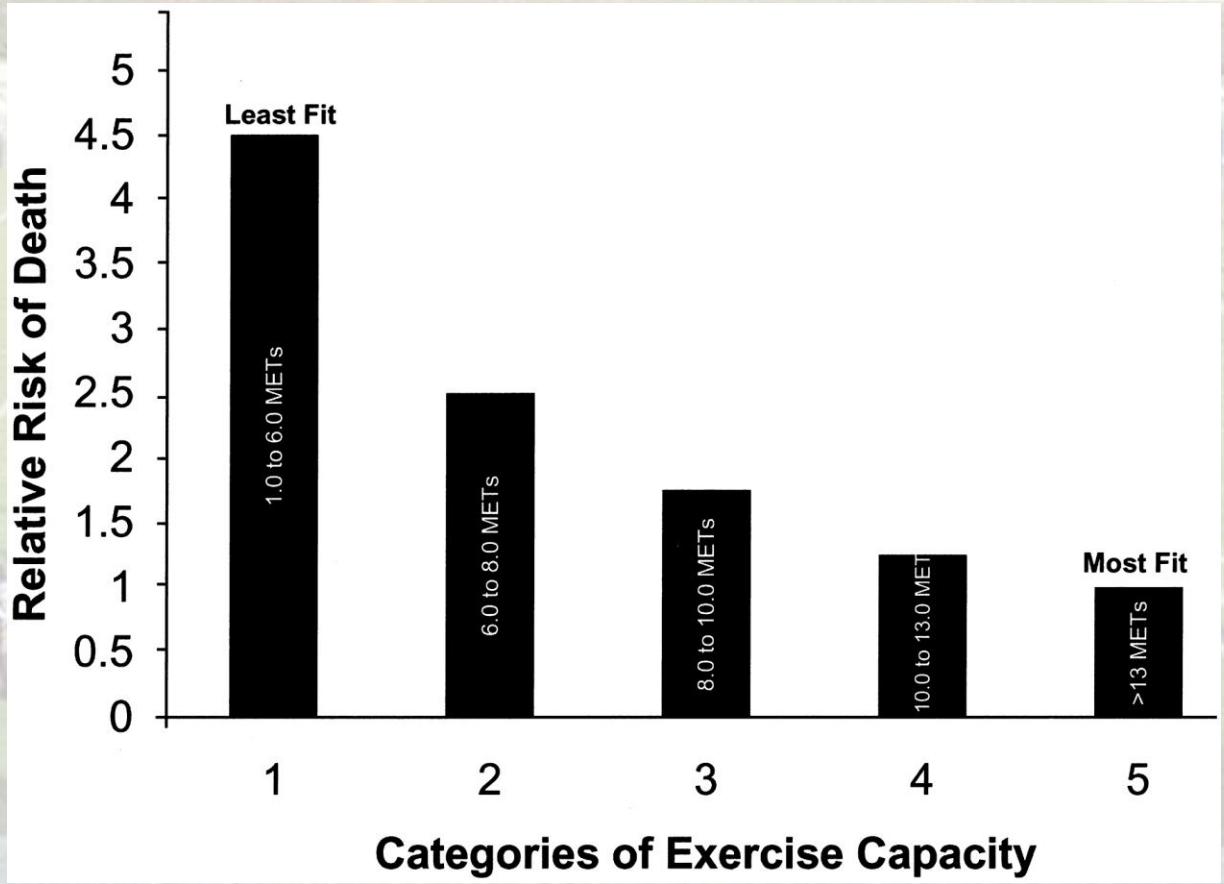
Exercise and Health

There is overwhelming evidence that exercise provides health benefits and decrease the risk of:

- Premature mortality
- Coronary artery disease
- Ischemic/hemorrhagic stroke
- Hypertension
- Type 2 diabetes mellitus
- Breast and colon cancer
- Falls
- Preserves bone mass
- Depression
- Osteoarthritis
- Anxiety
- Peripheral Artery Disease
- Hypercholesterolemia
- Weight Loss
- C-reactive protein and other CHD biomarkers
- Enhances feelings of "energy", well-being, quality of life, and cognitive function and is associated with a lower risk of cognitive decline and dementia

Garber, C. et al. (2011). Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults: Guidance for Prescribing Exercise.

Exercise and All-Cause Mortality



Blair, S. et al. (1995). *JAMA: Journal Of The American Medical Association*.

Exercise Guidelines

- Physical Activity guidelines (ACSM 2013):
  - 150 minutes of moderate-intensity physical activity per week; OR
  - 75 minutes of vigorous-intensity physical activity per week (75 minutes per week), OR
  - Combination of moderate and vigorous exercise week.

- Most people do not meet these guidelines
  - More than 80% of adults do not meet the physical activity guidelines
  - 32.6% of adults do not participate in any leisure time physical activity (United States Department of Health and Human Services, Healthy People 2020. (2011, June 29).
  - The WHO states that physical inactivity (lack of physical activity) has been identified as the fourth leading risk factor for global mortality (6% of deaths globally)

Why Don't People Exercise?

- Lack of time
- Negative thoughts about exercise
- Unaware of the benefits
- Lack of motivation
- Fear of injury
- Fear of falling (older adults)
- Don't know how
- Too tired to exercise
- Lack of enjoyment

Kendzierski, D., & Johnson, W. (1993). *Journal Of Sport & Exercise Psychology*.

Kwan, B. M., & Bryan, A. D. (2010). Affective response to exercise as a component of exercise motivation: Attitudes, norms, self-efficacy, and temporal stability of intentions.

Why Marching Band?

- Video clip: http://www.youtube.com/watch?v=hk_SRUsJFN8

- Research shows evidence that people do not exercise when they do not enjoy the activity

Marching Band and Exercise

- Cowen, V (2006) found:
  - Band members took an average of 13,987.8 ± 4,715.7 steps on game day
  - 8,337.5 ± 4,015.7 steps on non game days
- Edwards, J (2008) found that a drumline member works as hard as a professional football player.
  - HR over 200bpm
  - VO_2 over 40 mL/kg/min

Marching Band and Exercise

- Erdmann, L. D. et al. (2003) looked at the energy cost of marching band
  - Energy demand ranged from 4.0 to 6.5 METS
    - Moderate activity
- Wenta, M. R. (2011) investigated energy balance of marching band members
  - Negative energy balance of -661 kcals ± 785 kcals per day

Purpose

- **Primary Goal:**
  - To see whether the band improves their cardiorespiratory fitness from pre-season to post season
  - To evaluate the amount of physical activity associated with a non-traditional activity, marching band, and if it assists in reaching ACSM guidelines and thus attribute to healthy lifestyles.
- **Secondary Goal:** To assess whether the drumline or woodwinds/brass benefited more

Hypotheses

1. Marching band members will have a significantly higher VO_{2max} at the end of the season compared to the pre-season.

2. Marching band members will have a lower percentage of body fat at the end of the season compared to the pre-season.

3. Band members will meet ACSM guidelines for moderate-intensity physical activity based on percentage of time spent in their target heart rate zone and the number of steps taken during regular practice sessions.

4. The drumline will have a significantly greater improvement in VO_{2max} compared to the brass and woodwinds sections.

5. The drumline members will spend more percentage of time in their target heart rate zone compared to the brass and woodwinds.

Institutional Review Board

- A full proposal was submitted to the URI Institutional Review Board (IRB) for approval
  - Research
  - Develop methods
  - Write Informed Consent
  - Find a Medical Questionnaire
  - Write proposal

Procedure/ Design

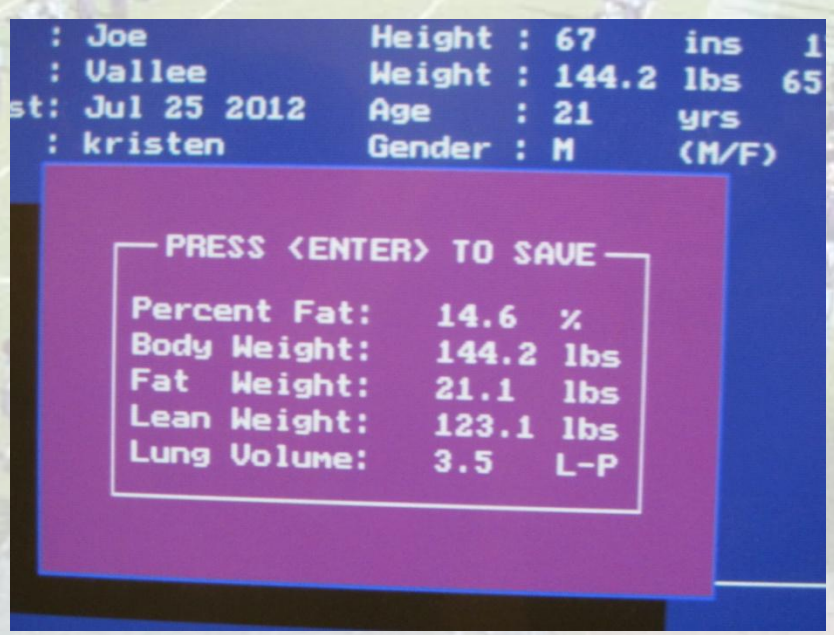
- Two parts:
  - Pre/Post season
    - Anthropometrics
    - Body Composition
      - % body fat
    - Cardiorespiratory Fitness
      - Maximal exercise test to determine VO_2max
  - Practices
    - During the marching band season, the quantity and intensity of physical activity accomplished during a routine band practice was measured on five occasions.

Measures

- Anthropometrics
  - Height
  - Weight
  - BMI

Measures

- Body Composition
  - Air Displacement Plethysmography (Bod Pod)

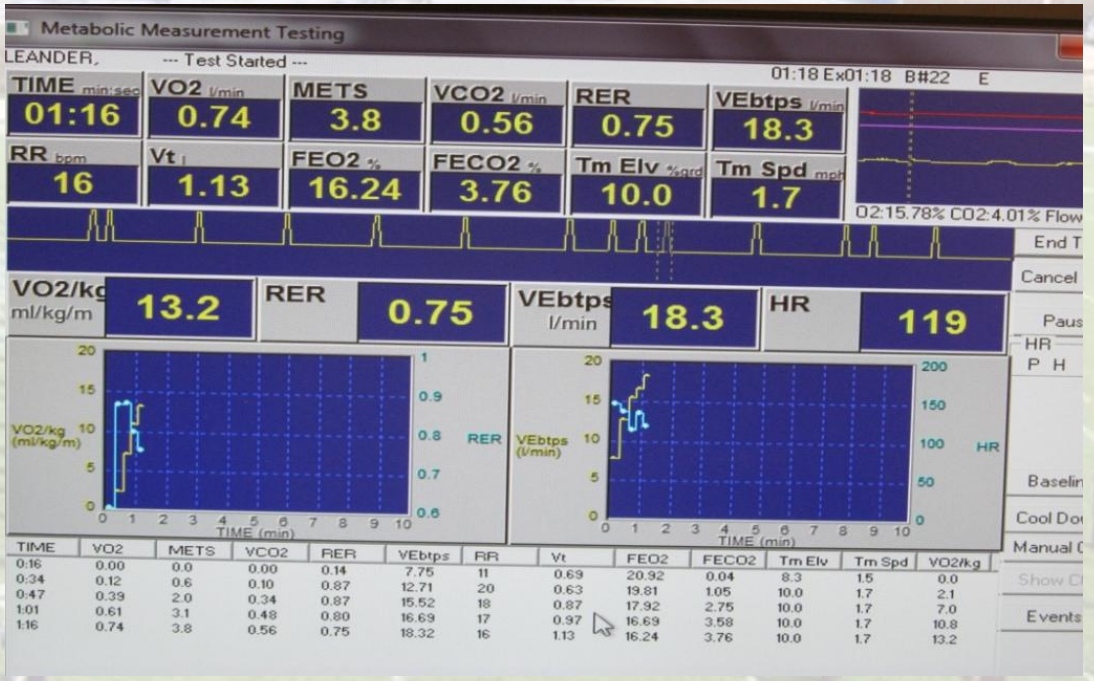


Measures

- Maximal Exercise Testing
  - Determines VO_2max
  - Requires a metabolic cart, treadmill, heart rate monitor, and Rating of Perceived Exertion Scale (RPE)
- How do you know if subject gives a maximal effort?
  - RPE ≥ 17
  - HRmax within 10% of age predicted HRmax
  - RER ≥ 1.1

BORG'S RPE SCALE

6	Very, very light
7	
8	
9	Very light
10	
11	Fairly light
12	
13	SOMEWHAT HARD
14	
15	Hard
16	
17	Very hard
18	
19	Very, very hard
20	



Measures

- Physical activity during practice was measured using
  - Suunto Heart Rate Monitor – provided the number of minutes in MVPA
  - Pedometer – number of steps

Statistical Analysis

- Means and standard deviations were calculated for all variables.
- Changes in cardiorespiratory fitness and body composition for all band members were examined using a paired t-test.
- Change scores for cardiorespiratory fitness and body composition between band sections were examined using a t-test.
- The amount of time spent in MVPA and the number of steps taken during practice was compared to national recommendations.
- Significance levels were set at $p<0.05$ level for all analyses.
- All analyses were done using SPSS software

Descriptive Characteristics (n = 21)

Age (years)	20.2 ± 2.97
Height (cm)	172.7 ± 7.56
Weight (kg)	80.1 ± 27.9
BMI (kg/m2)	26.56 ± 8.1
Sex	66.7% Male 33.3% Female
Section	57.1 % Drumline 42.9% Woodwind/Brass

Body Composition

	Pre	Post
Weight (kg)	80.1 ± 27.9	80.4 ± 28.5
BMI (kg/m2)	26.56 ± 8.1	26.6 ± 8.1
% Body Fat	24.8 ± 12.1	25.8 ± 10.1
Fat Weight (kg)	22.1 ± 17.4	22.6 ± 15.8
Lean Weight (kg)	58.0 ± 14.6	57.8 ± 15.0

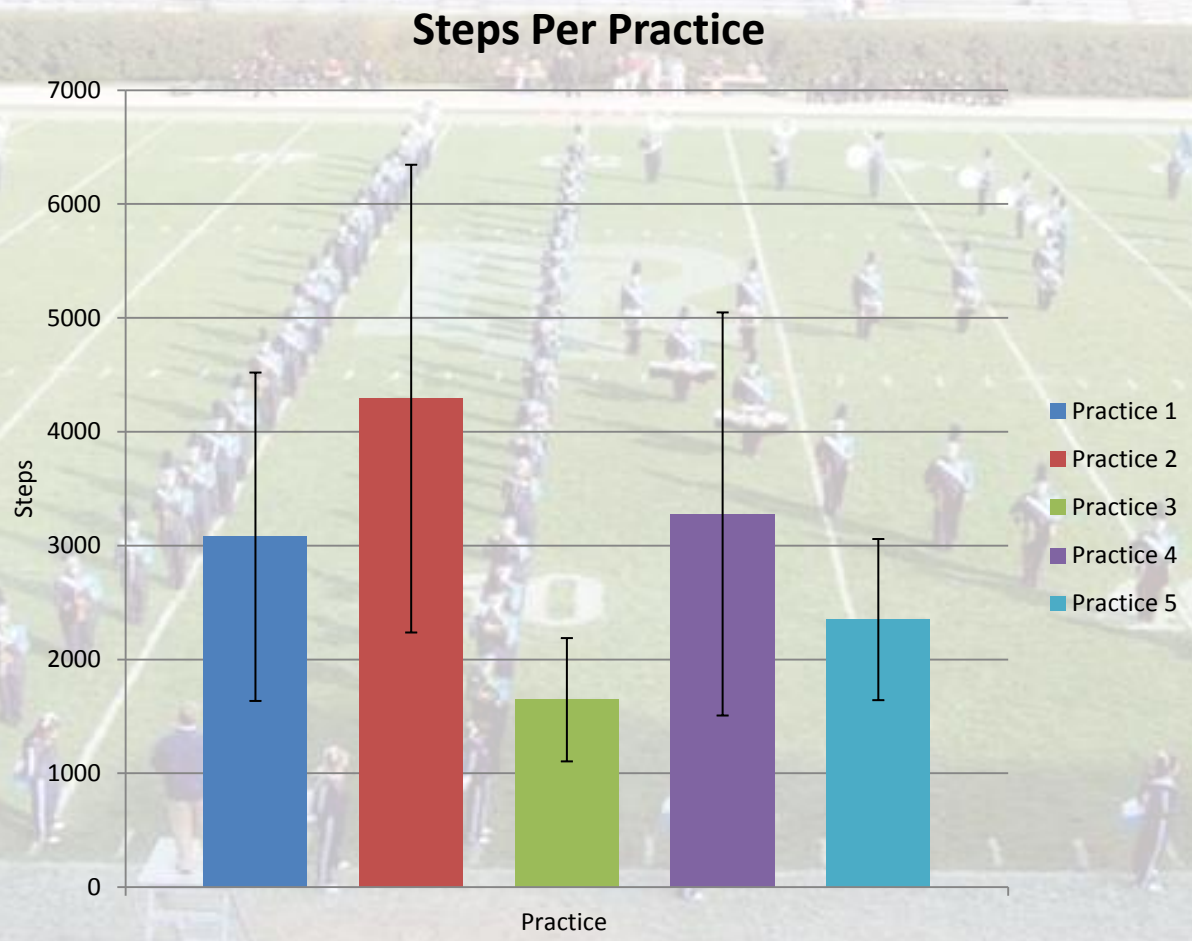
Maximal Exercise Test

	Pre	**Post**
RERmax	1.22 ± .09	1.17 ± .07
HRmax (bpm)	195.6 ± 8.76	194.9 ± 7.9
RPEmax	17.2 ± 1.5	17.3 ± 1.7
Treadmill Time (seconds)	579.3 ± 112.1	608.2 ± 99.0*
VO2max (mL/kg/min)	38.5 ± 9.23	40.8 ± 8.5*

Practice

Steps	2930.1 ± 1075.8
Time in moderate (minutes)	12.4 ± 6.4
Time in vigorous (minutes)	6.37 ± 6.8
Time in moderate + vigorous (minutes)	18.75 ± 12.4
Time in moderate + vigorous + light (minutes)	29.7 ± 14.9

Practice


Steps Per Practice
7000
6000
5000
4000
3000
2000
1000
0
Steps
Practice
Practice 1
Practice 2
Practice 3
Practice 4
Practice 5

Section Comparison-Descriptive

	Woodwind/Brass (n = 12)	**Drumline (n = 9)**
Age (years)	20.1 ± 1.2	20.4 ± 1.1
BMI (kg/m2)	26.4 ± 8.3	26.8 ± 8.3
Sex	66.7% Male 33.3% Female	66.7% Male 33.3% Female
Height (cm)	173.0± 6.4	172.1 ± 9.3
Weight (kg)	79.8 ± 27.7	80.6 ± 29.8

Section Comparison- Body Composition

	Woodwind/Brass		Drumline	
	Pre	Post	Pre	Post
Weight (kg)	79.8 ± 27.7	79.1 ± 28.8	80.6 ± 29.8	82.1 ± 29.7
BMI (kg/m2)	26.4 ± 8.3	26.1 ± 8.42	26.8 ± 8.3	27.3 ± 8.2
% Body Fat	25.6 ± 11.5	26.2 ± 12.3	23.7 ± 13.4	25.3 ± 7.0
Fat Weight (kg)	22.2 ± 15.6	23.0± 17.3	22.0 ± 20.5	22.2 ± 14.7
Lean Weight (kg)	57.6 ± 16.3	56.1 ± 14.8	58.6 ± 12.9	60.0 ± 16.0

Section Comparison- Maximal Exercise Test

	Woodwind/Brass		Drumline	
	Pre	Post	Pre	Post
RERmax	1.19 ± .08	1.15 ± .08	1.25 ± .08	1.19 ± .06
Hrmax (bpm)	193.2 ± 8.4	192.6 ± 7.7	198.6 ± 8.8	197.9 ± 8.2
RPEmax	17.3 ± 1.3	17.3 ± 2	17.0 ± 1.8	17.4 ± 1.2
Treadmill Time (seconds)	567.7 ± 93.3	608.3 ± 88.7	595.3 ± 139.3	608.1 ± 198.6
Change in Time (sec)	33.2 ± 42.5		11.4 ± 39.7	
VO2max (mL/kg/min)	37.4 ± 6.7	41.0 ± 7.4	40.1 ± 12.2	40.5 ± 10.4
Change in VO2max	3.6 ± 2.4		.39 ± 2.6*	

Section Comparison- Practice

	Woodwind/Brass	Drumline
Time in All zones	24.8 ± 12.9	36.3 ± 1
Time in Moderate	10.5 ± 5.4	14.9 ± 7.1
Time in Vigorous	4.7 ± 6.3	8.6 ± 7.0
Time in Moderate + Vigorous	15.2 ± 10.5	23.5 ± 13.8
Steps	2513.9 ± 1111.6	3485.1 ± 766.7*

Marching Band

- Body Composition
  - No change
- Cardiorespiratory Fitness
  - Marching band improved CRF
- Practice
  - Did not meet ACSM guidelines for PA
  - PA contributed toward overall total steps and minutes of MVPA per day

Section Comparison

- Practice
  - Drumline took more steps
  - More time in MVPA
- Body Composition
  - No change in either section
- Cardiorespiratory Fitness
  - Woodwinds/brass had greater improvements compared to drumline
    - Unexpected finding
    - May be due to higher baseline levels of CRF in drumline at baseline

Limitations

- Small number of subjects
- Not all subjects completed the VO_2max test
- Not all subjects came to every practice

Future Research

- How hard do marching band members work during a game?
- Follow band for entire season
- Other non-traditional means of exercise

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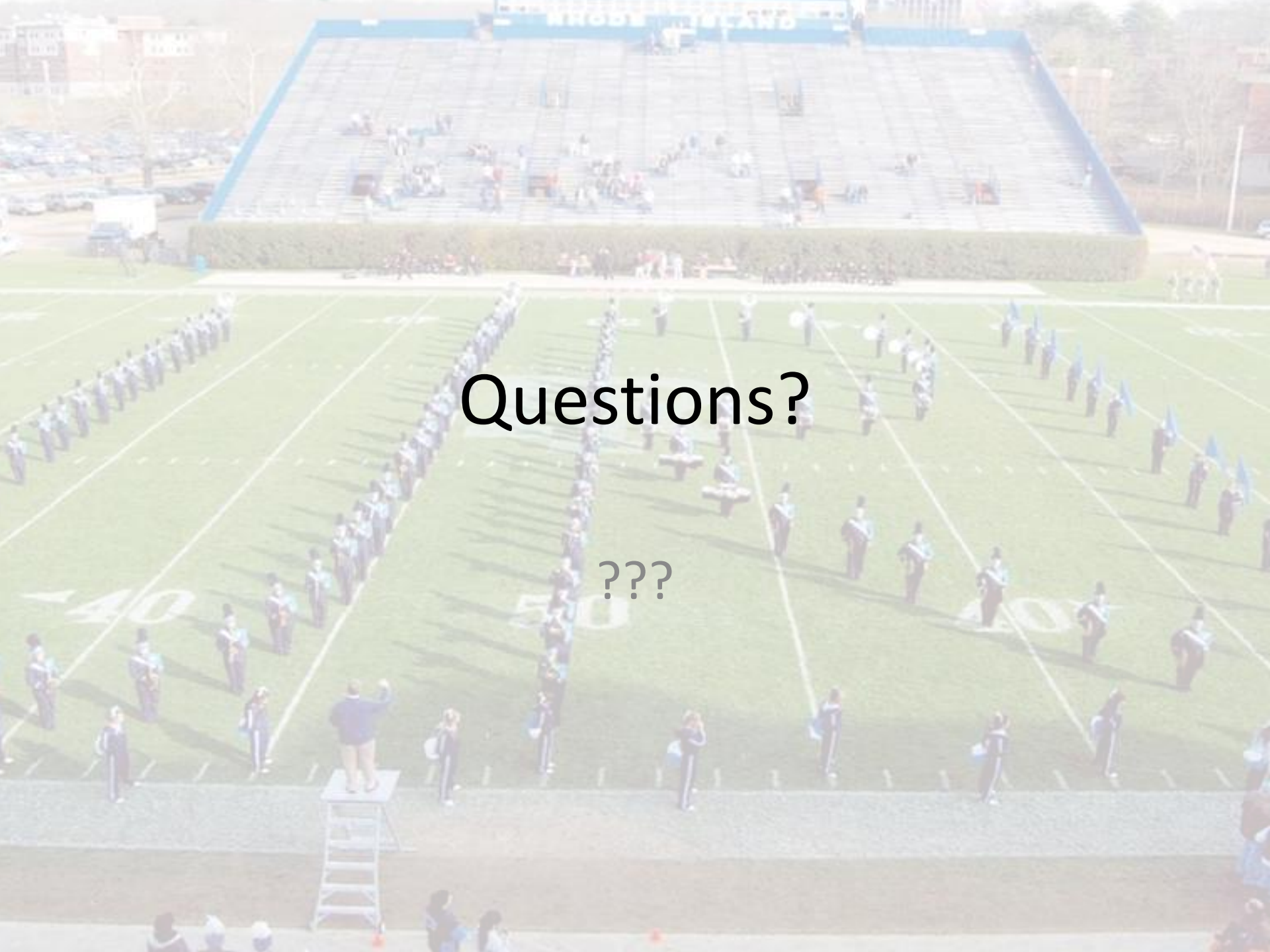
Acknowledgements



Questions?

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Thank you!