

Western Michigan University

Lee Honors College

PREBIOTIC AND PROBIOTIC KNOWLEDGE AND CONSUMPTION IN COLLEGIATE ATHLETES

Honors Thesis by Hannah Kahn

30 -70%

**Athletes experience gastrointestinal disturbances,
2019 (1)**

Why does gut health need to be talked about?

- Small intestine - diverse beneficial bacteria community
- Commensal relationship – release byproduct SCFA
- SCFA Functions: Endocrine, neural, and hormonal
 1. Promotes homeostasis
 2. Increase O₂ consumption
 3. Reduce energy expenditure
 4. Helps control appetite
 5. Maintains integrity of gut lining
 6. Supports tissue growth and repair

○

BACKGROUND



Prebiotics are “a substrate that is selectively utilized by host microorganisms conferring a health benefit.”



Probiotics are “live microorganisms that, when administered in adequate amounts, confer a health benefit on the host.” (7)

PREVIOUS STUDIES

35% knew of the health risks associated with low fiber intake and only 42% were able to identify a meal high in fiber (6)

2008

59.7% of students with a background in health sciences could identify the health effects of probiotics (3)

2012

Microbial diversity more prominent predictor of fitness as compared to age, sex, or BMI(2)

2016

2010

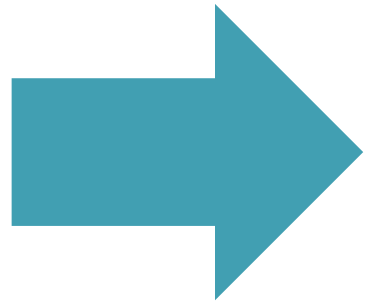
Dietary choices accounted for 57% of gut microbiota changes as compared to genetic influence of no more than 12% (5)

2016

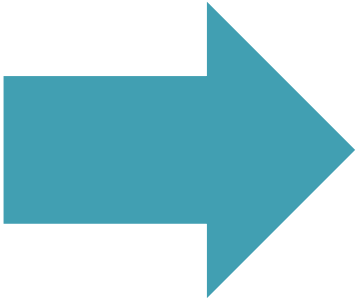
Athletes engaging in highly aerobic, endurance activity are at an increased risk of leaky gut & intestinal wall permeability due to exercise-induced stress (4)

MAJOR QUESTIONS

1. Are student-athletes knowledgeable about gut health?
2. Do student-athletes implement prebiotics and probiotics into their diet?
3. Do student athletes experience frequent gastrointestinal (GI) disturbances?



PURPOSE



Explore whether or not GI disturbances are caused from a lack of knowledge and choice in diets containing prebiotic and probiotic foods and supplements.

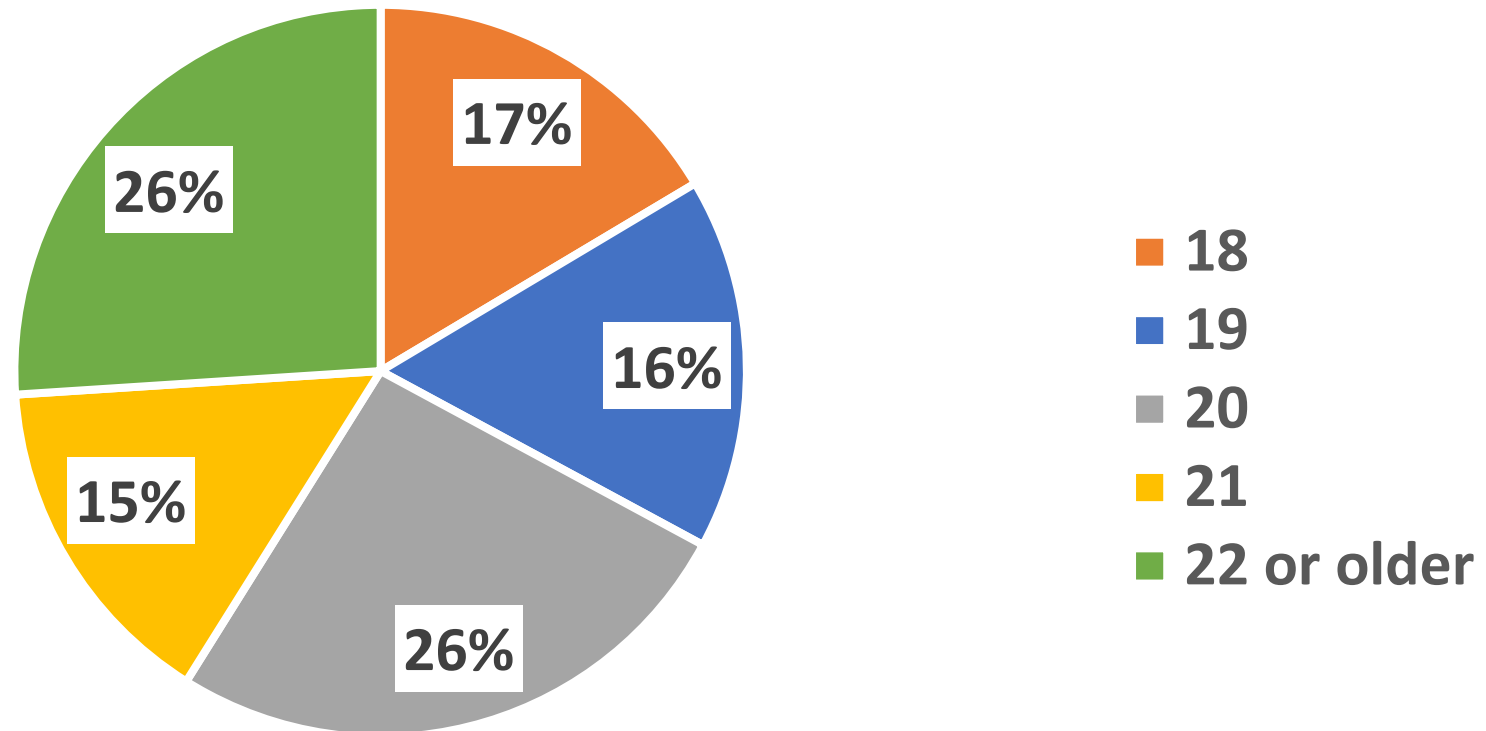
HYPOTHESIS

Student-athletes at the NCAA Division One level suffering from gastrointestinal disturbances are influenced by an absence of knowledge and diet containing prebiotic and probiotic foods.

METHODS

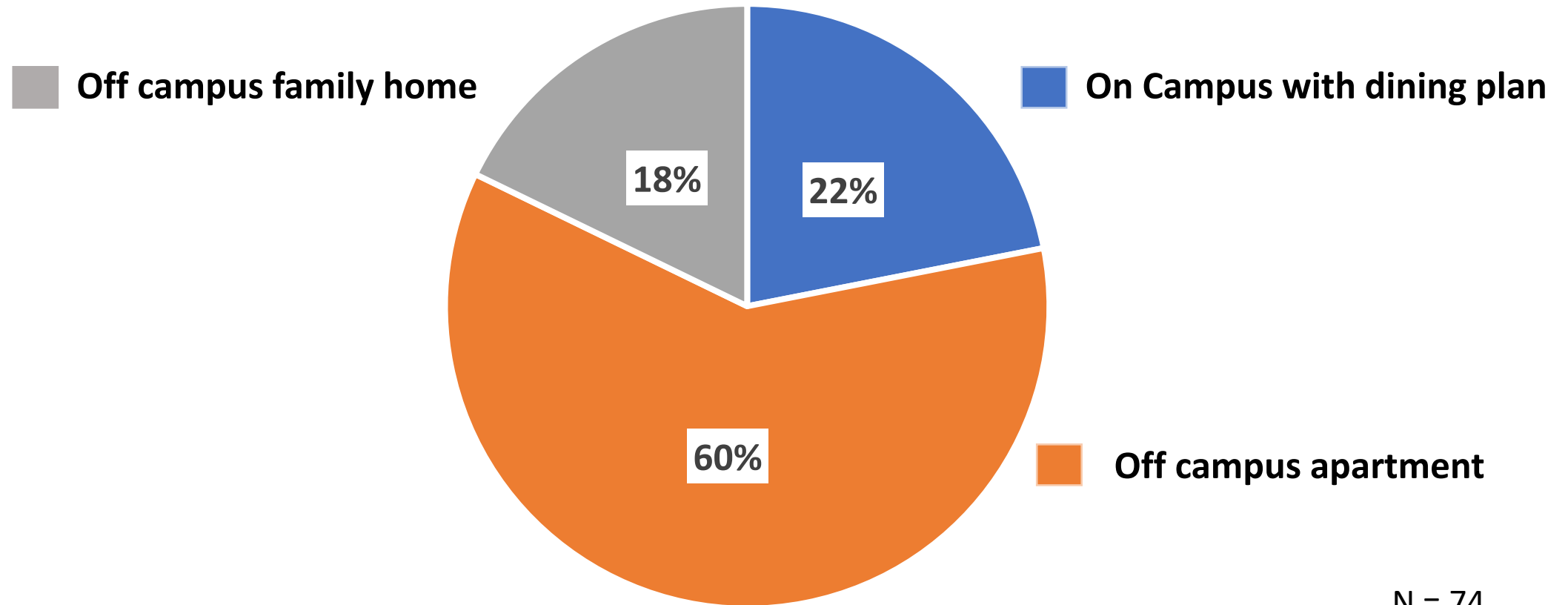
- ✓ Requested & approved by WMU Human Subject Institutional Review Board
- ✓ Questionnaire: Qualtrics
- ✓ Recruitment: 50-75 responses
- ✓ Informed Consent
- ✓ Analysis: Chi-Square Test for Independence

DEMOGRAPHIC DATA: Age

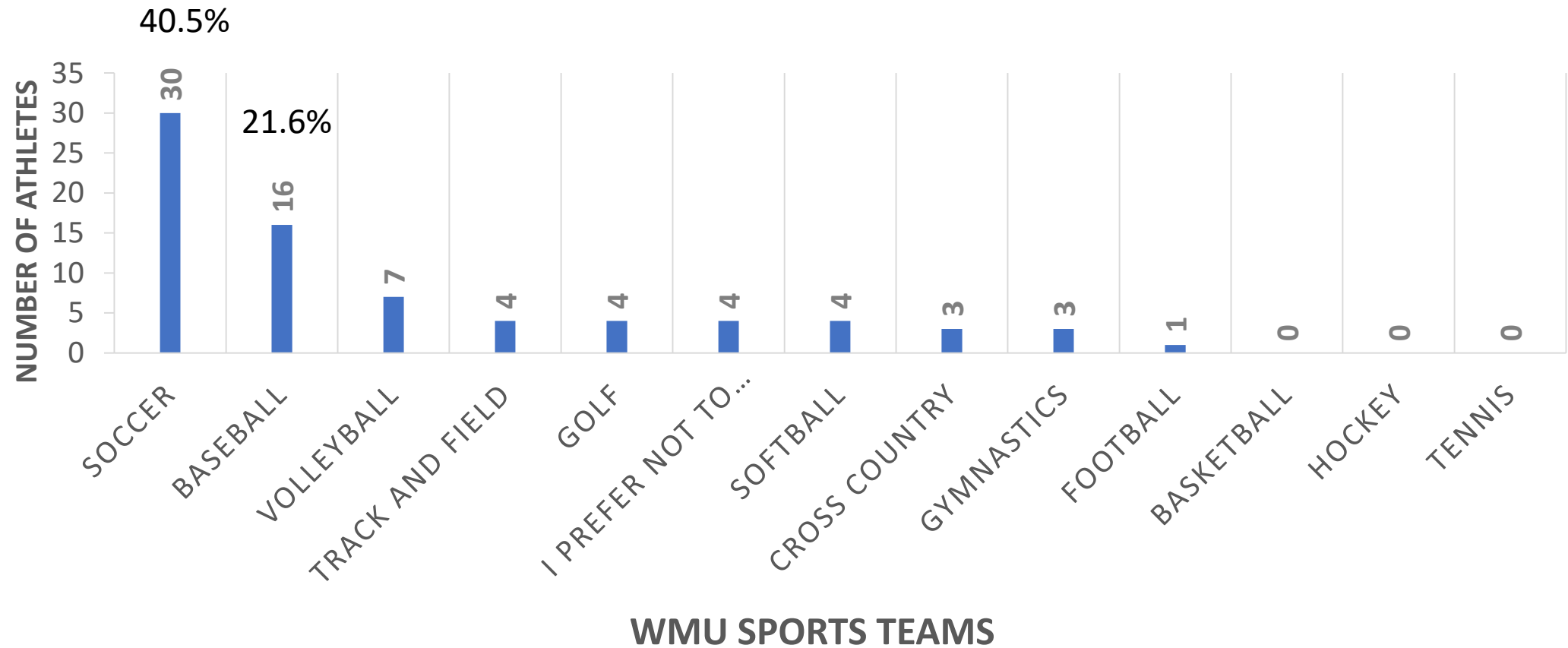


N = 74

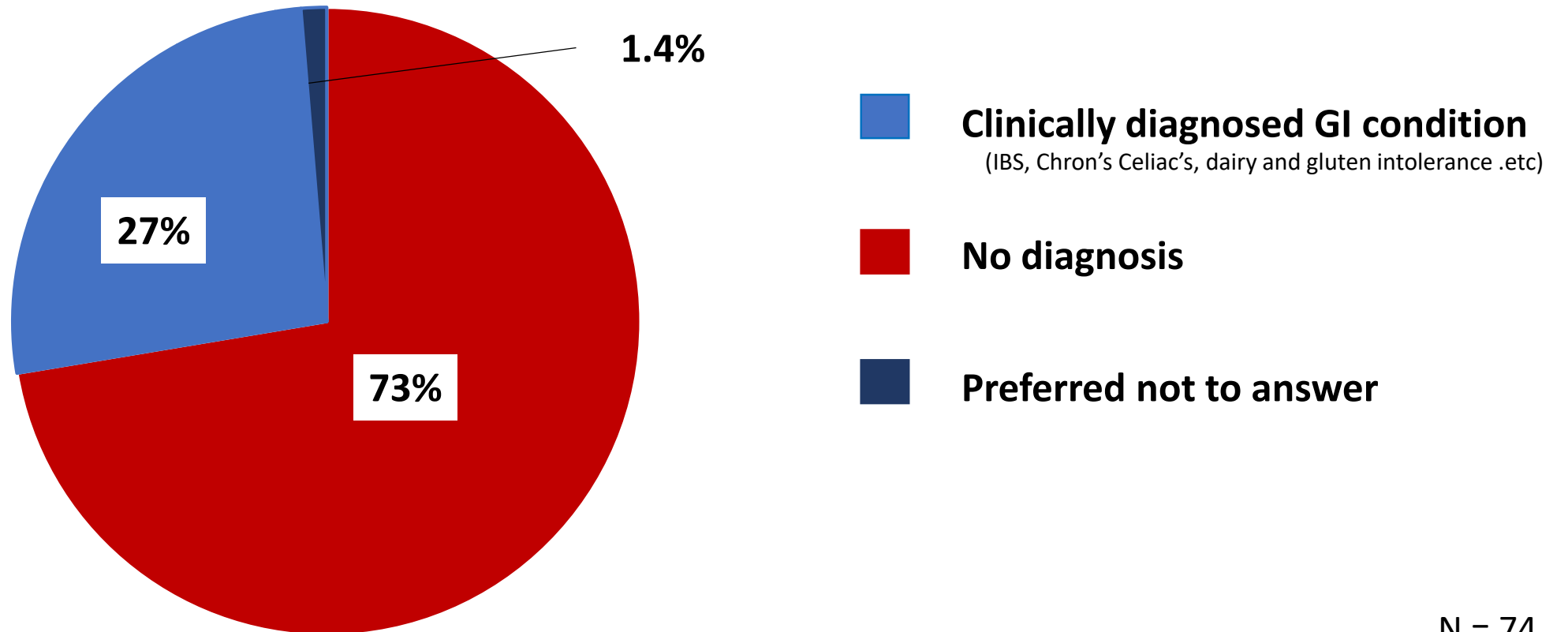
DEMOGRAPHIC DATA: Place of living



DEMOGRAPHIC DATA: Sport

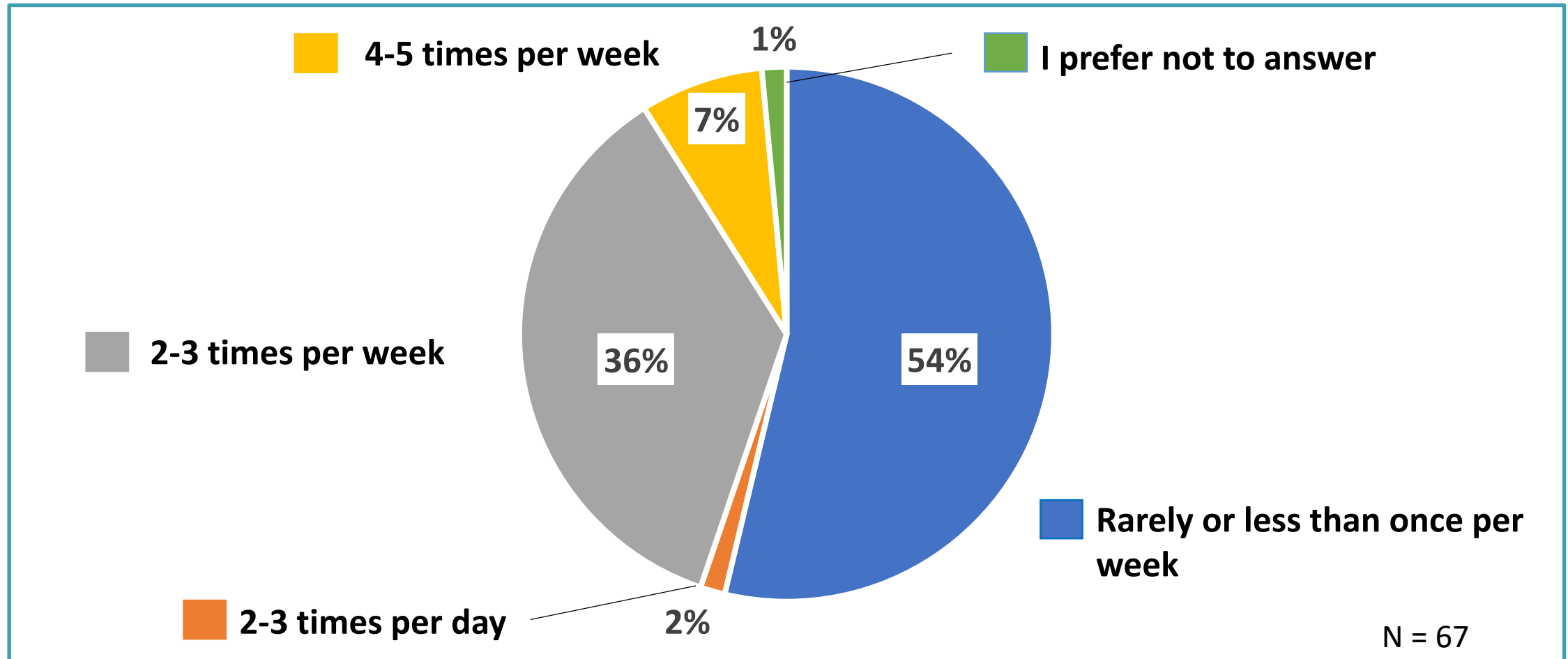


Previous health history



N = 74

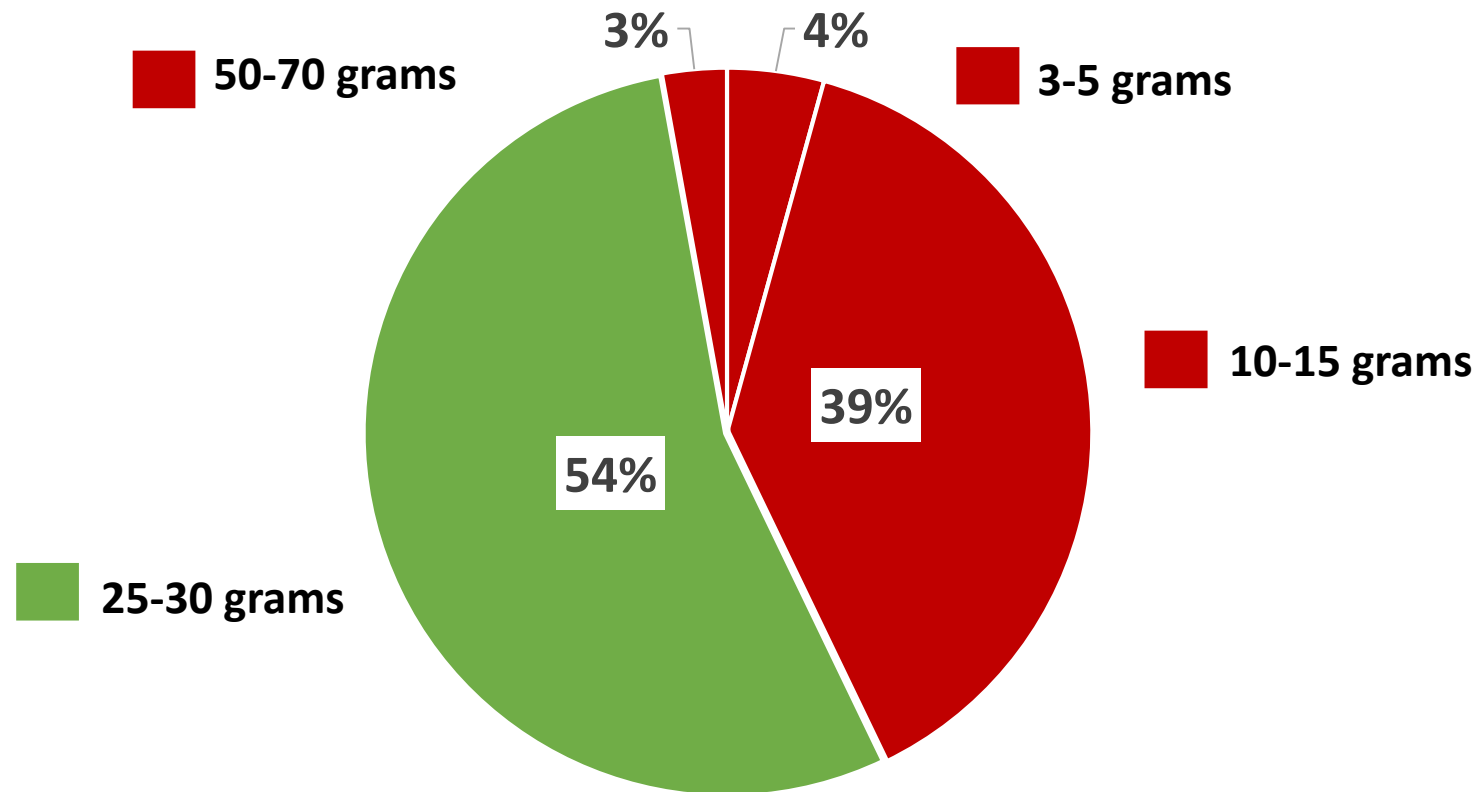
Fast food/Take-out



Major question #1: knowledge

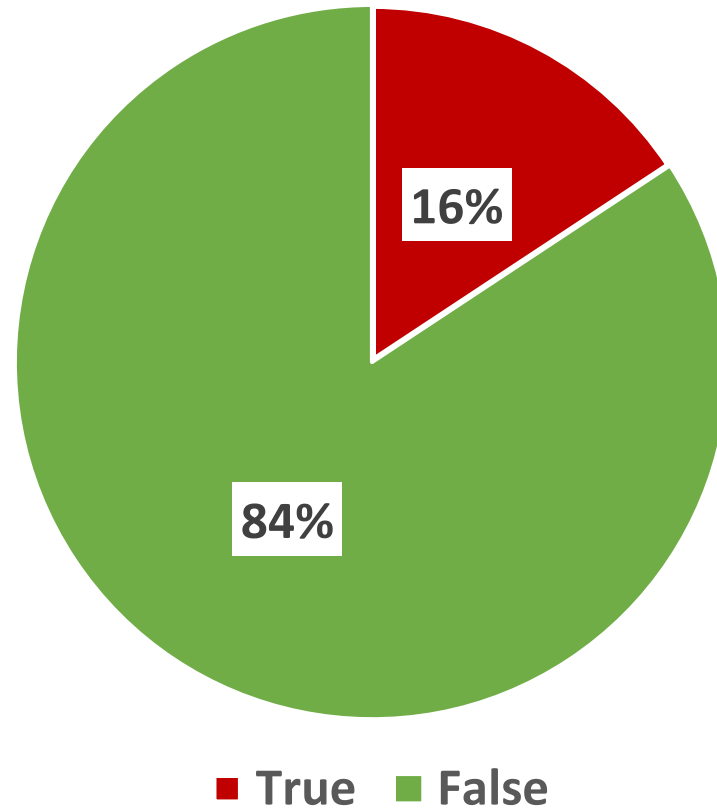
Are student-athletes knowledgeable about gut health?

What is the daily recommended intake of Fiber?



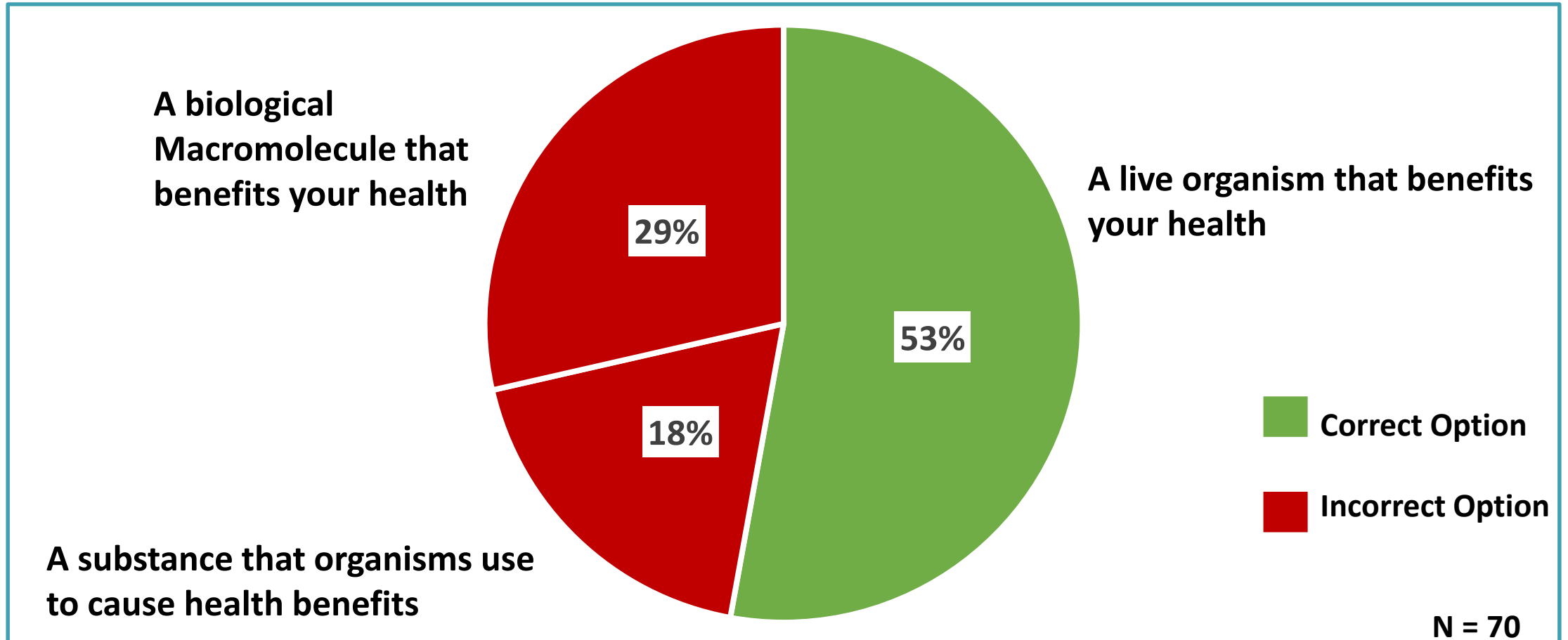
N = 70

True or false. It is bad to have wide range of bacteria in gut.

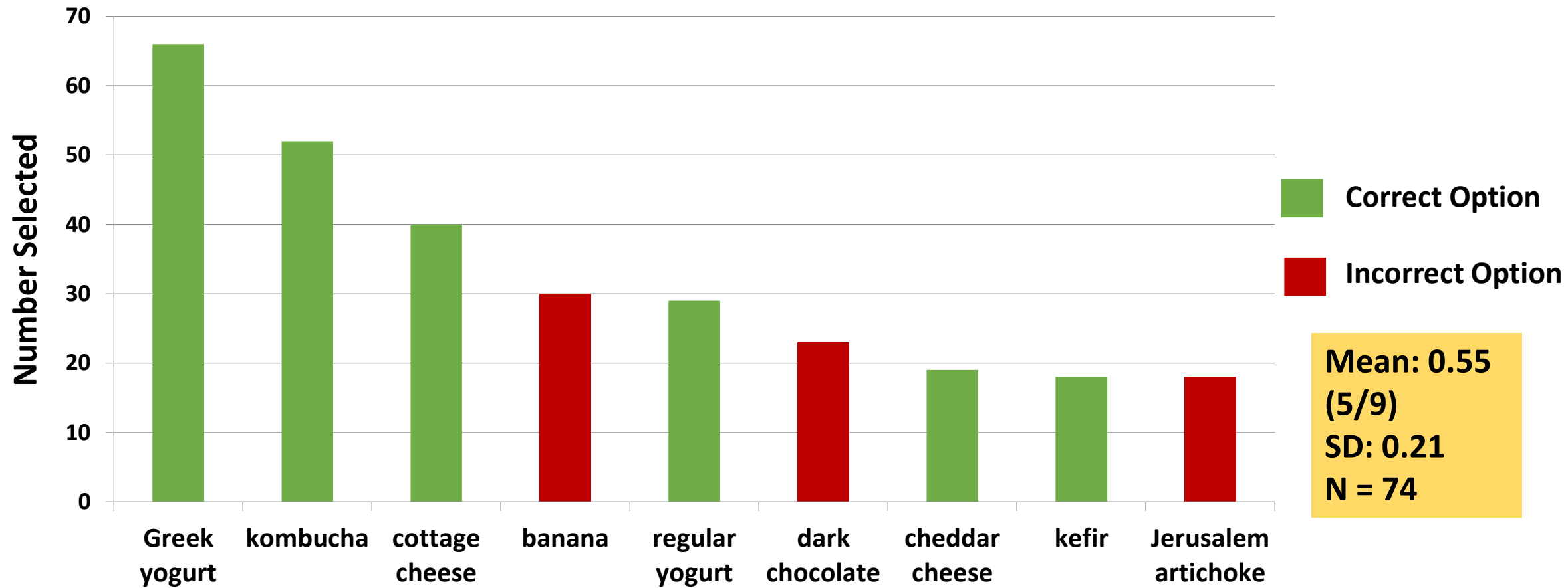


N = 70

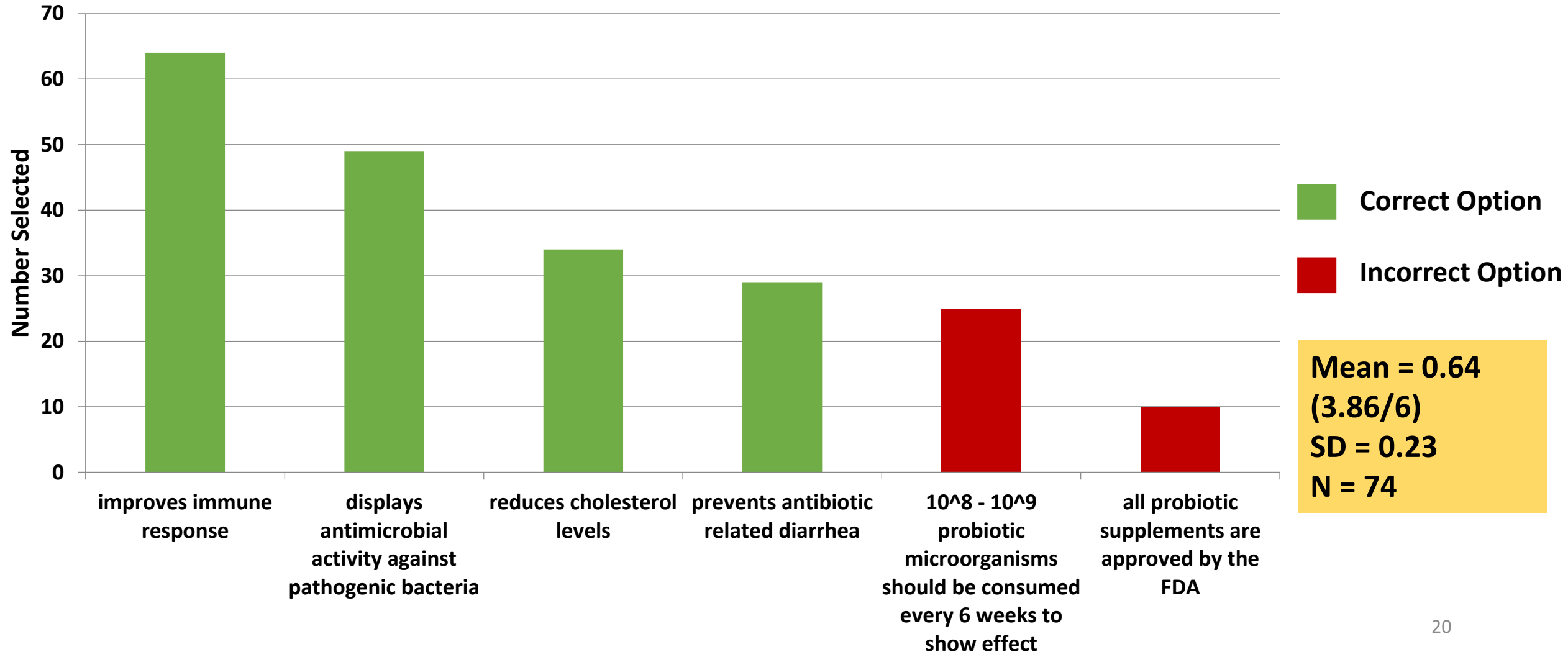
Probiotic definition



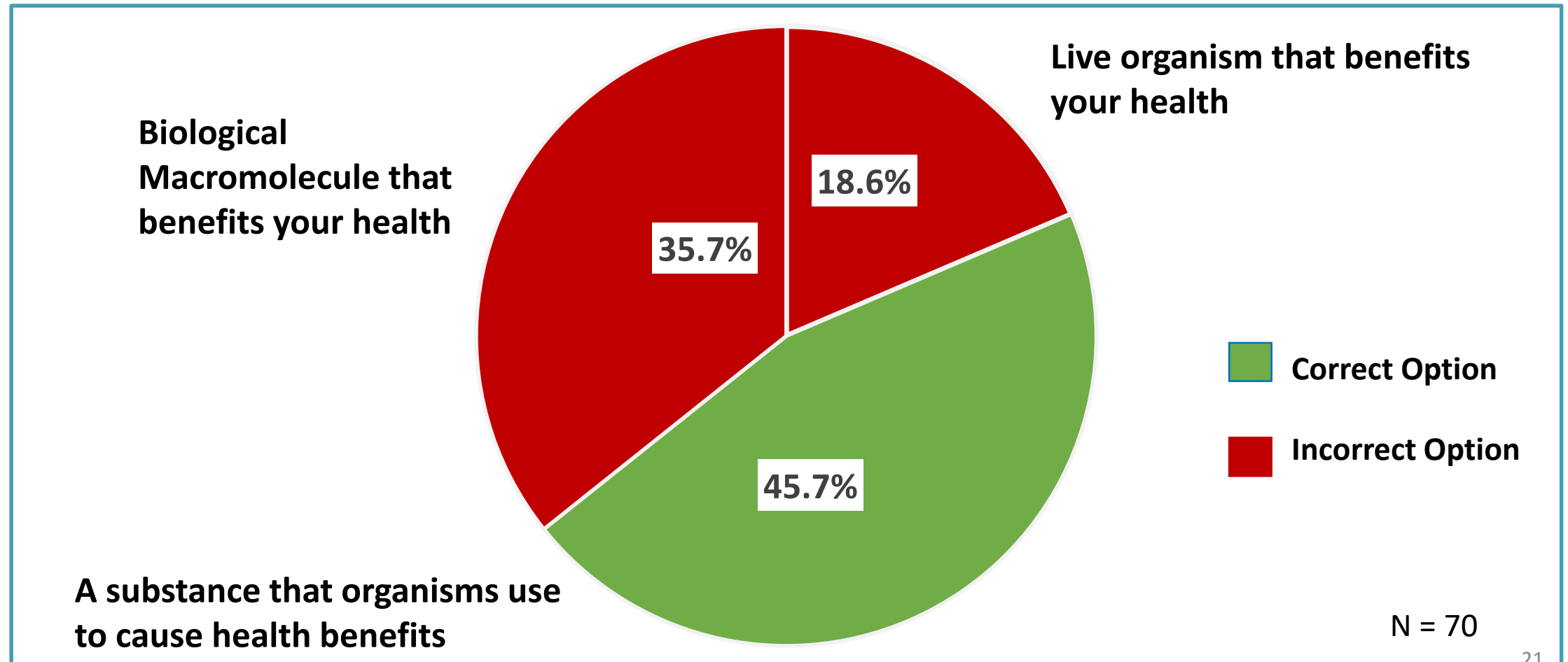
Probiotic selection



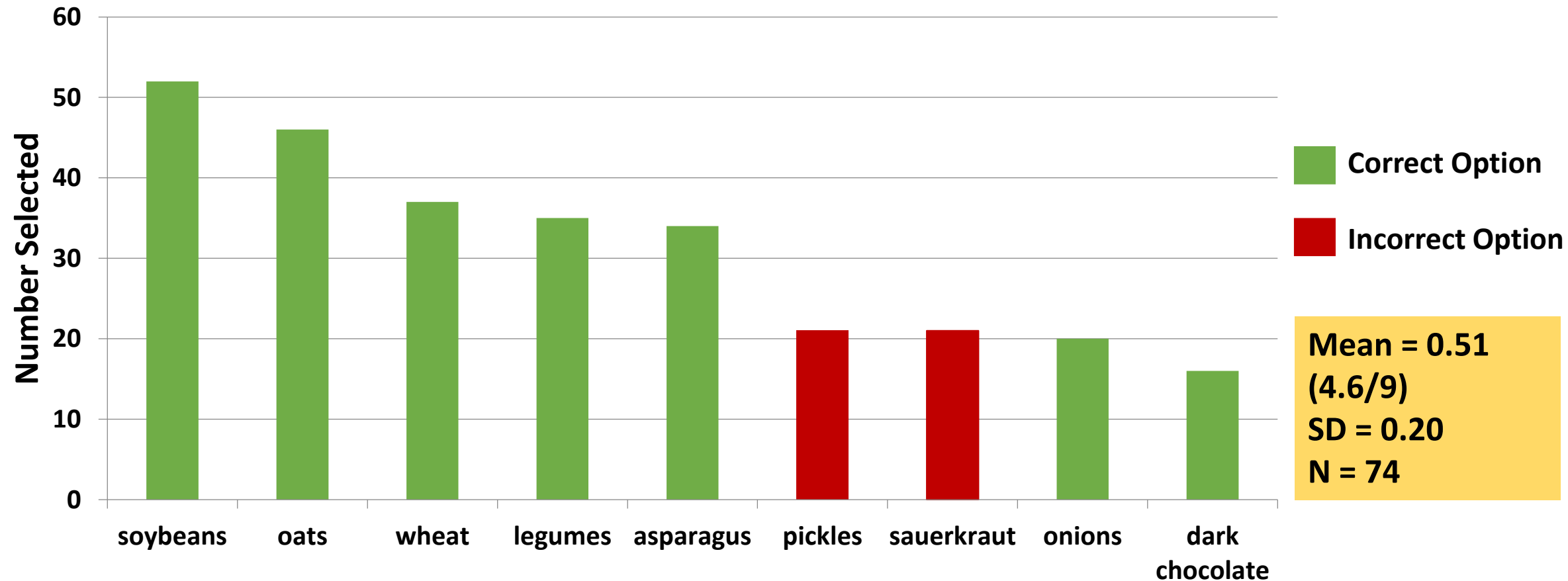
Which of the following are true of probiotics?



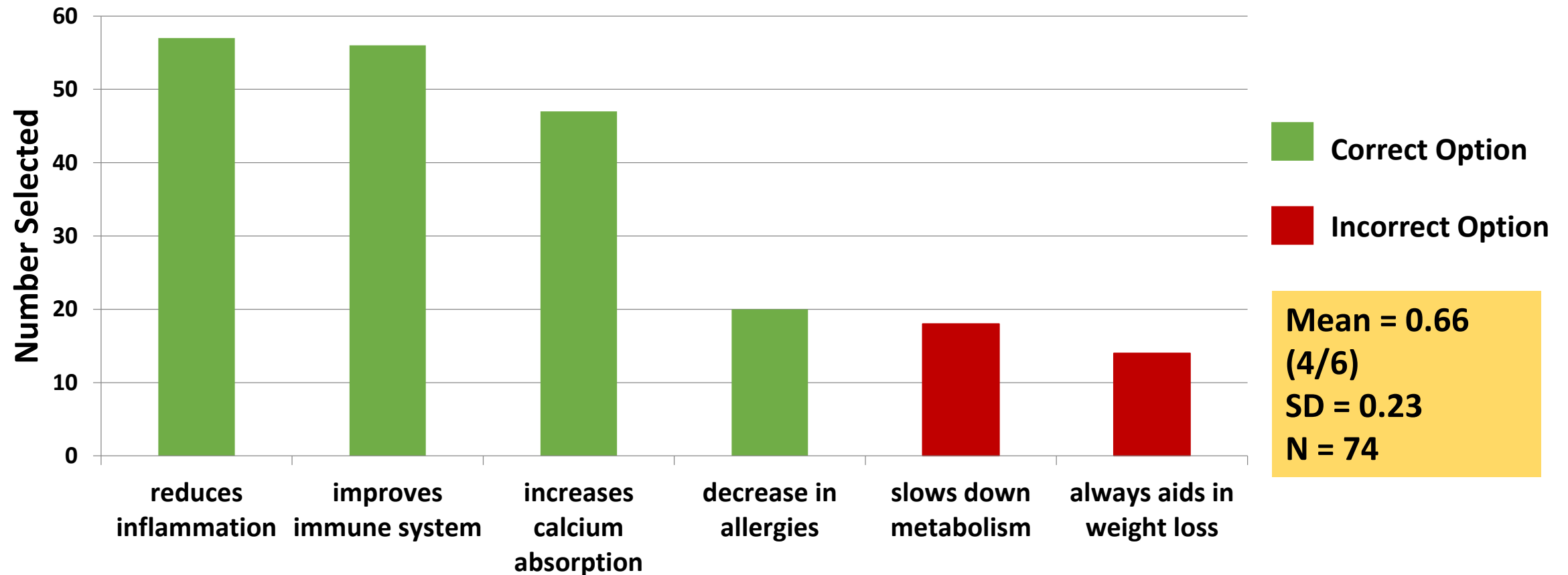
Prebiotic definition



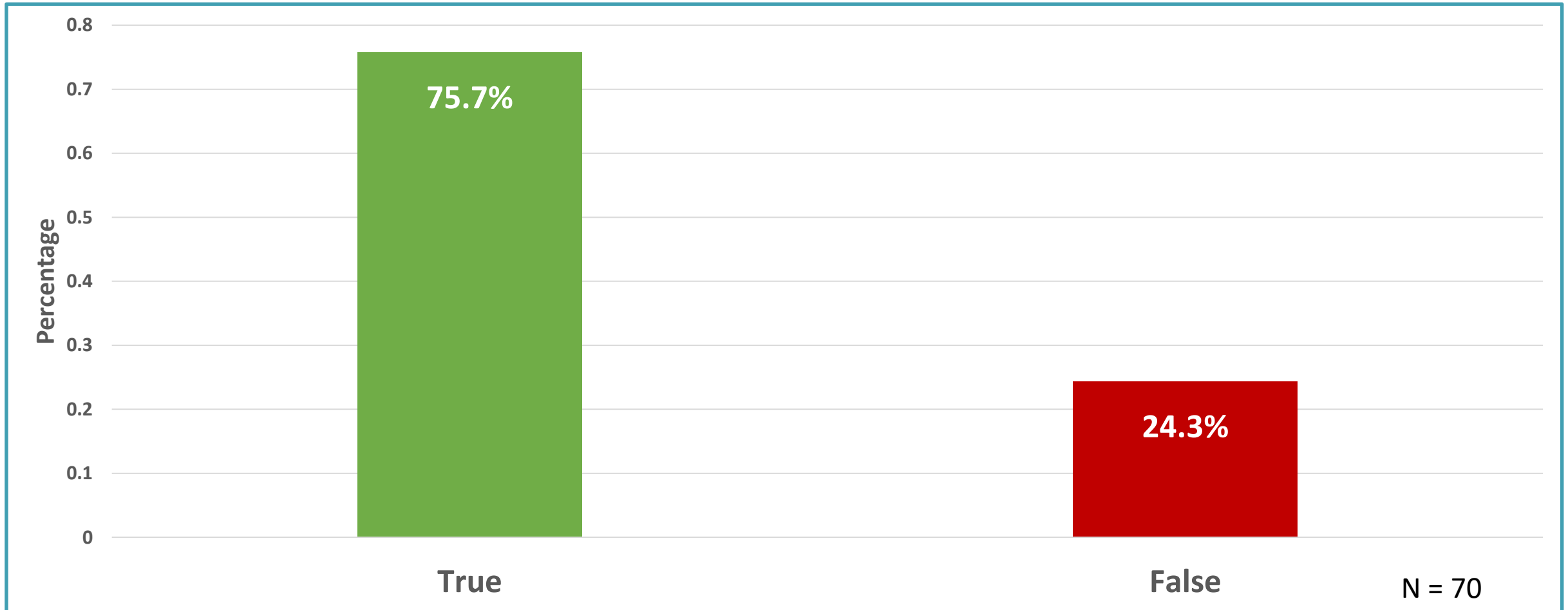
Prebiotic selection



Which of the following are the health benefits of prebiotics?



True or false. Higher levels of physical activity correspond to greater microbial diversity in the gut.



SUMMARY OF LEVEL OF KNOWLEDGE:

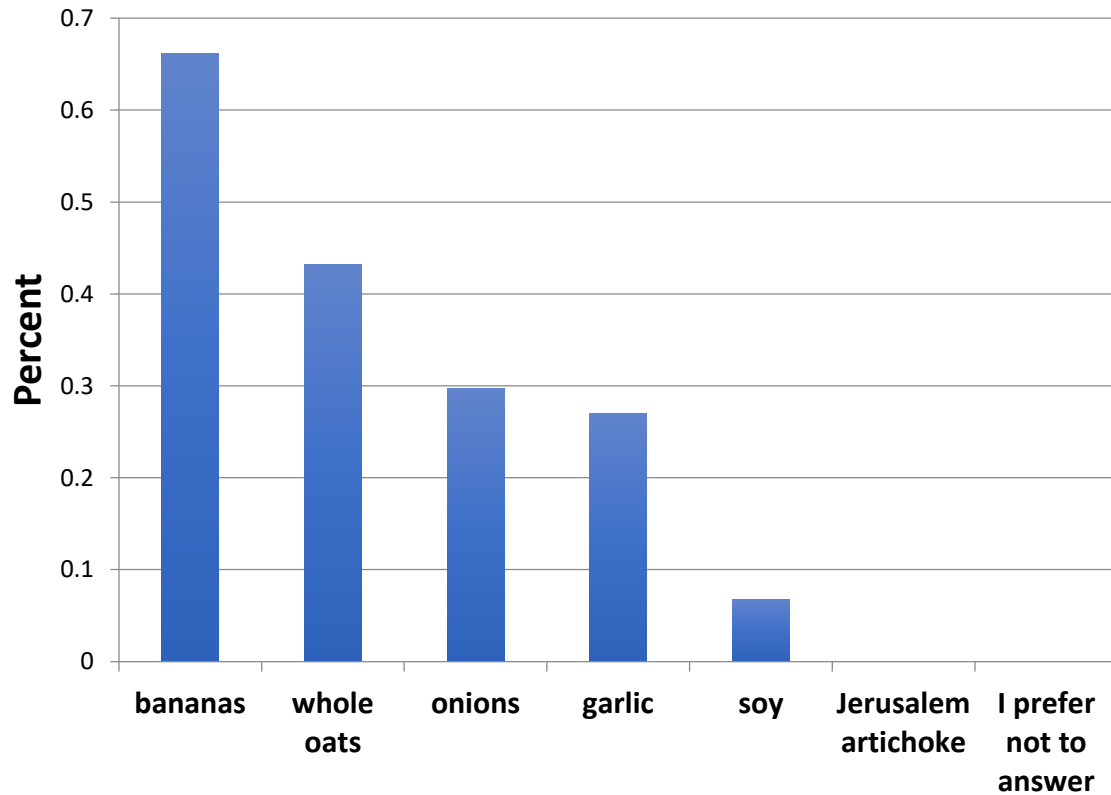
- **Acceptable Knowledge:**
 - a) Diversity of microbiome
 - b) Impact of physical activity
 - c) Prebiotic and probiotic benefits
- **Deficient Knowledge:**
 - a) Prebiotic and probiotic terms
 - b) Prebiotic and probiotic sources
 - c) DRI of fiber

Major question #2: diet

Do student-athletes implement prebiotics and probiotics into their diet?

Which of the following foods do you regularly incorporate into your diet? Select all that apply.

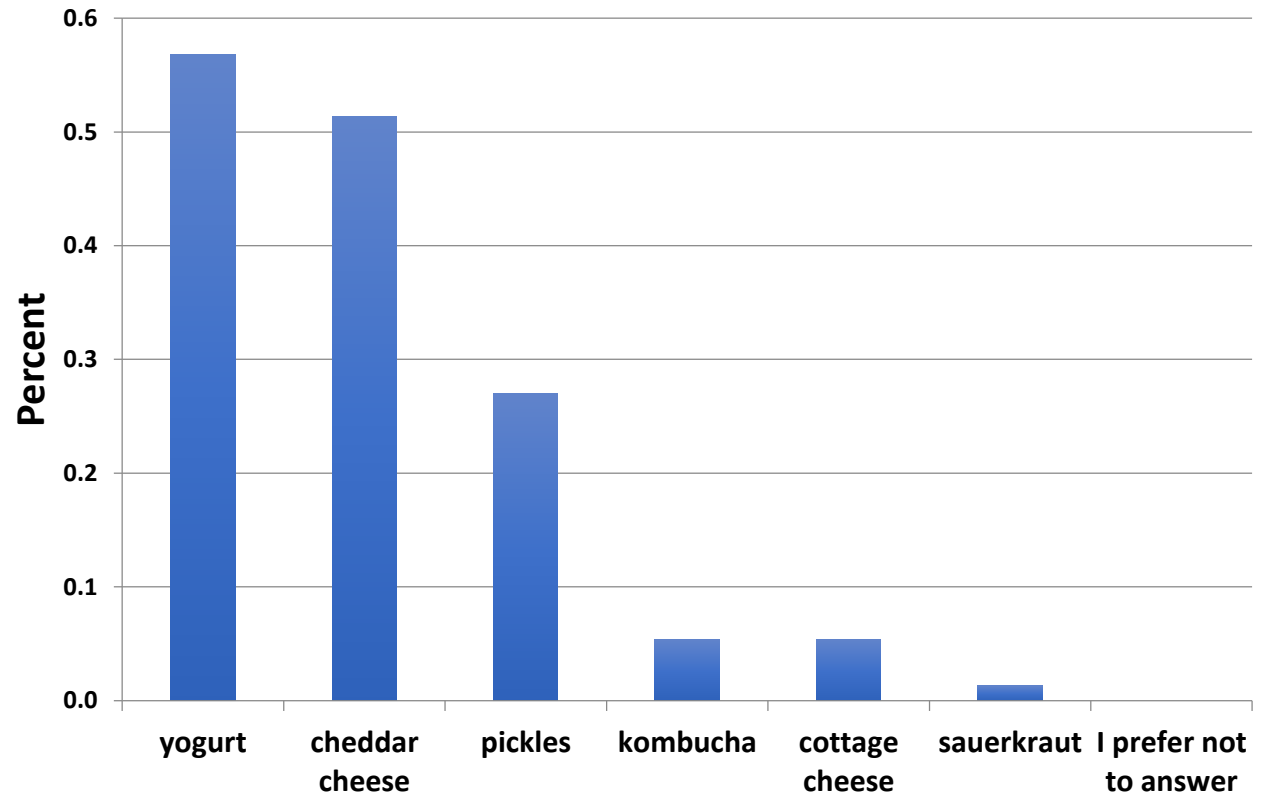
Prebiotic Consumption



Prebiotic food option

Mean: 1.71 ± 1.12

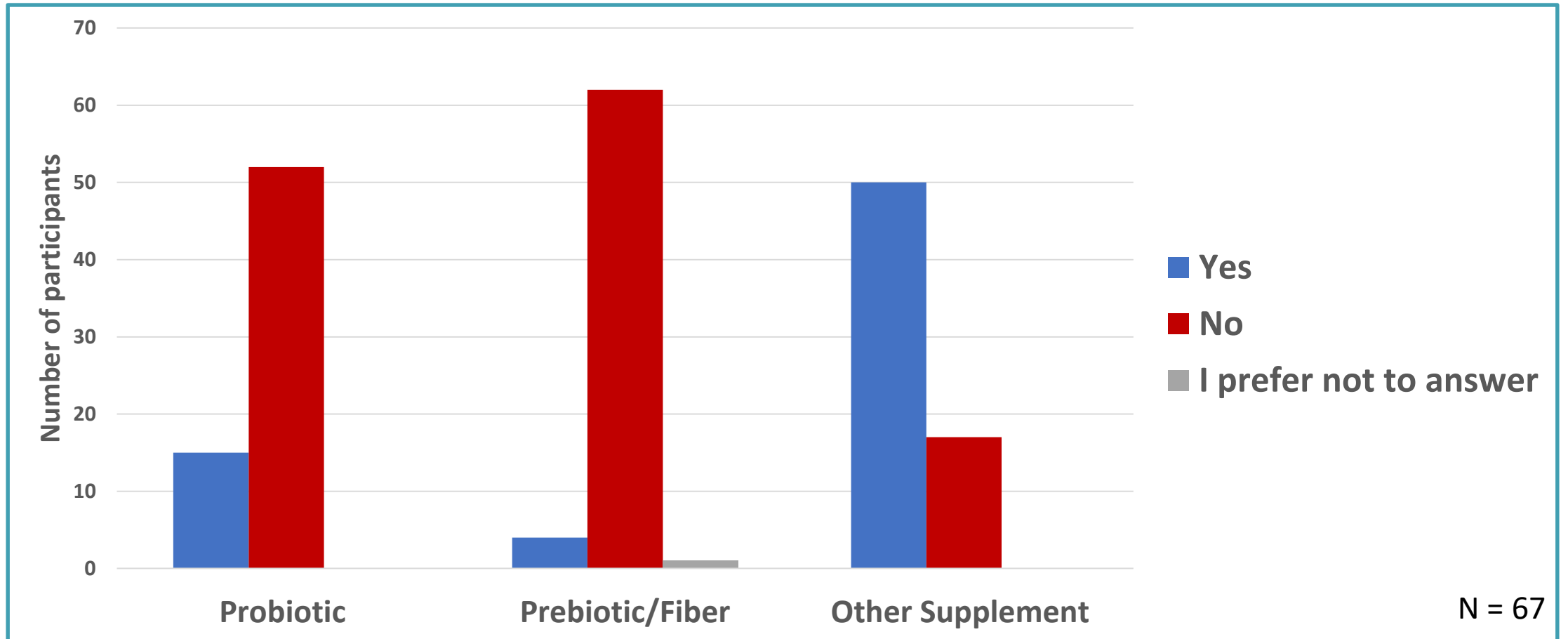
Probiotic Consumption



Probiotic food option

Mean: 1.49 ± 1.03

How many SA are taking probiotic and prebiotic supplements vs. other supplements?



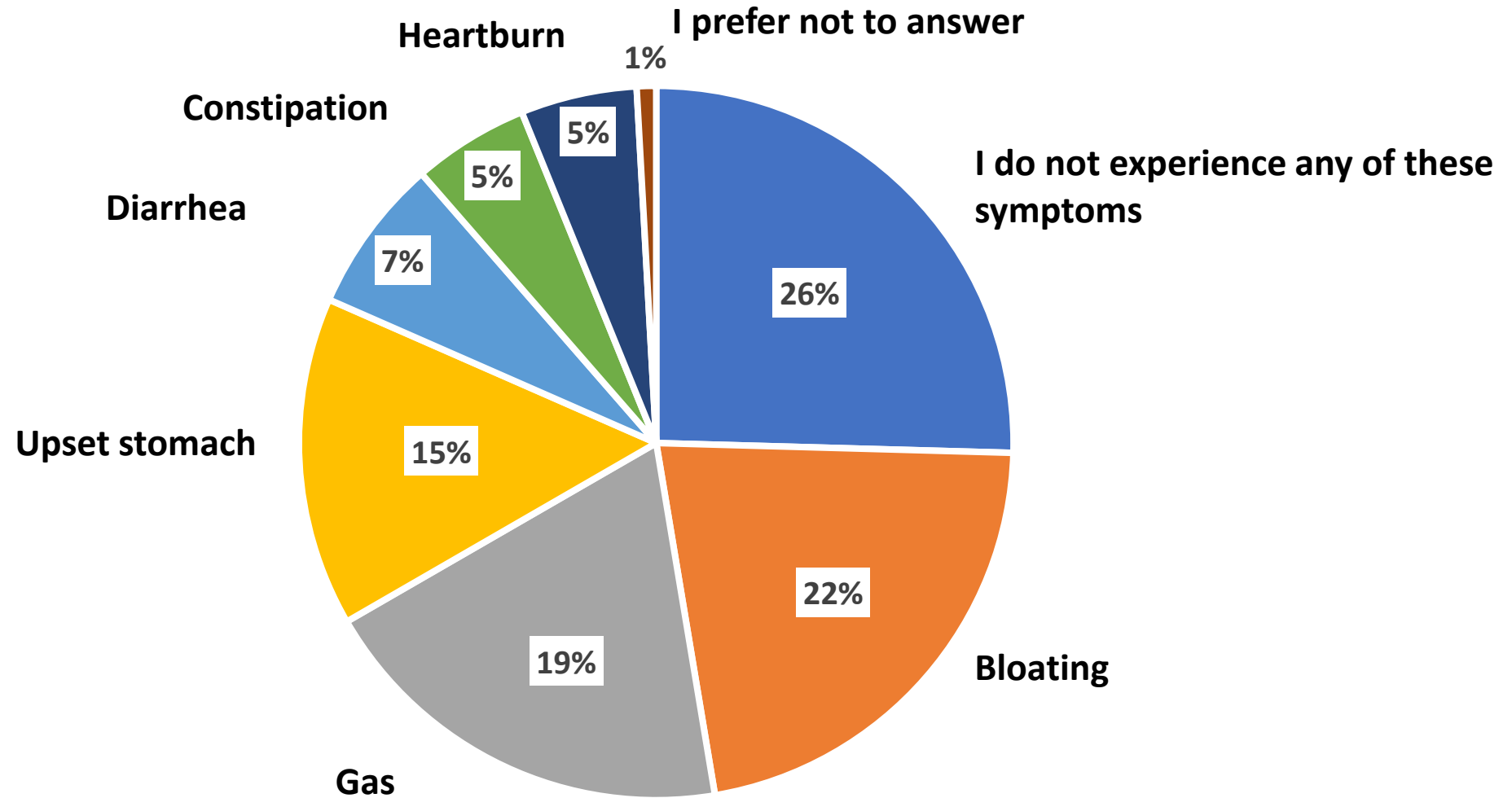
SUMMARY OF FOOD CHOICES

- a) 1.7 and 1.49 average selected prebiotic and probiotic foods.
- b) 52.2-68.6% difference in sample of those that take other forms of supplements compared to probiotics and prebiotic supplements.

Major question #3: GI disturbances

Do student athletes experience frequent gastrointestinal (GI) disturbances?

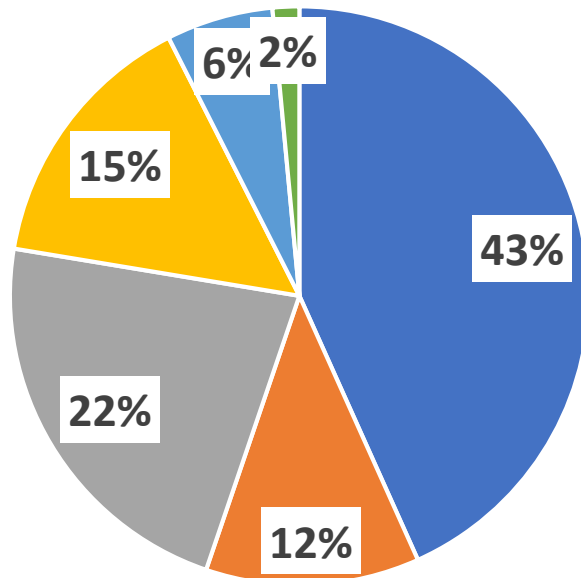
Do you currently experience any of the following symptoms on a regular basis?



N = 74

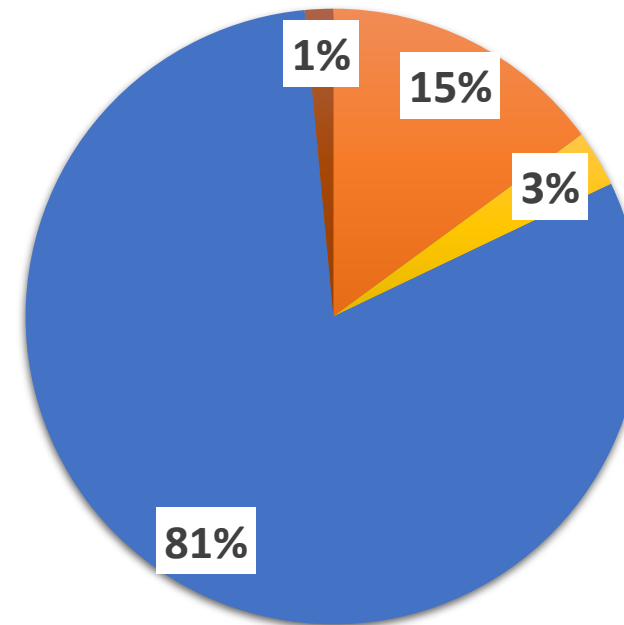
Symptom frequency and participation prevention

How often do you experience the selected symptom?



- I did not answer yes
- 2-3 times per week
- 5+ times per week
- Everyday
- 4-5 times per week
- I prefer not to answer

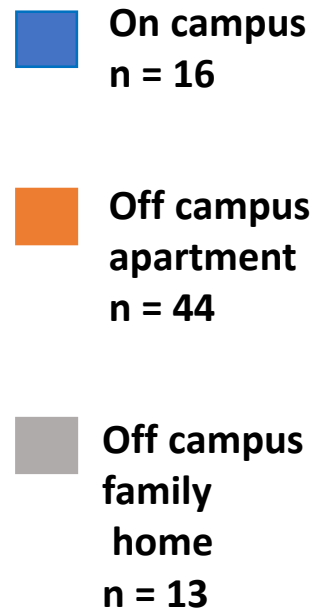
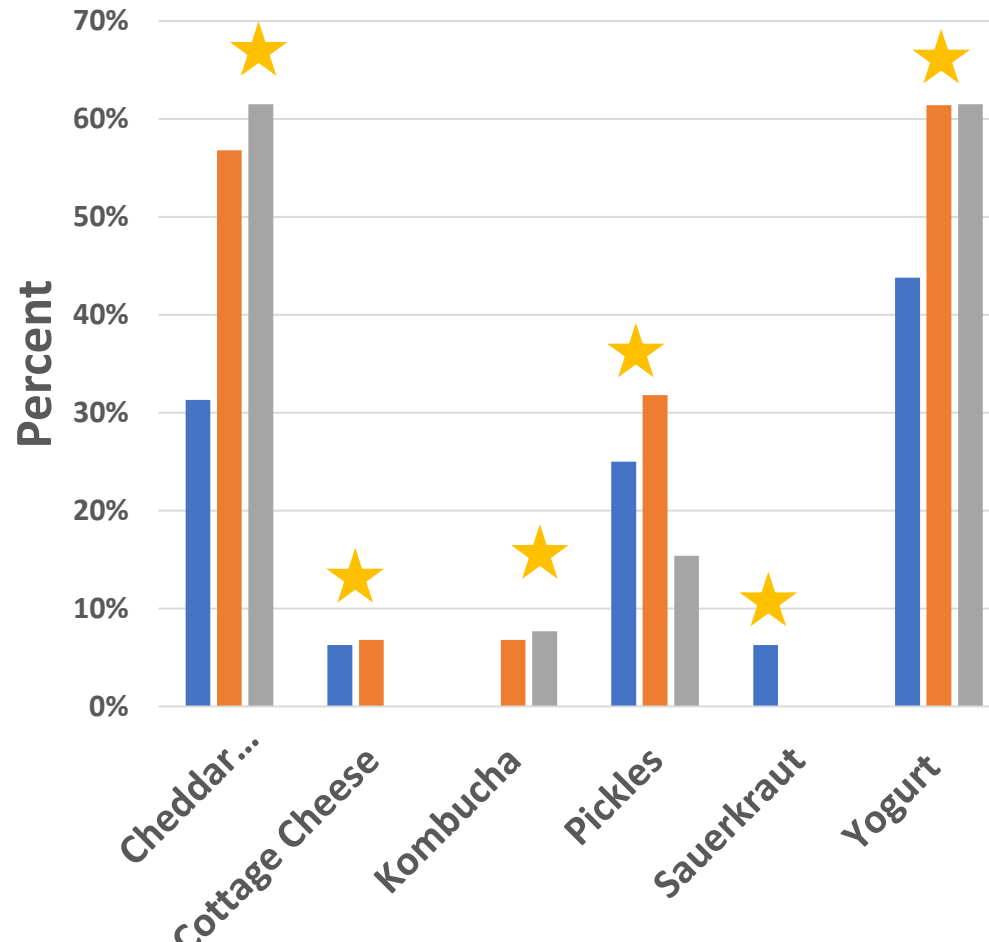
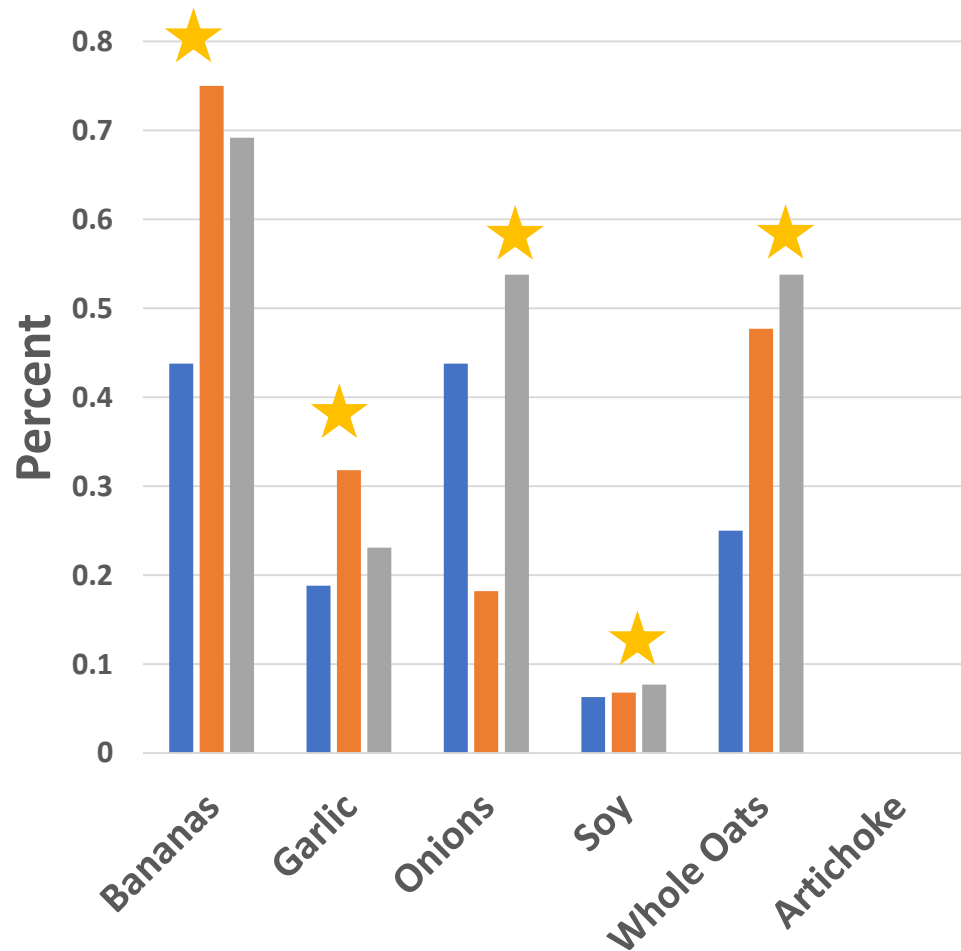
Have symptoms ever prevented training or competition?



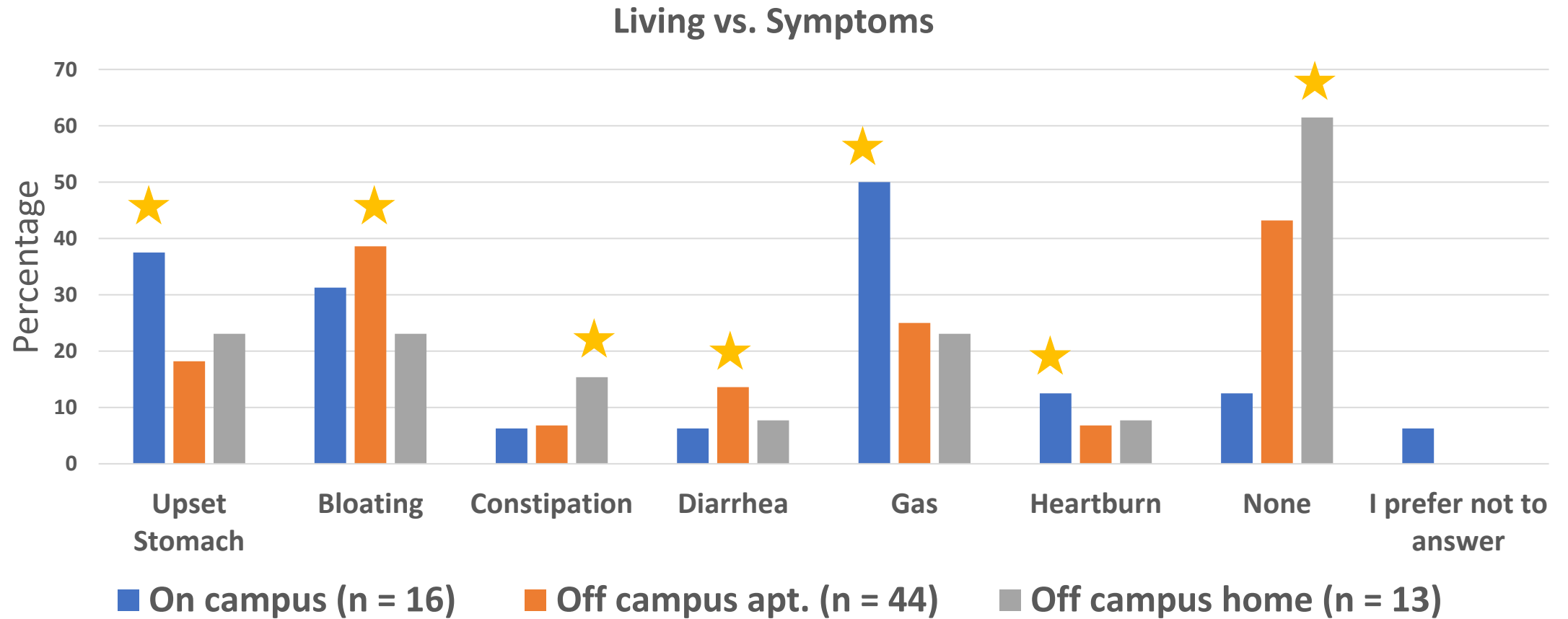
- Yes, but rarely
- Yes, frequently
- I prefer not to answer
- Never

Do demographics play a role?

Diet vs. Living Situation



Place of living vs. GI symptoms



N=73

HYPOTHESIS

Student-athletes, at the NCAA Division One level, suffering from gastrointestinal disturbances, are influenced by an absence of knowledge and diet containing prebiotic and probiotic foods.

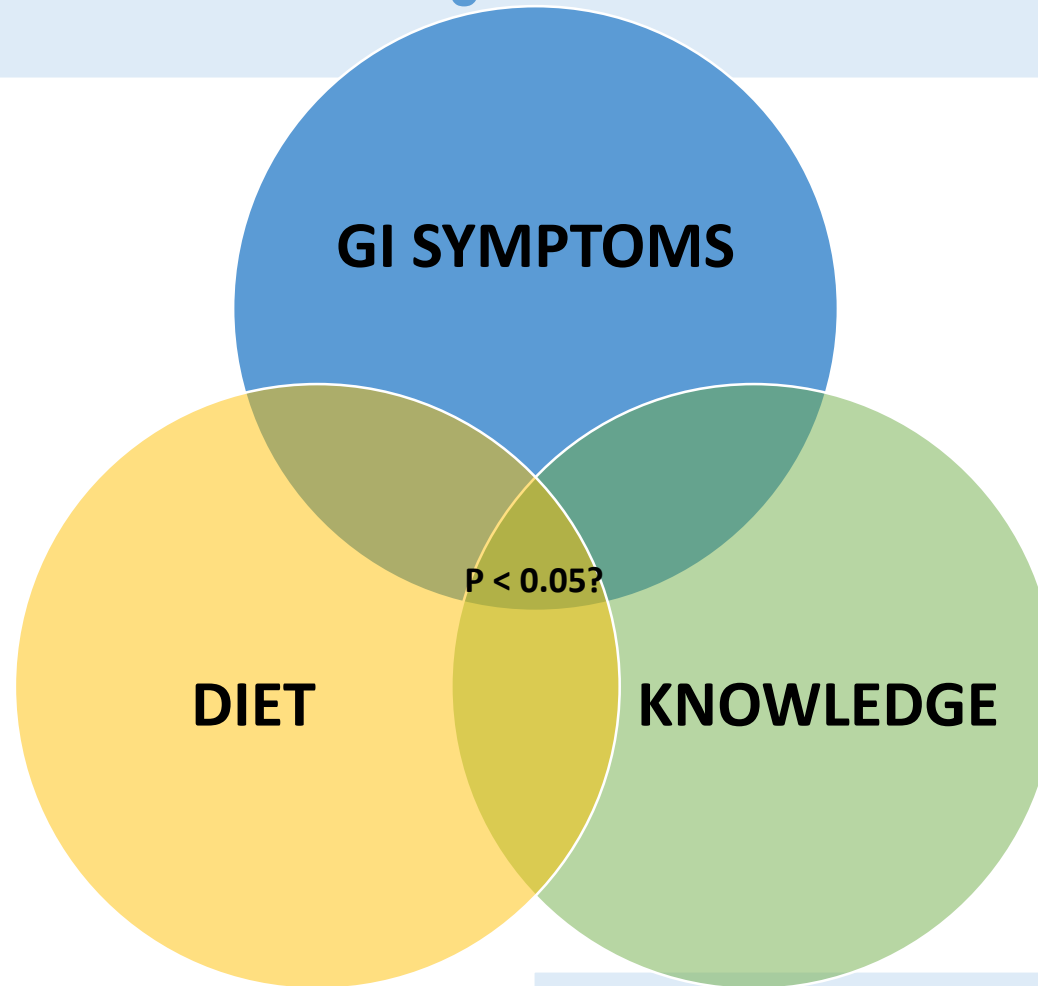
H_0

GI symptoms are **independent** upon Var 1: knowledge scores and Var 2: Diet

H_1

GI symptoms are **dependent** upon Var 1: knowledge scores and Var 2: Diet

Reject or fail to reject H_0 ?



Is there a **relationship** between the three?

Knowledge (Var 1.) vs. Diet (Var 2)

Table 5: SAMPLE KNOWLEDGE

Observed (f_o)	Var 1: Low (0-6)	Var 1: Mod (7-12)	Var 1: High (12-18)	Total
Var 2: Low (0-4)	3	41	8	52
Var 2: Mod (5-8)	0	11	4	15
Total	3	52	12	67

KEY:

Var 1 : Knowledge score

Var 2: Diet choices

Table 6: SAMPLE KNOWLEDGE

Chi-Square	Var 1: Low	Var 1: Mod	Var 1: High	Total
Var 2: Low	0.19	0.01	0.19	0.39
Var 2: Mod	0.67	0.04	0.64	1.35
Total	0.87	0.05	0.83	1.74

P-VALUE = 0.42

DF= 2

Knowledge (Var. 1) vs. Group A and B

Table 1: SAMPLE KNOWLEDGE

Observed (f_o)	Low (0-6)	Moderate (7-12)	High (13-18)	Total
Group A	2	22	6	30
Group B	1	30	6	37
Total	3	52	12	67

Table 2: CHI-SQUARE KNOWLEDGE

Chi-Square	Low	Moderate	High	Total
Group A	0.32	0.07	0.07	0.46
Group B	0.26	0.06	0.06	0.38
Total	0.58	0.13	0.13	0.84

KEY:

Group A: Student-athletes with no symptoms

Group B: Student-athletes with symptoms

P-VALUE = 0.66

DF= 2

Diet (Var. 2) vs. Group A and B

Table 3: SAMPLE KNOWLEDGE

Observed (f_o)	Low (0-4)	Moderate (5-8)	Total
Group A	25	5	30
Group B	27	10	37
Grand Total	52	15	67

Table 4: CHI-SQUARE KNOWLEDGE

Chi-Square	Low	Moderate	Total
Group A	0.13	0.44	0.57
Group B	0.10	0.36	0.46
Total	0.23	0.79	1.02

KEY:

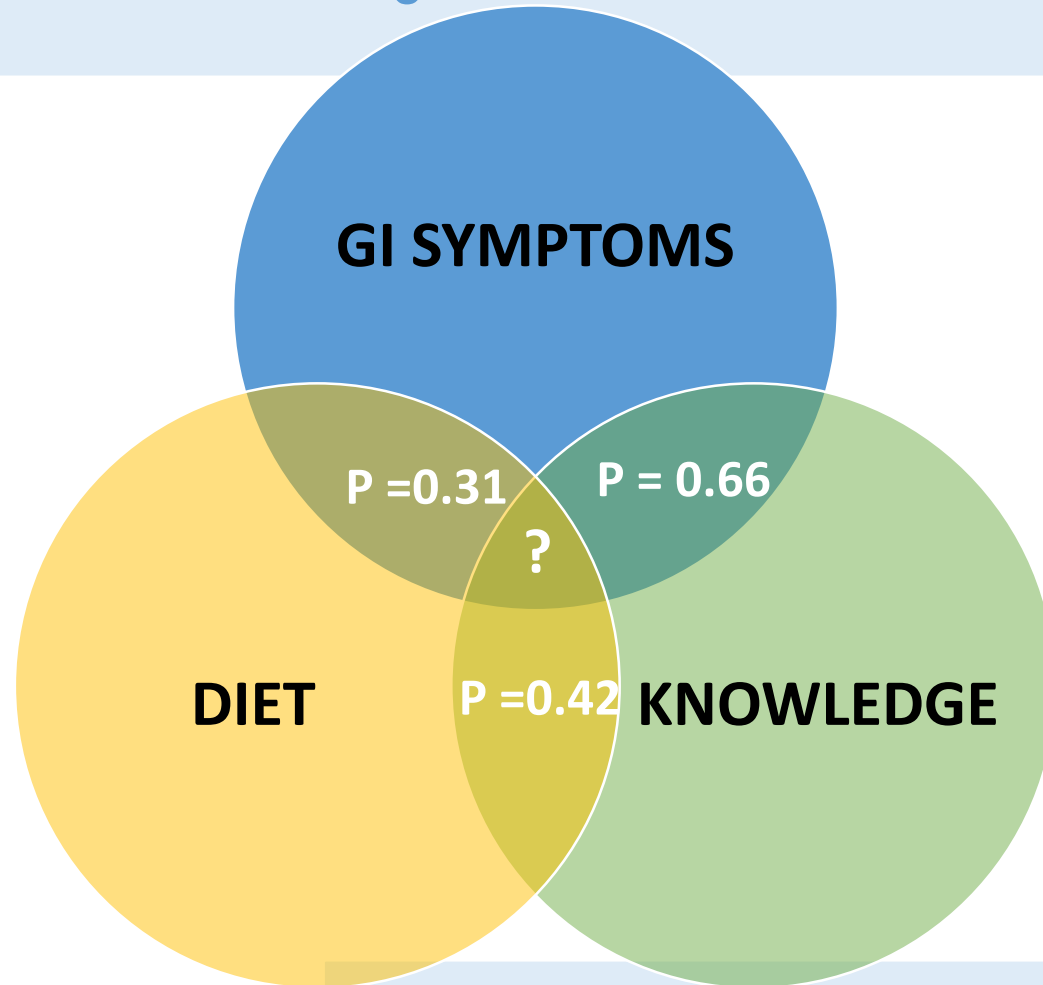
Group A: Student-athletes with no symptoms

Group B: Student-athletes with symptoms

P-VALUE = 0.31

DF= 1

Reject or fail to reject H_0 ?



Answer: Fail to reject Null Hypothesis

Fail to reject H_0 : What does this mean?

- Student athletes' knowledge in sources of prebiotic and probiotics **does not** show to significantly impact their diet
- A student-athlete's **level** in knowledge **is not** substantially contributing to GI symptoms
- A student-athlete's **absence** of prebiotic and probiotic foods **is not** substantially contributing to GI symptoms

Future Research

- . Individualized approach using an in-depth assessment into an athlete's diet and GI health.
 - Severity
 - Prior to or after competition
 - Stress related?
- This research design would benefit if sample size was larger. May be available as pilot study in the future.
- Athletes may benefit from education intervention on importance of gut health and implementing prebiotic and probiotic foods
- Coincided with previous research- sports medicine intervention on reducing GI disturbances
- Future research should be completed as to what may be contributing to GI disturbances in the student-athlete population.

References

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Thank You

A special thank you to Professor Geiser, my thesis chair, for all of his thoughtful guidance and support throughout the past year.

I would also like to thank Gretchen Kauth, R.D., for her inspiring ideas, sources, and feedback.

An additional thank you to all of the WMU student-athletes that took part in the survey and to Dr. Kang for statistical support!

Questions?