

# The Effect of Ultra-processed Food Intake on Metabolic Health in Young Adults

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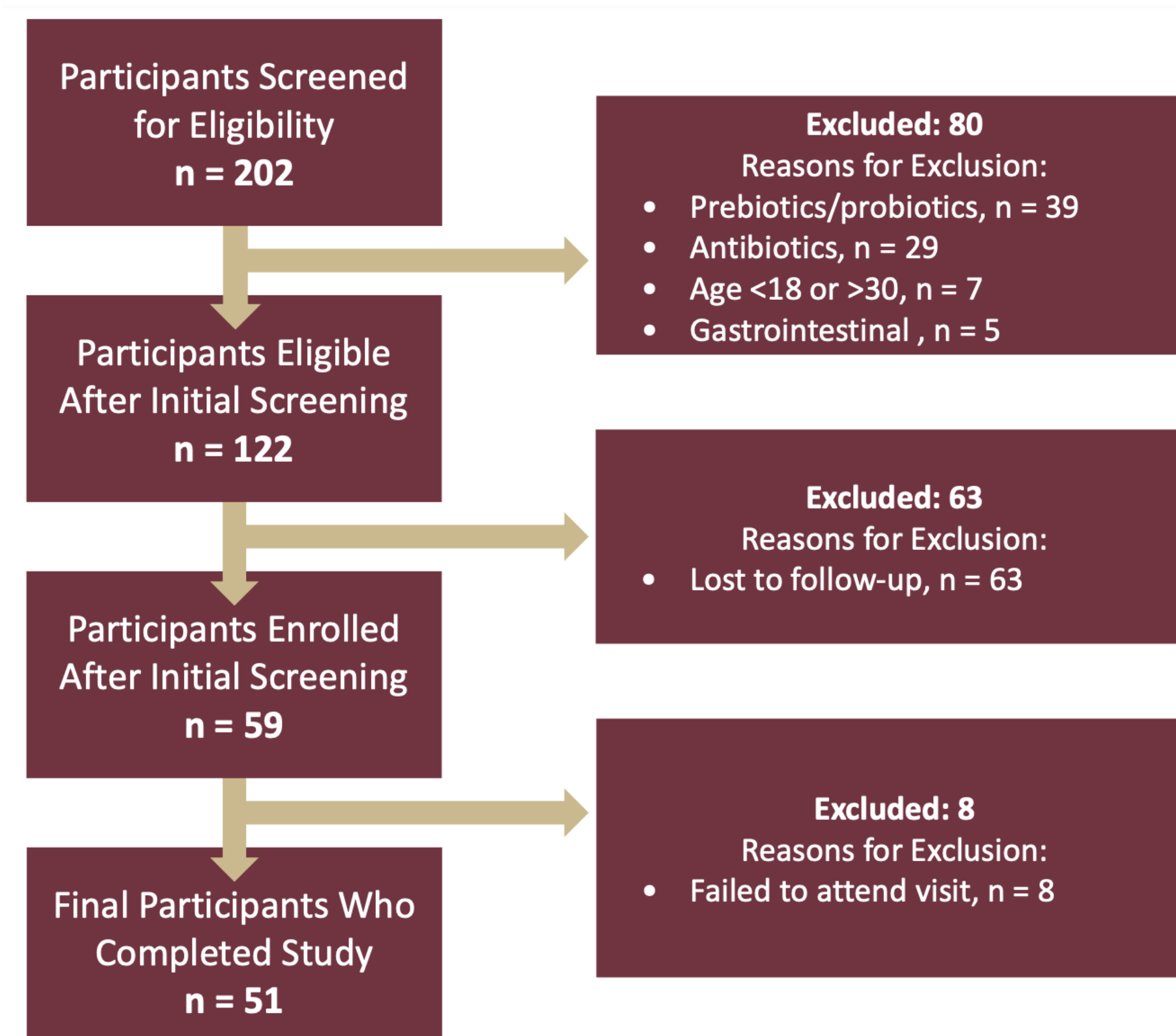
## Background

- Ultra-processed foods (UPFs) are industrial formulations that lack the basic nutritional factors.
- UPFs are characterized by the addition of emulsifiers, artificial additives, refined sugars, fats, and preservatives to provide convenience, shelf-stability, and optimize palatability while sacrificing nutritional diversity and compromising the gut-oral axis, often promoting metabolic dysregulation.
- Diets characterized by high UPF intake are increasingly common in Western populations and are linked to metabolic dysregulation through excess energy intake, reduced satiety, chronic inflammation, and impaired glucose regulation.

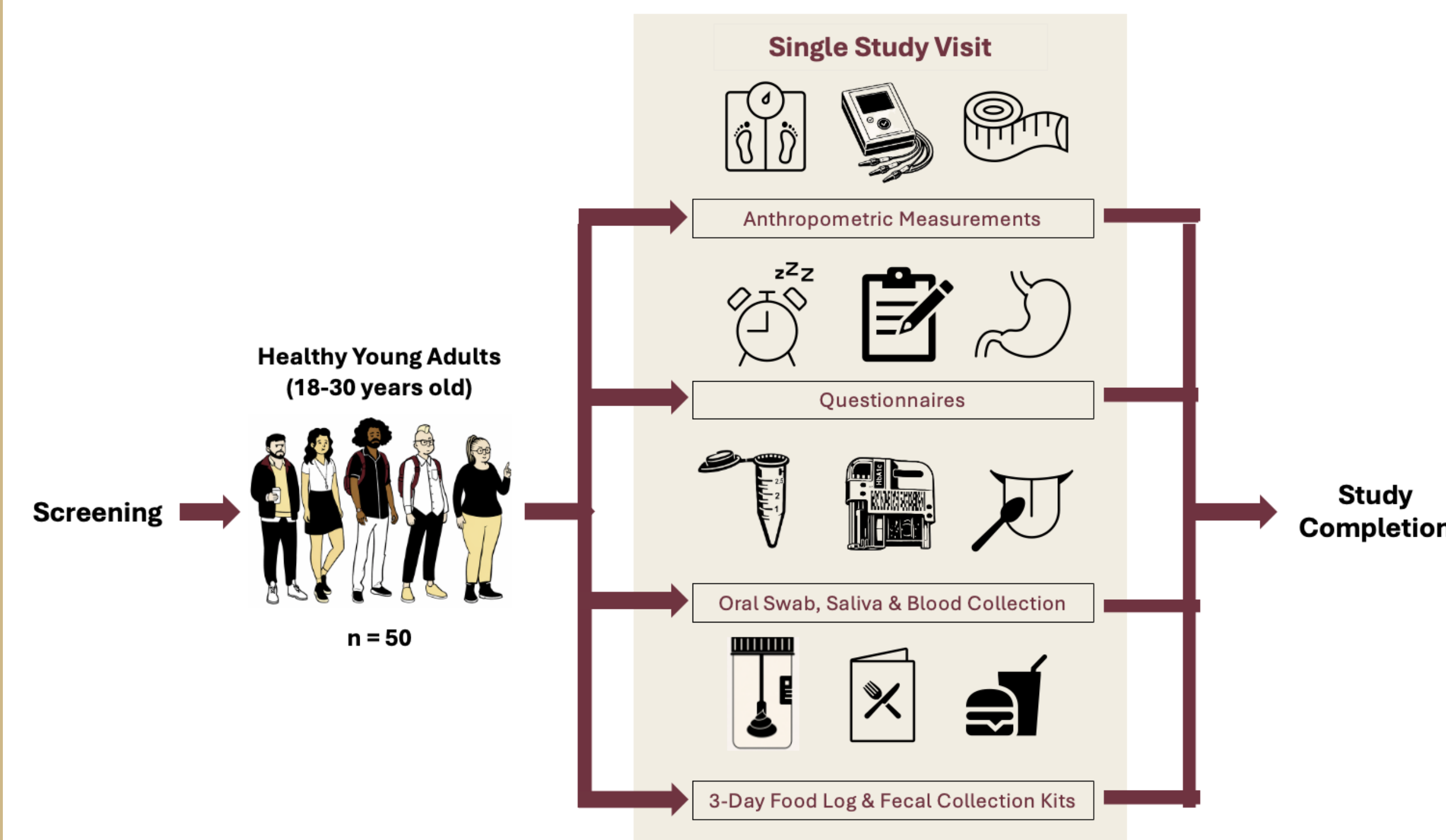
## Research Objectives

- Investigate the effects of UPFs on metabolic health outcomes and their relationship to overall body composition and metabolic health.
- Primary outcome measures aim to research the relationship of diet with body composition and fat mass, blood pressure, and blood glycemic concentration.

## Participant Recruitment



## Study Design



## Participant Characteristics

Table 1: Demographic and Clinical Characteristics of Participants by UPF Quartile (n = 51)<sup>1,2</sup>

Variable	Q1 (n = 14)	Q2 (n = 12)	Q3 (n = 13)	Q4 (n = 12)	P value <sup>a</sup>	Effect Size (η <sup>2</sup> or V) <sup>b</sup>
Age (years)	23.3 ± 3.9	20.0 ± 2.6	20.4 ± 2.2	20.8 ± 3.9	0.10	0.15
Sex, n (%)					0.464	0.23
Male	5 (35.7)	2 (16.7)	6 (46.2)	5 (41.7)		
Female	9 (64.3)	10 (83.3)	7 (53.8)	7 (58.3)		
Race, n (%)					0.403	0.36
White	6 (42.9)	5 (41.7)	9 (69.2)	4 (33.4)		
Black	1 (7.1)	0 (0)	1 (7.7)	4 (33.3)		
Asian	4 (28.6)	2 (16.7)	1 (7.7)	2 (16.7)		
Hispanic	3 (21.4)	5 (41.6)	2 (15.4)	2 (16.6)		
Education, n (%)					0.06	0.35
High School or Less	0 (0)	1 (8.3)	0 (0)	0 (0)		
Some College	5 (35.7)	8 (66.7)	12 (92.3)	10 (83.3)		
Undergraduate Degree	3 (21.4)	2 (16.7)	0 (0)	0 (0)		
Graduate Degree	6 (42.9)	1 (8.3)	1 (7.7)	2 (16.7)		
Body Mass Index (kg/m <sup>2</sup> )	24.8 ± 7.9	23.8 ± 4.6	26.9 ± 9.4	27.3 ± 4.2	0.565	0.04

<sup>1</sup>Data are presented as mean ± SD for continuous variables and n (%) for categorical variables.  
<sup>2</sup>UPF intake quartiles were defined based on the percentage of total energy derived from ultra-processed foods using the NOVA classification system.  
<sup>a</sup>Data only available for n = 11 in Q1, n = 10 in Q2, n = 11 in Q3, and n = 8 in Q4.  
<sup>b</sup>Continuous variables were compared using one way ANOVA or Welch's analyses of variance as appropriate, and categorical variables using chi square tests.  
<sup>c</sup>Effect sizes are reported as eta squared (η<sup>2</sup>) and Cramér's V for chi square tests.

## Key References

References



Lab Website



## Results

Table 3: Anthropometric and Body Composition Measures by UPF Quartile (n = 51)<sup>1,2</sup>

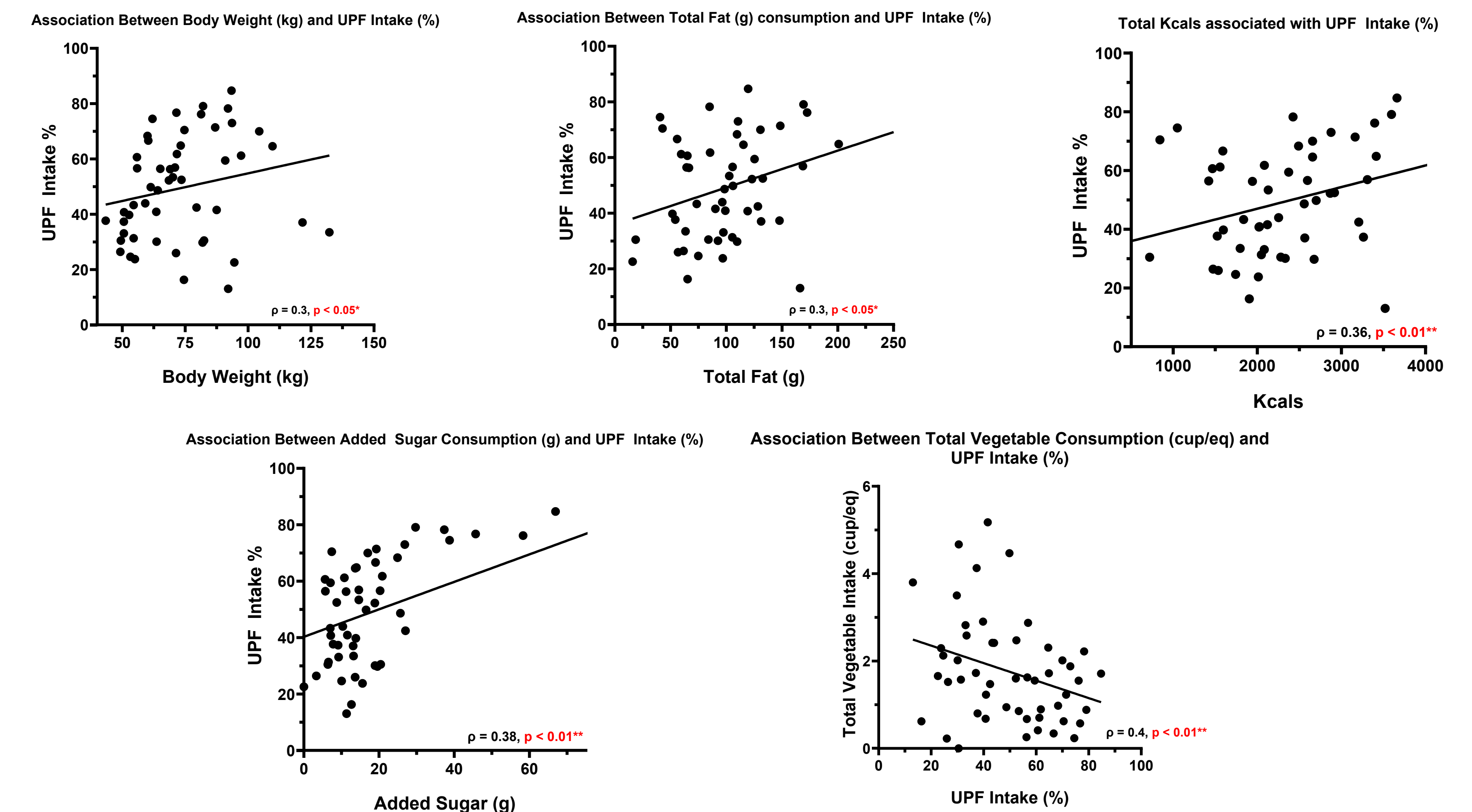
Variable	Q1 (n = 14)	Q2 (n = 12)	Q3 (n = 13)	Q4 (n = 12)	P value <sup>a</sup>	Effect Size <sup>b</sup>
Weight (kg)	71.8 ± 23.6	65.7 ± 21.5	74.7 ± 15.6	80.2 ± 14.7	0.332	0.07
Body Fat (%)	18.5 ± 9.9	18.4 ± 11.3	19.6 ± 8.2	23.8 ± 11.5	0.530	0.05
Muscle Mass (%)	77.2 ± 19.3	77.9 ± 20.4	80.4 ± 8.2	76.3 ± 11.5	0.924	0.01
Total Body Water (L)	40.7 ± 13.2	36.6 ± 8.4	47.2 ± 9.1	45.8 ± 10.6	0.06	0.14
ECF (L)	17.7 ± 4.7	14.7 ± 3.8	18.8 ± 3.4	18.8 ± 3.7	<0.05*	0.16
ICF (L)	25.3 ± 6.8	21.9 ± 4.7	28.4 ± 5.8	26.7 ± 6.8	0.07	0.14
WHR	0.77 ± 0.06	0.76 ± 0.06	0.76 ± 0.06	0.78 ± 0.06	0.858	0.02

<sup>1</sup>Data presented as mean ± SD.  
<sup>2</sup>UPF intake quartiles were defined based on the percentage of total energy derived from ultra-processed foods using the NOVA classification system.  
<sup>a</sup>Group differences were assessed using one way ANOVA or Welch's analysis of variance as appropriate. \*p < 0.05. \*\*p < 0.01.  
<sup>b</sup>Effect sizes are reported as eta squared (η<sup>2</sup>).

Table 4: Metabolic Outcomes of Participants by UPF Quartile (n = 51)<sup>1,2</sup>

Variable	Q1 (n = 14)	Q2 (n = 12)	Q3 (n = 13)	Q4 (n = 12)	P value <sup>a</sup>	Effect Size <sup>b</sup>
Systolic Blood Pressure (mmHg)	114.7 ± 14.5	111.0 ± 7.8	112.3 ± 19.0	122.1 ± 16.0	0.277	0.08
Diastolic Blood Pressure (mmHg)	72.8 ± 5.8	68.6 ± 8.9	69.3 ± 8.6	75.6 ± 13.5	0.246	0.09
Heart Rate (bpm)	74.5 ± 20.7	67.5 ± 14.9	71.0 ± 9.8	78.3 ± 11.5	0.344	0.07
HbA1c (%)	5.1 ± 0.2	5.1 ± 0.2	5.2 ± 0.2	5.3 ± 0.4	0.323	0.08

<sup>1</sup>Data presented as mean ± SD.  
<sup>2</sup>UPF intake quartiles were defined based on the percentage of total energy derived from ultra-processed foods using the NOVA classification system.  
<sup>a</sup>Data only available for n=46.  
<sup>b</sup>Group differences were assessed using one way ANOVA or Welch's analysis of variance as appropriate. \*p < 0.05. \*\*p < 0.01.  
<sup>c</sup>Effect sizes are reported as eta squared (η<sup>2</sup>).



## Conclusions

- Increased UPF consumption was positively correlated with greater caloric intake, total dietary fat consumption, and added sugar intake.
- Vegetable consumption was negatively correlated with UPF intake, indicating increased UPF consumption displaces nutrient rich diets.
- Cross comparisons among UPF intake quartiles did not demonstrate statistical significance for anthropometric measures (total derived fat and lean mass and weight) and metabolic health indicators (blood pressure, heart rate, and HbA1c).
- Extracellular fluid statistically differed across UPF quartiles, suggesting UPF intake may underscore physiological health.
- Findings indicate increased UPF intake is associated with poorer markers of diet quality and adiposity marked by increased fats, calories, and added sugars while lacking fiber and micronutrients, although distinct associations with metabolic outcomes were not evident.