

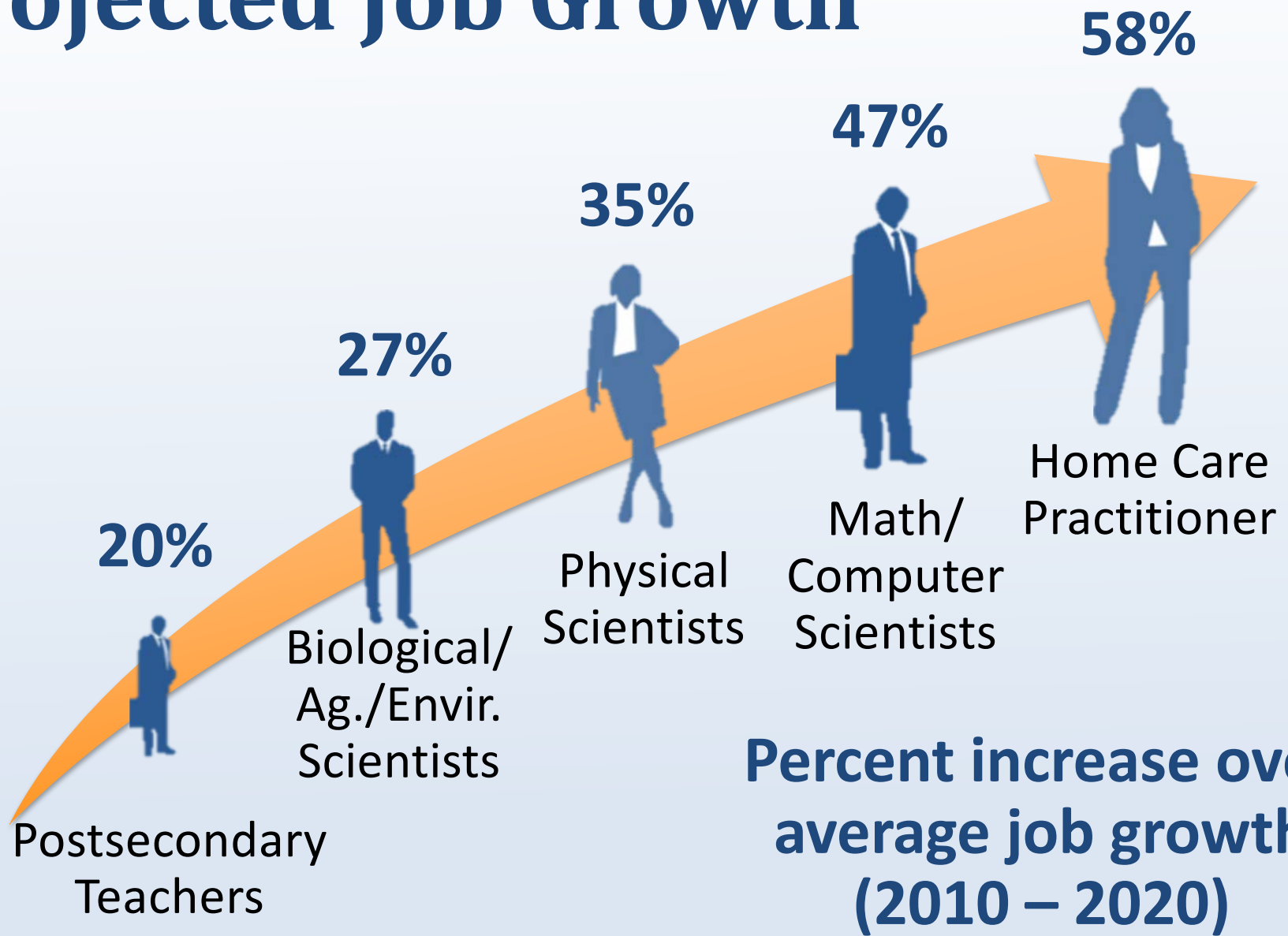
Math phobia in agricultural classrooms: A three-year study of student attitudes and skills

Taylor L. Hansen*
and Lori K. Warren

UF | IFAS
UNIVERSITY *of* FLORIDA

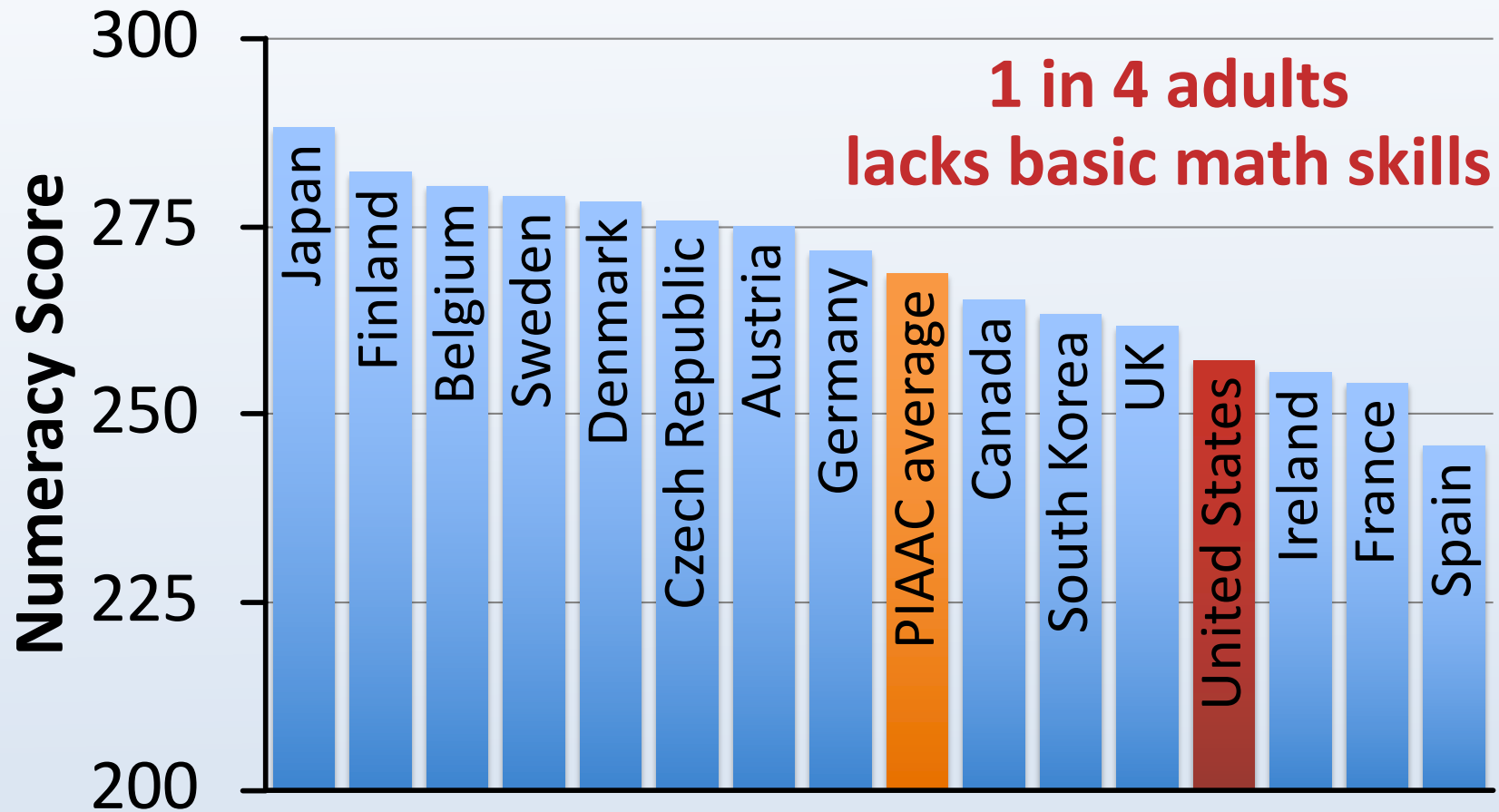


Projected Job Growth



BLS (2013)

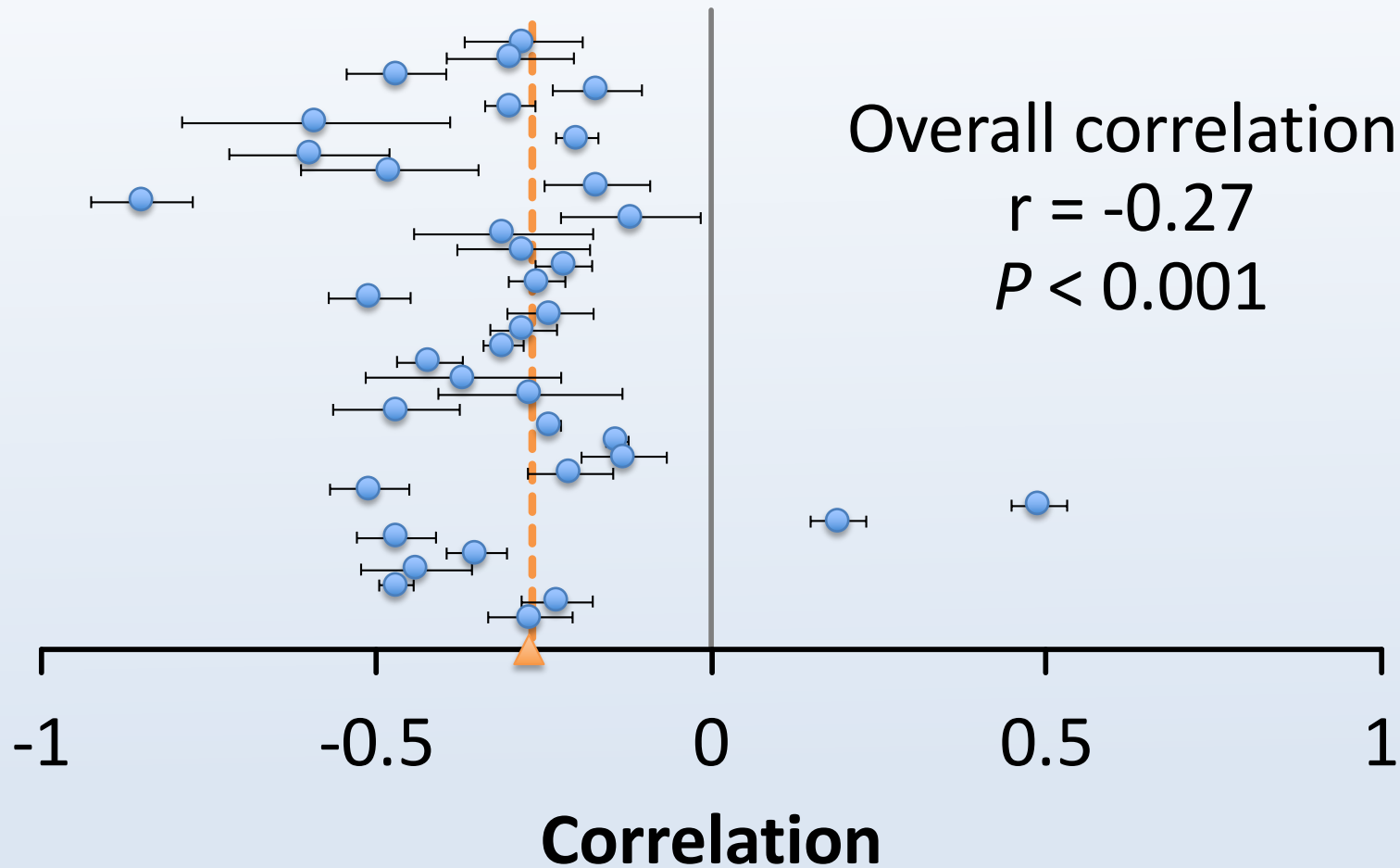
International Adult Numeracy



NCES OECD PIAAC (2016)



Math Anxiety & Achievement



Ma (1999)

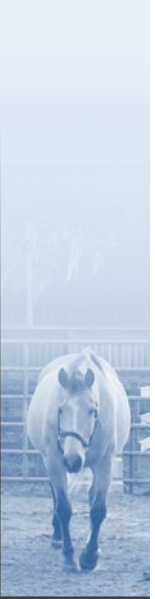




**Budgeting
Feed/Fertilizer
Scheduling
Management
Evaluating Markets**

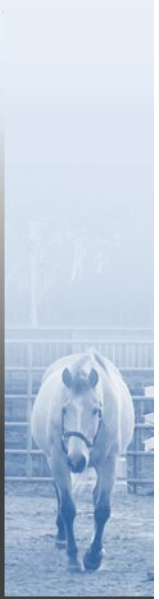
Objectives

- 1. *Assess student perceptions, skills, and previous math experiences in an equine science course***
- 2. *Determine if math skills increase following application to an area of student interest***



ANS 3405 - Equine Nutrition

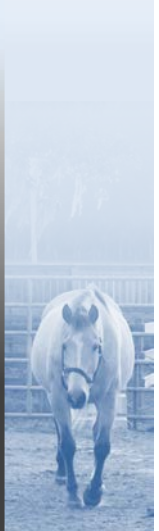
- **Applied nutrition course focusing on feeding programs for all classes of horses**
 - ◆ *Feed selection, nutrient requirements, diet evaluation/formulation, feeding management*
- **Prerequisites: Algebra & Animal Nutrition**
- **Requirement for Equine Specialization**
- **Traditional lecture based class**
 - ◆ *Assignments, case-studies, exams*



Survey

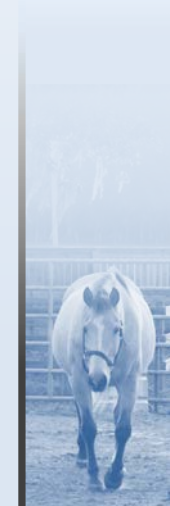


- **Pre and post course survey**
 - ◆ *First and last 2 weeks of class*
 - ◆ *Responses recorded anonymously*
- 1. **Attitudes Toward Mathematics Inventory** (*Tapia and Marsh, 2004*)
- 2. **Math Skills**
- 3. **Demographic Information**



Attitudes Toward Mathematics Inventory (Tapia and Marsh, 2004)

Factor		# Questions
Student's Self Confidence		9
Value of Mathematics		5
Enjoyment of Mathematics		6
Motivation		3
<i>Positively and negatively phrased questions</i>		
Likert-Type Scale	Strongly Disagree 1	Strongly Agree 5



Math Assessment (10 Questions)

- **Unit Conversions**
 - **Percentages**
 - **Simultaneous Equations**
- *Fill in the blank*
 - *I cannot answer this question*

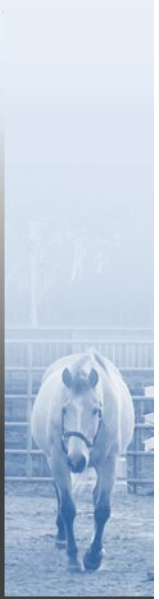
DIRECT: *What is 15% of 30?*

WORD: *A feed contains 0.9% calcium. If you feed 6 kg of this feed, how many grams of calcium are you feeding?*



Statistical Analysis

- **ANOVA: Performance on math questions**
 - ◆ **Percent correct responses**
 - *Type of question*
 - *Pre vs. post response*
- **Logistic regression: Math attitudes and skills**
 - ◆ **ATMI total and factor scores between pre- and post-assessment**
 - *Stratified by year*



2016

**31
Students**

**Math GPA
3.05**

**Last Math
Class 1.5 y**

2017

**40
Students**

**Math GPA
3.03**

**Last Math
Class 2.5 y**

2018

**40
Students**

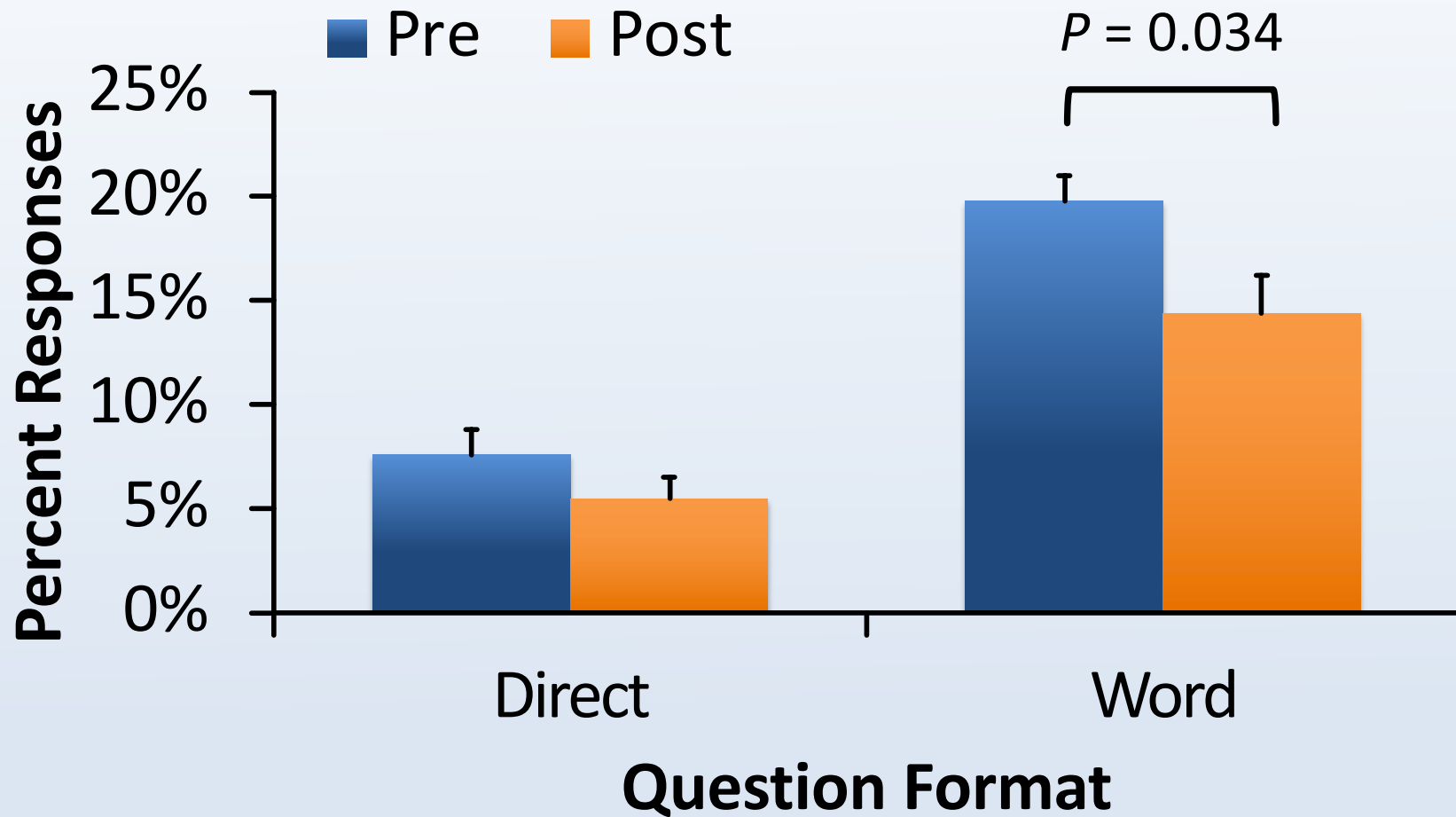
**Math GPA
3.02**

**Last Math
Class 1.5 y**

Student Math Responses



Cannot Answer



Case Study: Picking a Suitable Ration

***Oprah Whinney* is a 15-yo, 1250 lbs Haflinger. Evaluate each of the 3 rations to determine if they meet the nutrient requirements of the horse.**

Ingredients and Amounts

1 44 Lbs Legume Forage Silage

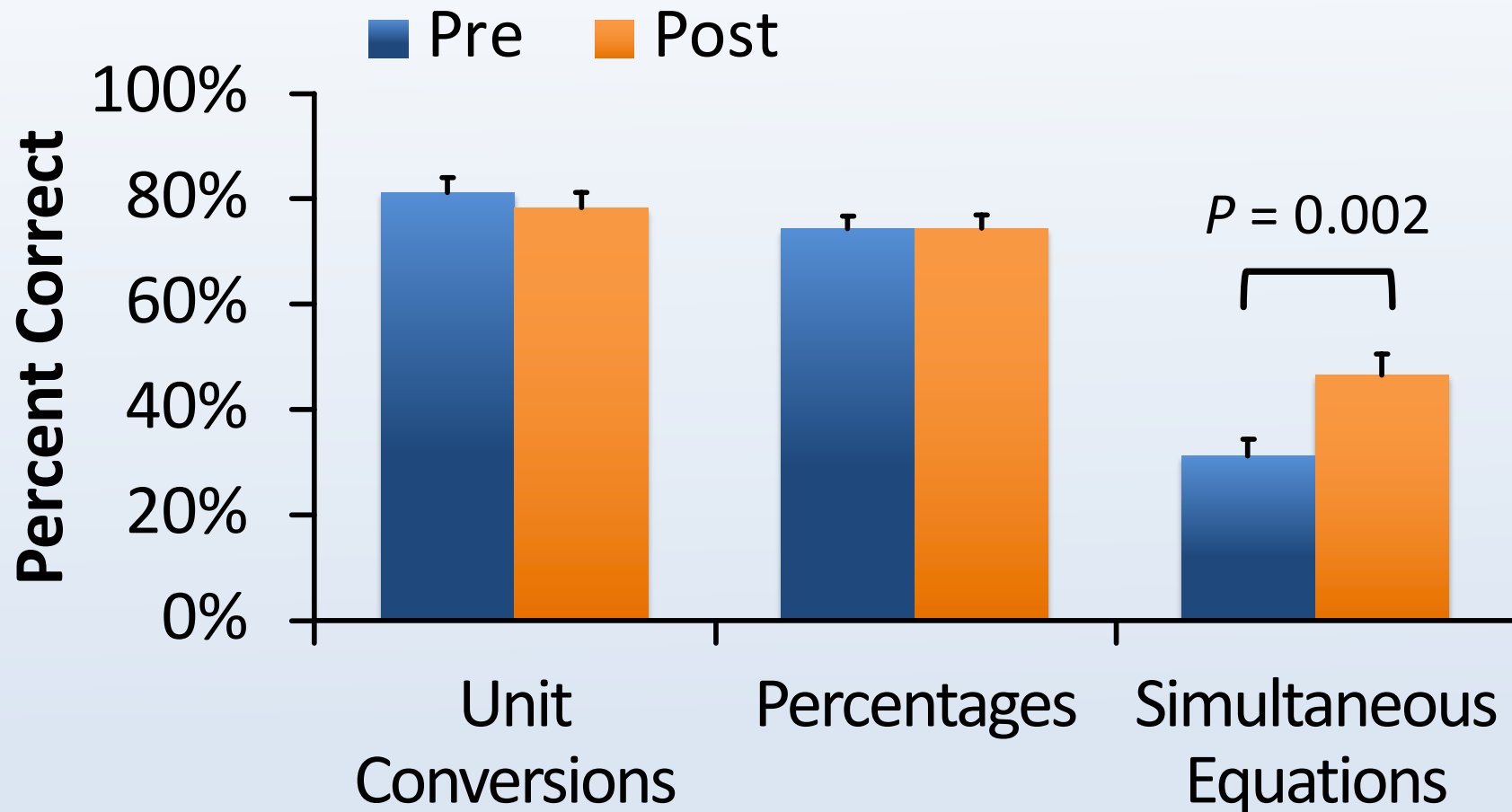
2 26 Lbs Cool-Season Grass Hay

3 14.5 Lbs Cool-Season Grass Hay
6.0 Lbs Rolled Oats

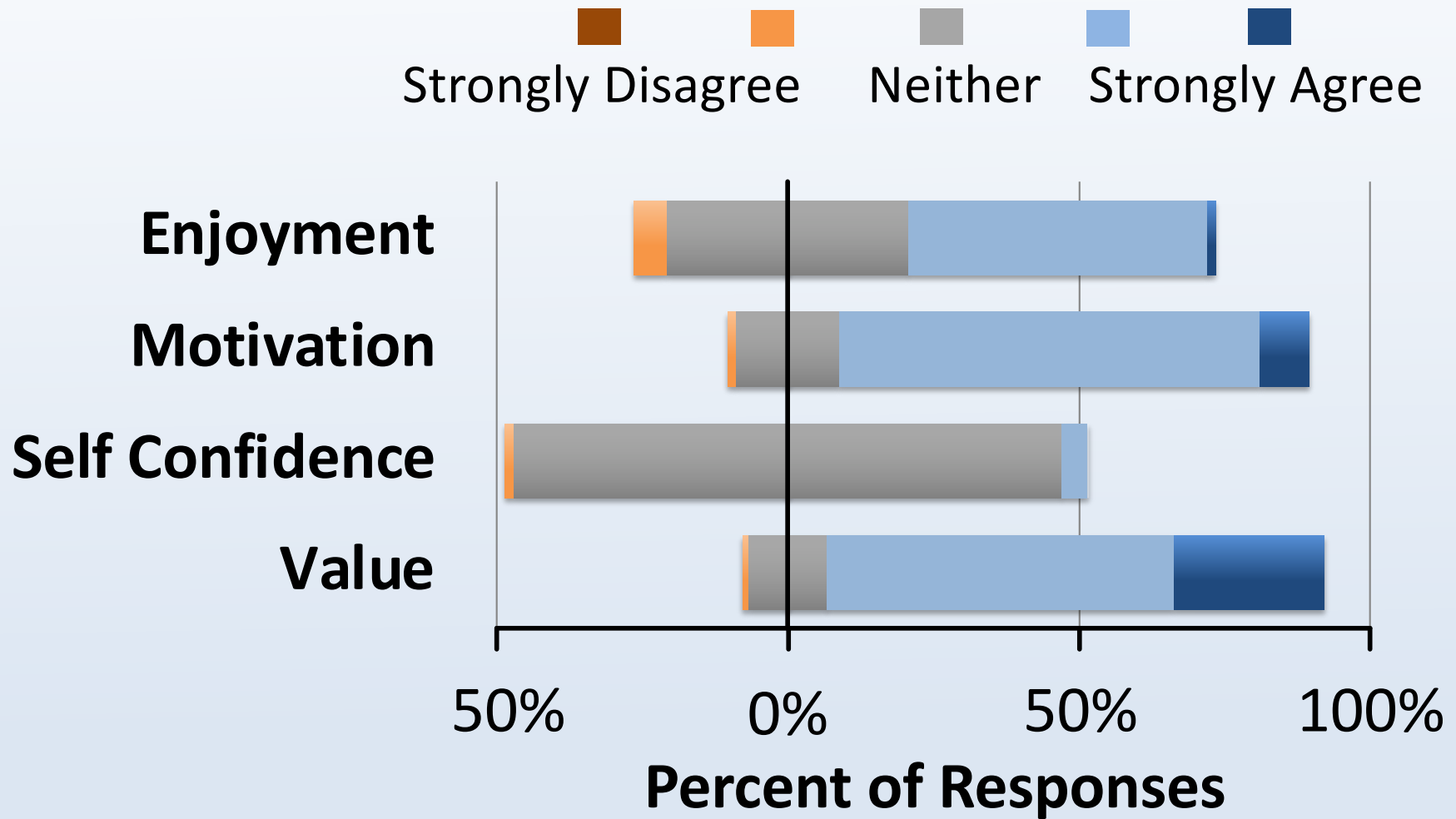
Which ration is best suited for Oprah Whinney?



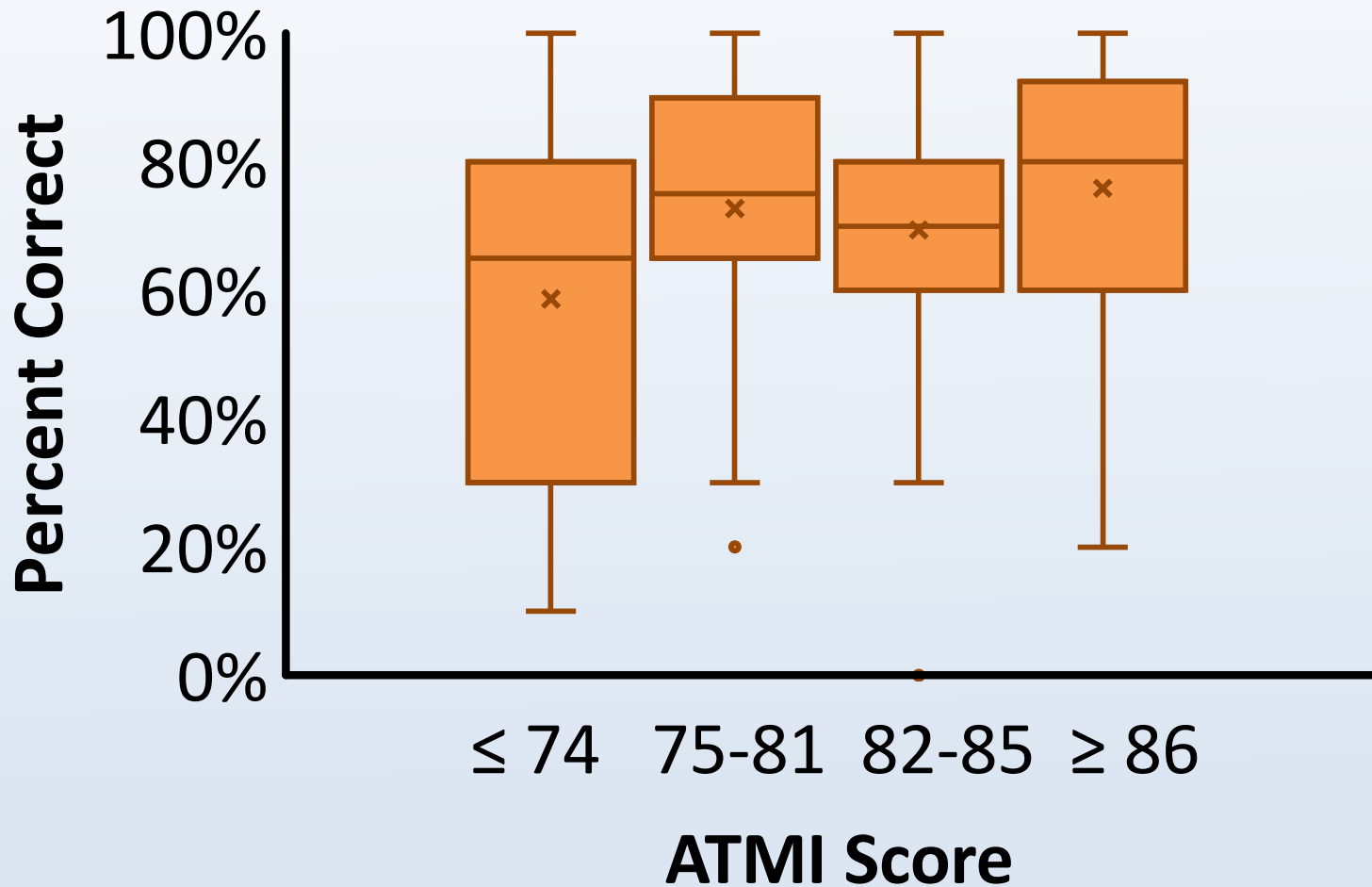
Math Skills by Type of Question



ATMI Response



Math Skills Differed by ATMI

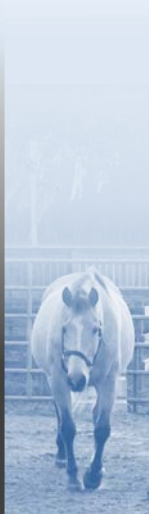


OR: 1.075
 $P < 0.001$

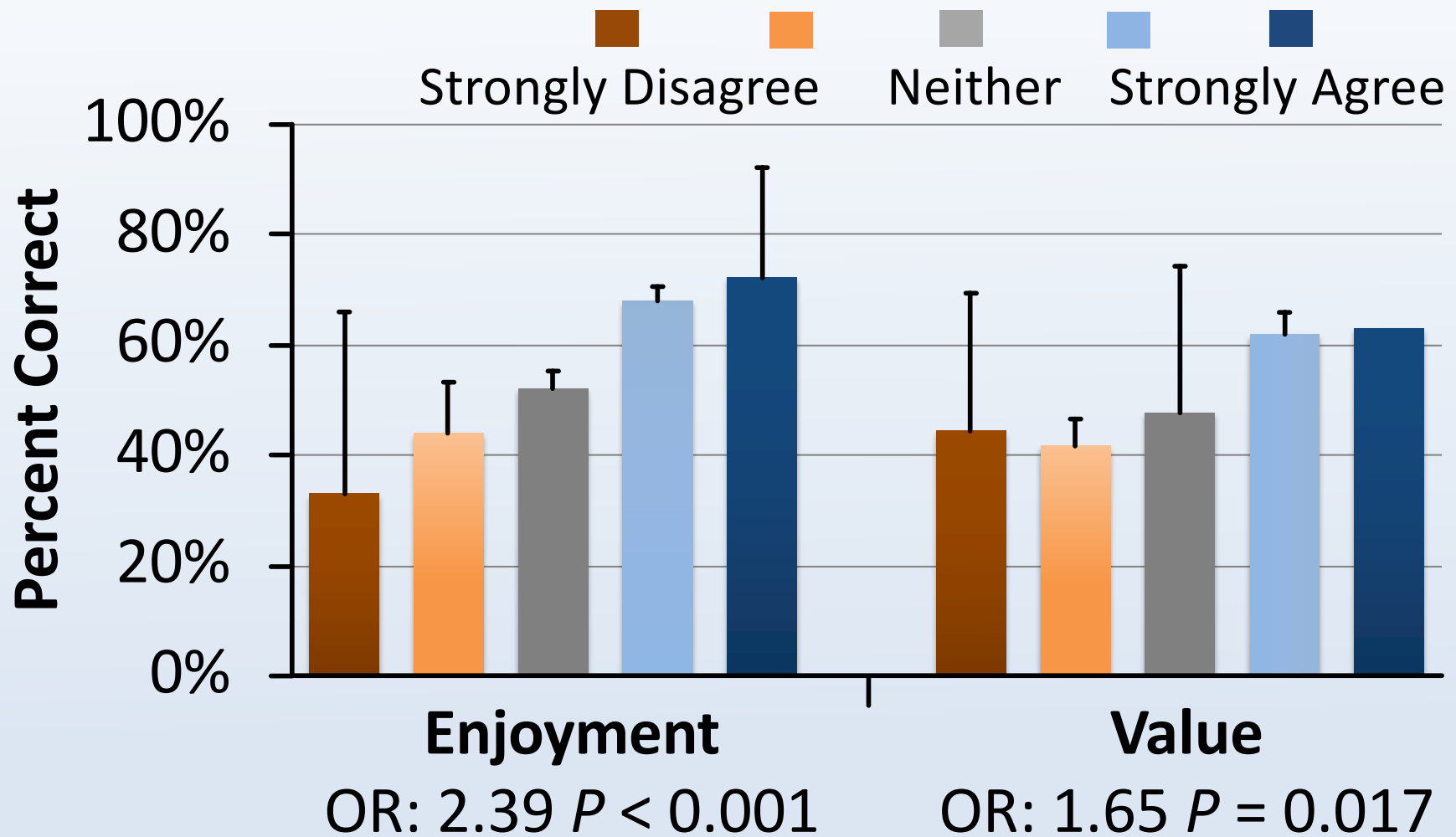


ATMI Factors Affect Math Skills

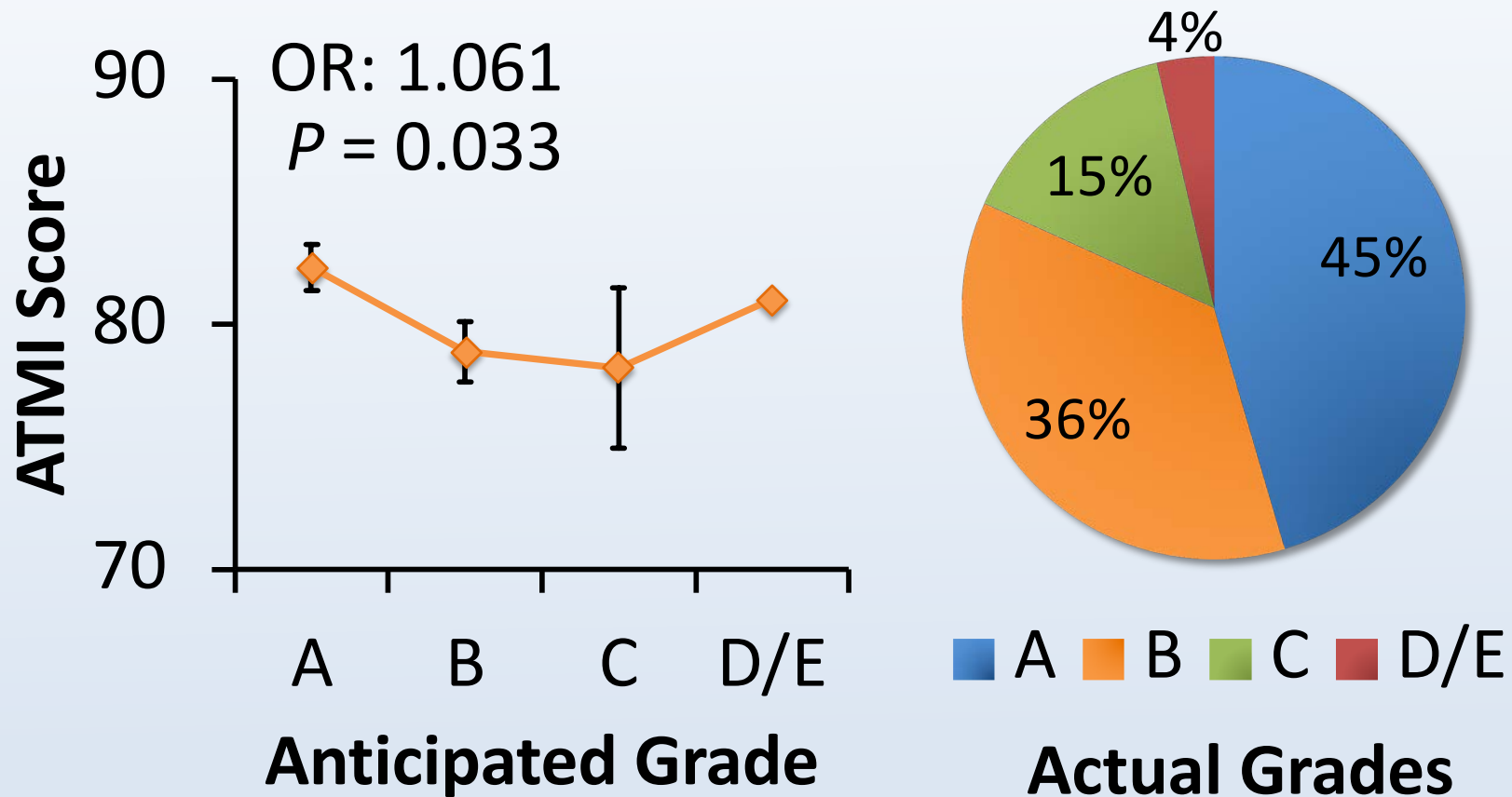
	OR	95% CI for OR	P-value
Enjoyment	2.54	1.61 – 3.99	< 0.001
Motivation	1.67	0.98 – 2.85	0.061
Self Confidence	1.92	0.65 – 5.69	0.238
Value	1.63	1.03 – 2.58	0.037



Word Problem Performance



Final Grades in Equine Nutrition



Key Findings



Completing equine nutrition improved student math performance

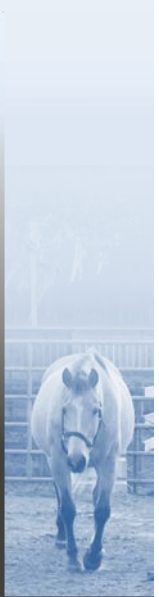
- *Attempt to answer word problems*
- *Simultaneous eqn.*

66%
of math
questions
answered
correctly



Competence and Learning

- **Voluntary math support programs**
(Johnston et al., 2016)
 - ◆ *Increased confidence in math and chemistry*
 - ◆ *Still anxious to answer chemistry problems requiring calculations*
- **Major challenge in science is applying math skills in a new setting** *(Tuminaro and Redish, 2004)*



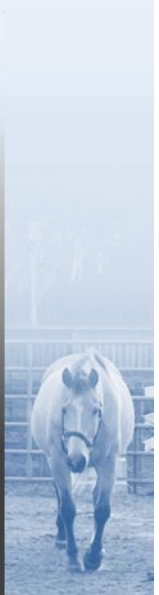
Before Students Start College



Math effort is related to competence beliefs in secondary schools
(Chouinard et al., 2011)



Parents' beliefs influence children's self perceptions of math ability and career choices (Bleeker and Jacobs, 2004)



Questions?

