The Influence of Diet Quality on Vaginal Microbiota Composition in Pregnant Women

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DISCLOSURES

- The opinions and assertions expressed herein are mine and do not necessarily reflect the official policy or position of the Uniformed Services University, US Air Force, or the Department of Defense
- I have no financial interest to declare

AGENDA

Introduction

- Introduction
- Definitions
- Literature review
- Research gaps
- Summary
- Research questions
- Specific aims

Methods

- Parent project
- Study design and sample
- Measures
- Data analysis and results
- Contributions
- Implications
- Limitations
- Strengths
- Questions

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- Research gaps
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- Parent project
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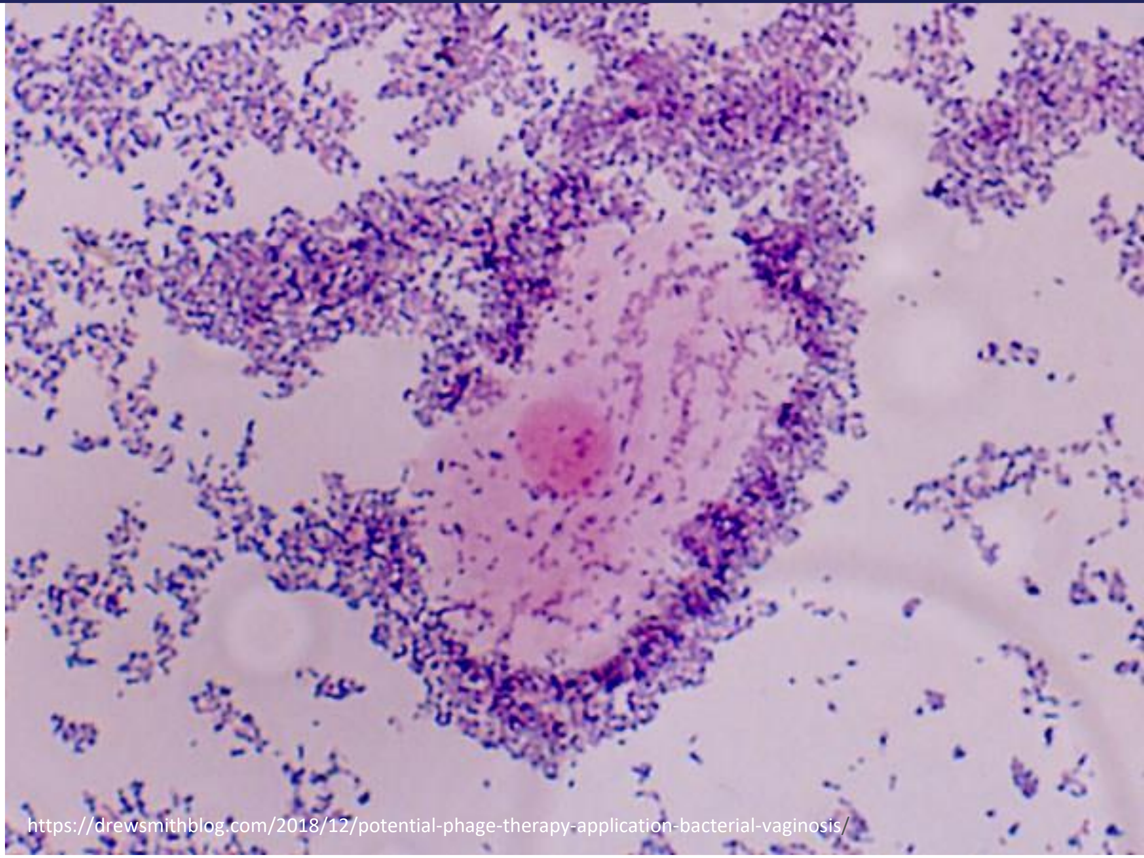
- Measures
- Data analysis
- Significance
- Assumptions
- Limitations
- Strengths
- Questions

INTRODUCTION

- Bacterial vaginosis (BV) is a dysbiotic condition
- Affects 30% of reproductive age women
- Greater risk for Preterm birth and STIs
- As many as 80% are asymptomatic
- The economic burden is $15B
- Diet may play a role in shaping vaginal microbiota
- Understanding diet influences may have important clinical implications



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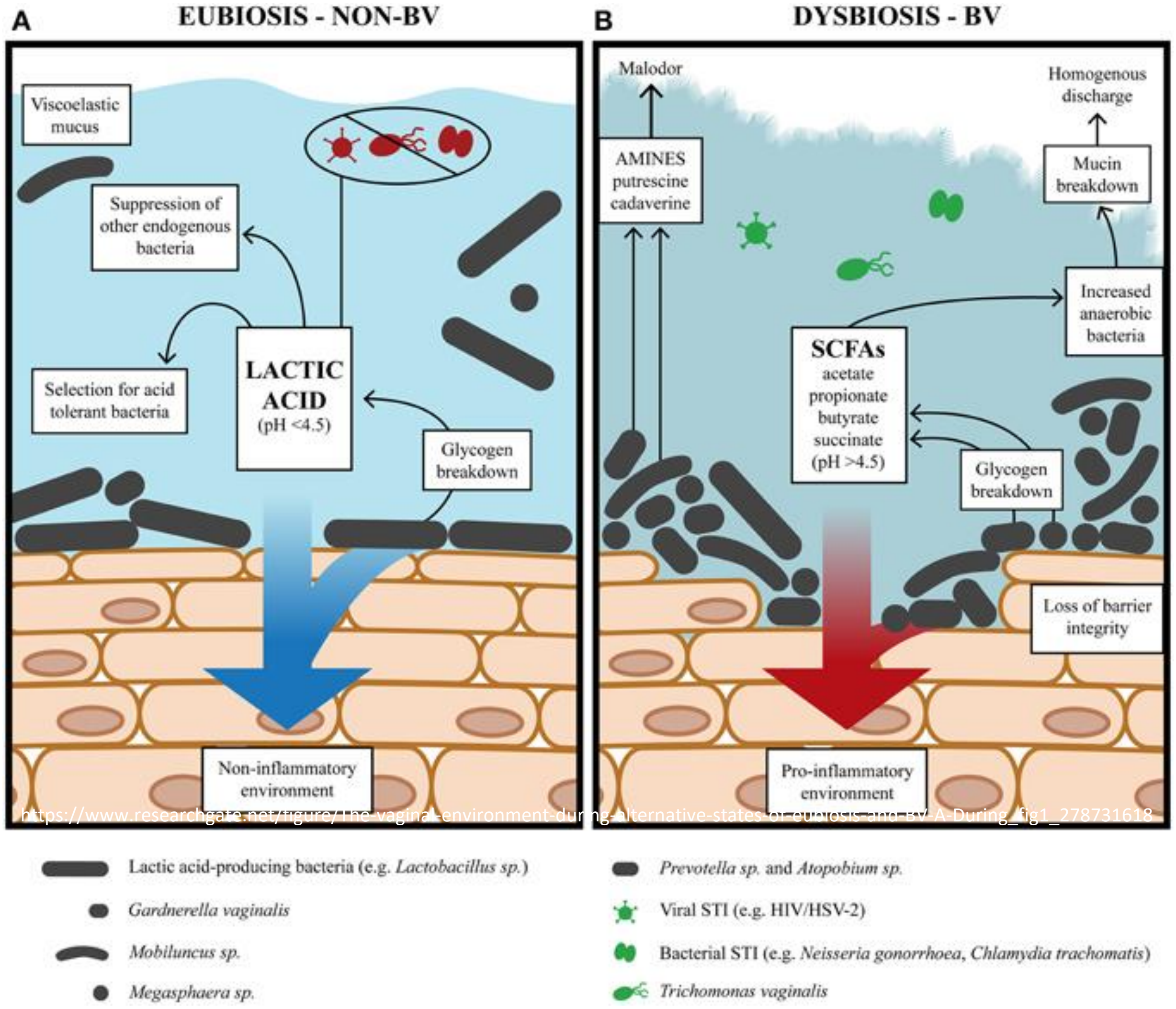
INTRODUCTION

Vaginal Microbiota

BV Associated Dysbiosis

- Overgrowth of anaerobic and facultative bacteria
- Diverse polymicrobial composition
- Community Class type D



https://www.researchgate.net/figure/The-vaginal-environment-during-alternative-states-of-eubiosis-and-BV-A-During_fig1_278731618

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Amsel-BV	BV meets at least 3 of 4 Amsel's criteria: • Abnormal discharge • pH>4.5 • Clue cells • Fish odort Symptomatic or Asymptomatic
Nugent-BV	BV diagnosed by Gram Stain: • Nugent score 7 – 10 (Nugent-BV) • Nugent score 4 - 6 (Intermediate-BV) Nugent score 0 – 3 (Non BV), *Lactobacillus*-dominated^ Symptomatic or Asymptomatic
Molecular-BV	General term for "non-optimal" bacterial communities depleted of lactobacilli with abundant anaerobes* characterized by molecular techniques
Seq BV	• 16S rRNA gene sequencing or broadrange PCR. Shotgun sequencing approaches High relative abundance of anaerobes* depleted of *Lactobacillus* spp. associated with increased genital inflammation and/or HIV risk*
qPCR-BV	• Taxon specific quantitative PCR "Non-optimal" taxa demonstrating concentration dependent associations with increased genital inflammation and/or odds of HIV risk Symptomatic or Asymptomatic
	^Depends on the population studied[22] *Polymicrobial/diverse or *G. vaginalis*-dominated #May also be associated with other adverse sexual as well as reproductive health outcomes

Mckinnon LR, Achilles SL, Bradshaw CS, Burgener A, Crucitti T, et al. 2019. The Evolving Facets of Bacterial Vaginosis: Implications for HIV Transmission. *AIDS Res. Hum. Retroviruses*. 35(3):219–28

Defining BV

Diagnosis

- The etiology is not well understood
- Inconsistencies in the literature

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Defining BV

Diagnosis

- Amsel criteria
- Nugent score
- Sequencing

Amsel-BV	BV meets at least 3 of 4 Amsel's criteria: • Abnormal discharge • pH>4.5 • Clue cells • Fish odor† Symptomatic or Asymptomatic
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Defining BV

Diagnosis

Not all women present with symptoms

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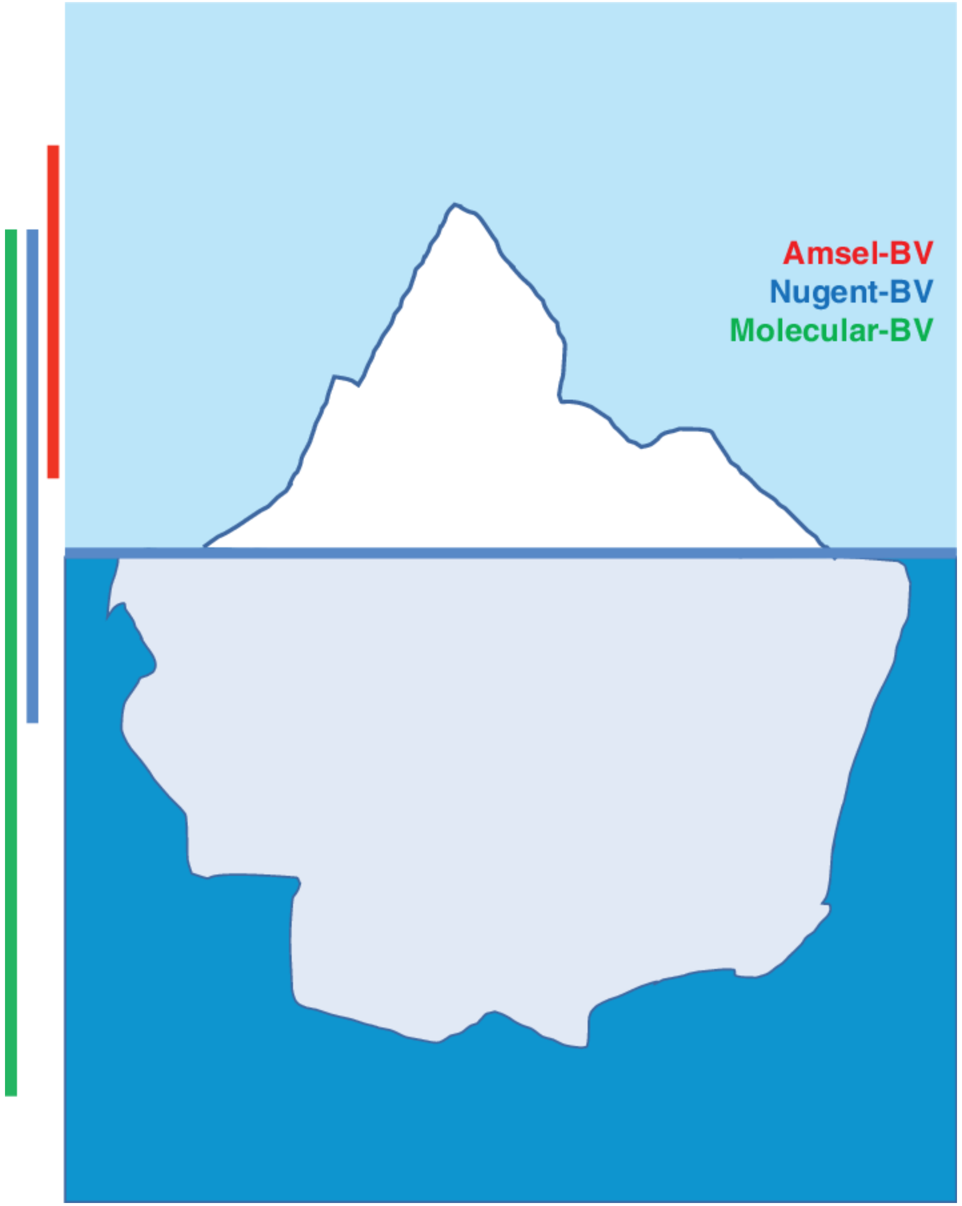
INTRODUCTION

Defining BV

Diagnosis

Molecular BV



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INTRODUCTION

Molecular BV

The Iceberg Concept

Women with BV are at greater risk for adverse health outcomes but go unrecognized

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Literature Review

The influence of diet on BV

- Majority used Nugent scores to define BV
- Micronutrients associated with BV
- Macronutrients associated with BV
- Diet quality associated with BV
- Diet may shape the composition of the vaginal microbiota

INTRODUCTION

Research Gaps

- Unclear what effect diet has on changes to the vaginal microbiota
- Inconsistencies in defining BV
- No studies have examined the longitudinal influence of diet on BV
- No studies on the influence of diet on molecular BV among pregnant women

Summary

- BV affects roughly a third of all women of reproductive age women predisposing them to adverse health outcomes
- As many as 80% of women with BV associated microbiota are asymptomatic
- Diet may play a role in shaping the vaginal microbiota composition
- The current body of literature has not addressed how diet quality influences the molecular composition of the vaginal microbiota
- This study was designed to begin to fill that gap by examining the longitudinal changes in the structure of the vaginal microbiota of the pregnant women who participated in the BEAM study

INTRODUCTION

Research Question & Aims

- Does diet quality predict alterations in the frequency of molecular BV?
- Assess the influence of diet quality on the vaginal communities to determine if differences in diet quality were associated with molecular BV
- Analyze the relationship of diet quality scores and molecular BV using diet data at 6-, 7-, and 8-month gestations

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AGENDA

Introduction

Methods

Parent Project

***Birth, Eating, and the Microbiome* (BEAM, NR014826)**

- NINR funded project
- IRB approval from University of Maryland, Baltimore
- The influence of diet on the vaginal microbiota and preterm birth among a pregnant cohort
- Data were collected from 2014 to 2018
- Data included demographic data, food photographs , & sequenced vaginal samples for 66 women

Study Design

BEAM Data

- Original analysis using longitudinal data collected prospectively
- The sample
  - 18 to 34 years old
  - Primigravid women with singleton pregnancies recruited between 12 to 22 weeks' gestation and were followed through delivery
  - Inclusion criteria: participants who had complete dietary and vaginal microbiota data for gestational months 6, 7, and 8
  - Exclusion criteria: more than one missing data point

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Component HEI-2015 [1]	Max Points	Standard for Maximum Score	Standard for Minimum Score of Zero
Adequacy:			
Total Fruit [2]	5	≥ 0.8 cup equivalent/1000 kcal	No Fruit
Whole Fruit [3]	5	≥ 0.4 cup equivalent/1000 kcal	No Whole Fruit
Total Vegetables [4]	5	≥ 1.1 cup equivalent/1000 kcal	No Vegetables
Greens and Beans [4]	5	≥ 0.2 cup equivalent/1000 kcal	No Dark Green Vegetables or Beans or Peas
Whole Grains	10	≥ 1.5 ounce equivalent/1000 kcal	No Whole Grains
Dairy [5]	10	≥ 1.3 cup equivalent/1000 kcal	No Dairy
Total Protein Foods [6]	5	≥ 2.5 ounce equivalent/1000 kcal	No Protein Foods
Seafood and Plant Proteins [7,8]	5	≥ 0.8 ounce equivalent/1000 kcal	No Seafood or Plant Proteins
Fatty Acids [9]	10	(PUFAs + MUFAs)/SFAs > 2.5	(PUFAs + MUFAs)/SFAs ≤ 1.2
Moderation:			
Refined Grains	10	≤ 1.8-ounce equivalents/1000 kcal	≥ 4.3 ounce equivalent/1000 kcal
Sodium	10	≤ 1.1 g/1000 kcal	≥ 2.0 g per 1000 kcal
Added Sugar	10	≤ 6.5 % of energy	≥ 26 % of energy
Saturated Fats	10	≤ 8 % of energy	≥ 16 % of energy

METHODS

Measure

DIETARY INTAKE DATA

- FoodFoto™ System
- Healthy Eating Index -2015
- Diet scores are continuous variables

HEI-2015 Components and Scoring Standards from the USDA's Center for Policy and Promotion (Krebs-Smith et al., 2018; USDA, 2018)

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METHODS

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DIETARY INTAKE DATA

- HEI-2015 Adequacy components

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DIETARY INTAKE DATA

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METHODS

Measure

VAGINAL MICROBIOTA DATA

- VALENCIA
  - Community Class Types
  - Categorical variables
    - *L* class for ‘non-BV group’
    - *D* class for ‘molecular BV group’

https://www.researchgate.net/figure/The-vaginal-environment-during-alternative-states-of-eubiosis-and-BV-A-During_fig1_278731618

METHODS

Sample Characteristics

- Age range 18 -34
- Gestation at delivery 34 -41
- Body Mass Index 17.9 – 60, 40% BMI > 30
- Race, 71% African American
- Education, 36% university degree
- Household Income, 20% > $75K
- Employment status, 27% unemployed
- Marital status, 55% Single

Specific Aim 1

Assess the influence of *total*, *adequacy*, and *moderation* diet quality scores on the vaginal communities among the cohort controlling for race and obesity

- Hypothesis – The higher diet quality scores would be associated with lower the odds of molecular BV and the lower the diet quality scores the higher the odds of molecular BV

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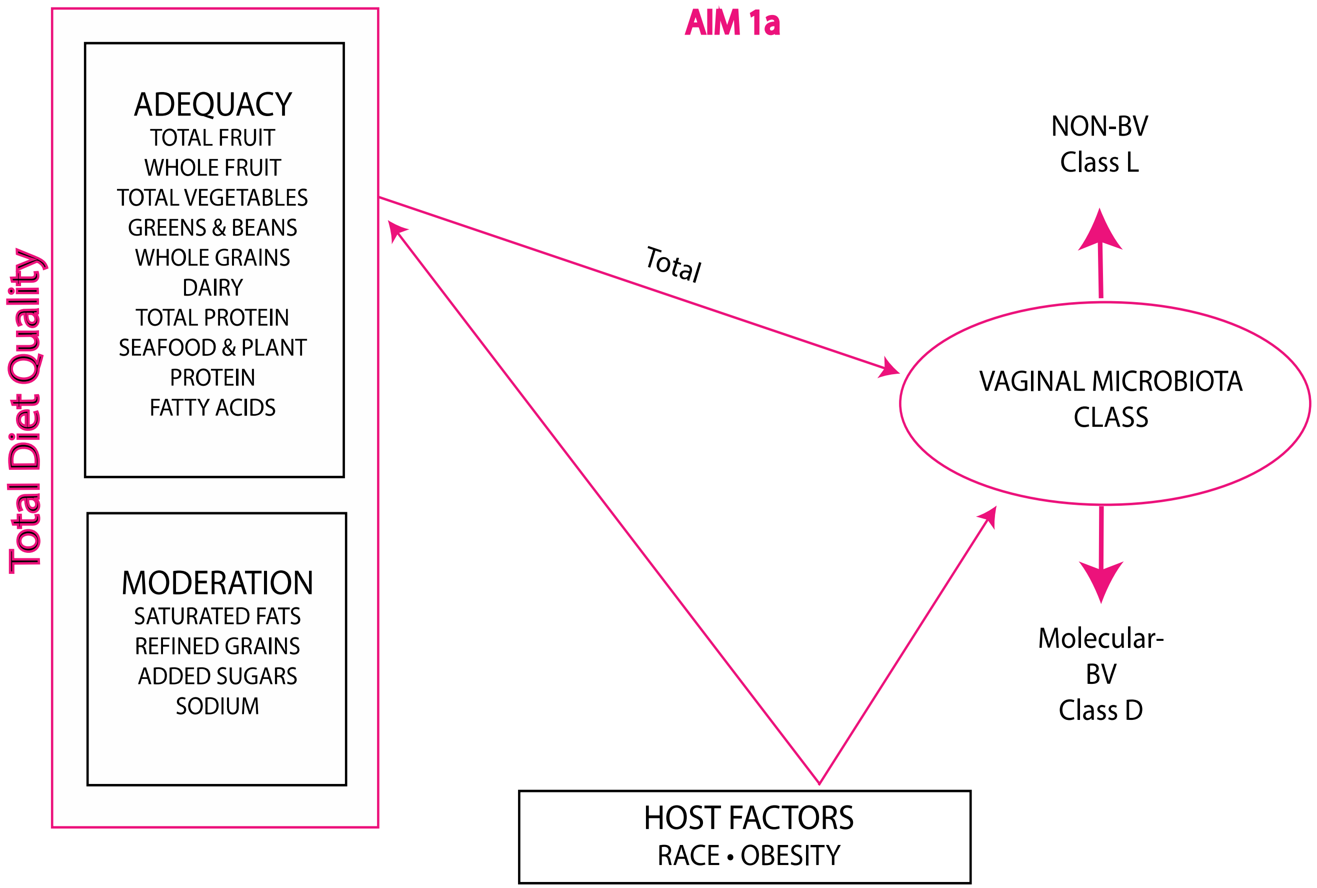
Specific Aim 1a

Assess the influence of *total* diet quality on the vaginal communities among the cohort controlling for race and obesity

- Hypothesis 1a—The higher the *total* diet quality scores the lower the odds of molecular BV and the lower the *total* diet quality scores the higher the odds of molecular BV (class D)



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Aim 1a

n = 55	ß	*SE*	Wald	*df*	*p*	OR	95% CI	
							Lower	Upper
Total diet score	-0.026	0.04	0.416	1	0.519	0.974	0.901	1.054
Obesity	-0.738	0.632	1.365	1	0.243	0.478	0.139	1.649
African Am.	1.127	0.822	1.881	1	0.17	3.086	0.617	15.444

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METHODS

Aim 1a

n = 53	*ß*	*SE*	Wald	*df*	*p*	OR	95% CI Lower	95% CI Upper
Total diet quality	-0.017	0.052	0.101	1	0.751	0.984	0.888	1.09
African American	-1.409	1.465	0.925	1	0.336	0.244	0.014	4.315
Single	0.883	0.901	0.96	1	0.327	2.419	0.413	14.148
Income > 75K	-2.449	1.434	2.919	1	0.088	0.086	0.005	1.434
University degree	0.73	1.161	0.396	1	0.529	2.076	0.213	20.222
Age	-0.182	0.093	3.782	1	0.052	0.834	0.695	1.001
Gestation	-0.659	0.285	5.358	1	0.021*	0.517	0.296	0.904
Forward Stepwise								
Age	-0.187	0.068	7.467	1	0.006*	0.83	0.726	0.949
Gestation at Del	-0.506	0.236	4.594	1	0.032*	0.603	0.379	0.958
Backward Stepwise								
Age	-0.187	0.068	7.467	1	0.006*	0.83	0.726	0.949
Gestation at Del	-0.506	0.236	4.594	1	0.032*	0.603	0.379	0.958

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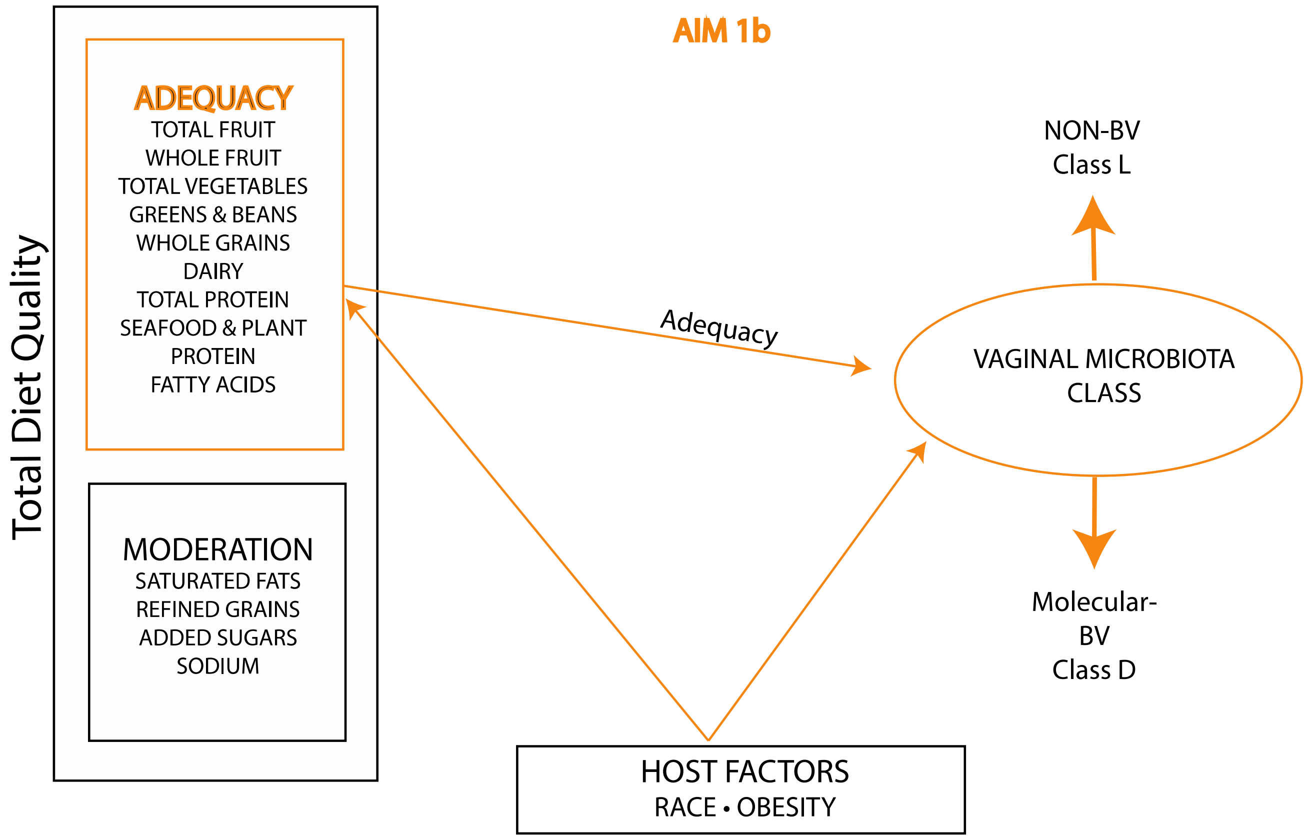
METHODS

Specific Aim 1b

Assess the influence of *adequacy* scores on the vaginal communities among the cohort controlling for race and body mass index

- Hypothesis 1b—The higher the *adequacy* diet scores the lower the odds of molecular BV (class D) and the lower the *adequacy* scores the higher the odds of molecular BV (class D)



Aim 1b

Table 10. Aim 1b, Model 1

n = 55	ß	*SE*	Wald	*df*	*p*	OR	95% CI	
							Lower	Upper
Adequacy score	-0.023	0.049	0.211	1	0.646	0.978	0.887	1.077
Obesity	-0.679	0.62	1.197	1	0.274	0.507	0.15	1.711
African Am.	1.264	0.778	2.636	1	0.104	3.539	0.77	16.28

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METHODS

Aim 1b

n = 53	*ß*	*SE*	Wald	*df*	*p*	OR	95% CI	
							Lower	Upper
Adequacy score	-0.02	0.065	0.097	1	0.756	0.98	0.863	1.113
African American	-1.358	1.411	0.927	1	0.336	0.257	0.016	4.082
Single	0.903	0.903	1.001	1	0.317	2.467	0.421	14.475
Income > $75K	-2.467	1.433	2.966	1	0.085	0.085	0.005	1.406
University degree	0.7	1.155	0.368	1	0.544	2.015	0.209	19.374
Age	-0.179	0.095	3.547	1	0.06	0.836	0.694	1.007
Gestation at Delivery	-0.656	0.286	5.284	1	0.022*	0.519	0.296	0.908
Forward Stepwise								
Age	-0.187	0.068	7.467	1	0.006*	0.83	0.726	0.949
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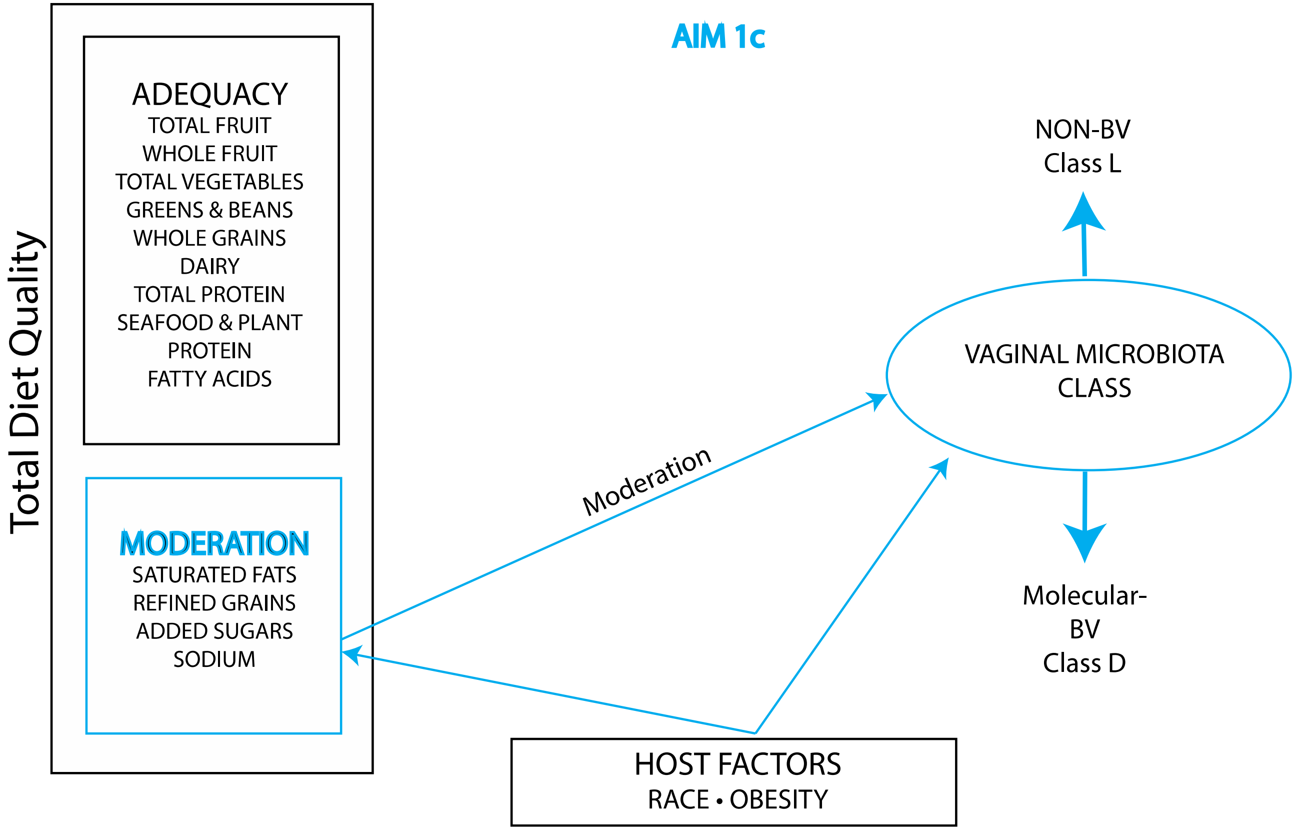
Specific Aim 1c

Assess the influence of *moderation* scores on the vaginal communities among the cohort controlling for race and body mass index

- Hypothesis 1c—The higher the *moderation* scores the lower the odds of molecular BV (class D) and the lower the moderation scores the higher the odds of molecular BV (class D)



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METHODS

Aim 1c

n = 55	ß	*SE*	Wald	*df*	*p*	OR	95% CI Lower	95% CI Upper
Moderation score	0.012	0.078	0.023	1	0.878	1.012	0.868	1.18
Obesity	-0.634	0.63	1.014	1	0.314	0.53	0.154	1.822
African Am.	1.472	0.808	3.32	1	0.068	4.356	0.895	21.208

Aim 1c

n = 55	ß	SE	Wald	df	p	OR	95% CI	
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Moderation score	0.012	0.078	0.023	1	0.878	1.012	0.868	1.18
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METHODS

Aim 1c

n = 53	ß	*SE*	Wald	*df*	*p*	OR	95% CI	
							Lower	Upper
Moderation score	0.055	0.106	0.265	1	0.607	1.056	0.858	1.301
African Am.	-1.023	1.384	0.546	1	0.46	0.36	0.024	5.417
Single	0.89	0.9	0.978	1	0.323	2.435	0.417	14.203
Income > $75K	-2.622	1.486	3.114	1	0.078	0.073	0.004	1.337
University degree	0.592	1.157	0.262	1	0.609	1.808	0.187	17.453
Age	-0.185	0.091	4.13	1	0.042*	0.831	0.695	0.993
Gestation at Delivery	-0.649	0.29	4.992	1	0.025*	0.523	0.296	0.923
Forward Stepwise								
Age	-0.187	0.068	7.467	1	0.006*	0.83	0.726	0.949
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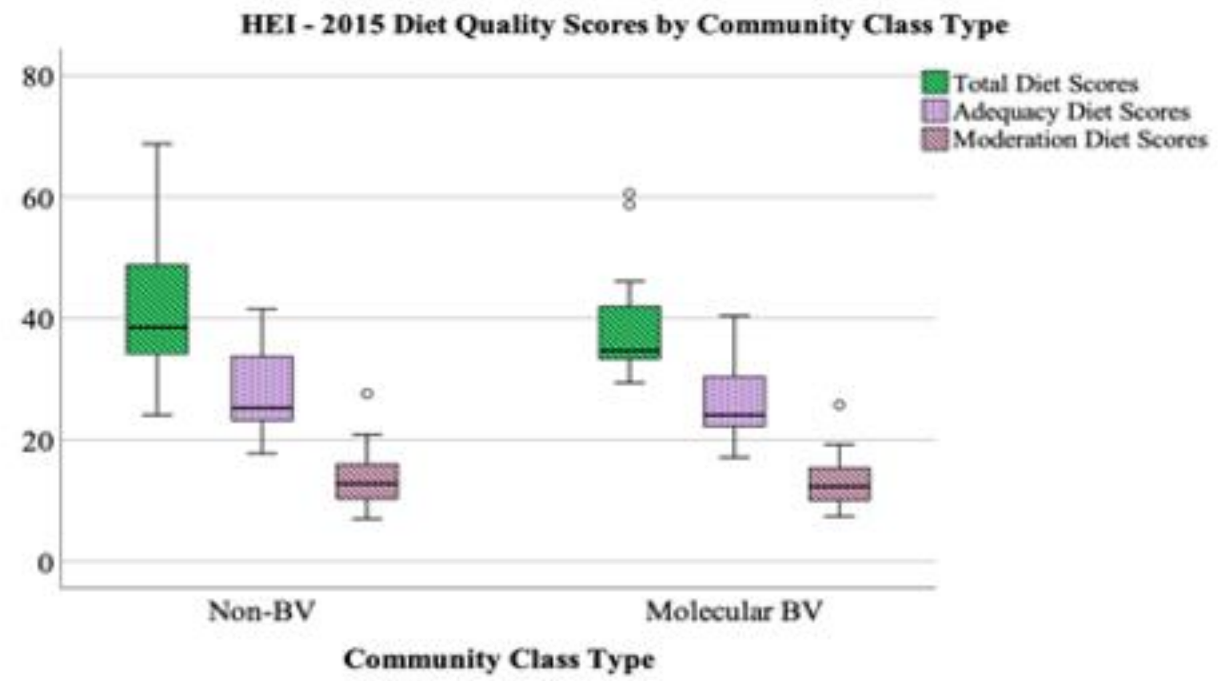
Income > $75K	-2.622	1.486	3.114	1	0.078	0.073	0.004	1.337
University degree	0.592	1.157	0.262	1	0.609	1.808	0.187	17.453
Age	-0.185	0.091	4.13	1	0.042*	0.831	0.695	0.993
Gestation at Delivery	-0.649	0.29	4.992	1	0.025*	0.523	0.296	0.923
Forward Stepwise								
Age	-0.187	0.068	7.467	1	0.006*	0.83	0.726	0.949
Gestation at Delivery	-0.506	0.236	4.594	1	0.032*	0.603	0.379	0.958
Backwards Stepwise								
Age	-0.187	0.068	7.467	1	0.006*	0.83	0.726	0.949
Gestation at Delivery	-0.506	0.236	4.594	1	0.032*	0.603	0.379	0.958

Research Questions

- **Are differences in diet quality scores associated with molecular BV?**



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Research Questions

- Are there significant differences in the HEI-2015 ***total, adequacy,*** **or** ***moderation*** **diet scores between women in the molecular BV compared to the non-BV group?**

Mean HEI-2015 Diet Quality Scores $\bar{x}$ (SD)			
	n = 31	*n* = 24	
Component	Non-BV	Molecular BV	*p*
Total	41.6 (10.6)	38.1 (8.1)	0.086
Adequacy	28 (7.5)	25.9 (5.5)	0.061
Moderation	13.7 (4.8)	13 (4.1)	0.381

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Research Questions

n = 55	ß	*SE*	Wald	*df*	*p*	OR	95% CI	
							Lower	Uppe
Adequacy scores	-0.024	0.05	0.23	1	0.632	0.976	0.885	1.07
Moderation scores	0.016	0.079	0.042	1	0.837	1.016	0.871	1.18
African Am.	1.328	0.846	2.463	1	0.117	3.774	0.719	19.82
Obesity	-0.656	0.631	1.08	1	0.299	0.519	0.151	1.78

Specific Aim 2

Analyze the relationship between a diet high in consumption of *adequacy and moderation* components and the community class using longitudinal diet and community class assignment data

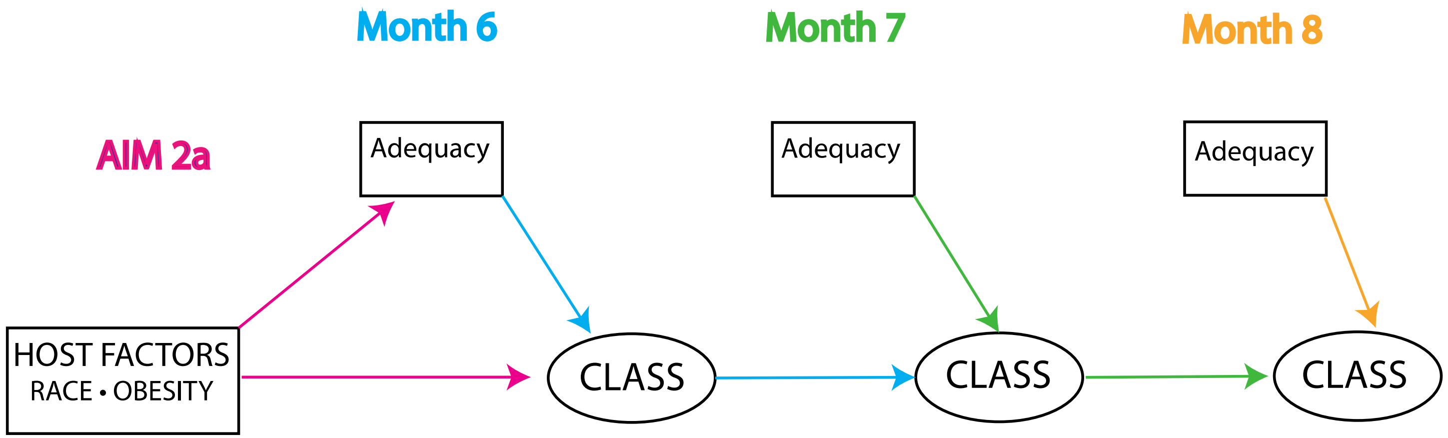
- Hypothesis – The higher diet quality scores would be associated with lower odds of molecular BV and lower diet quality scores would be associated with higher the odds of molecular BV

METHODS

Specific Aim 2a

Analyze the relationship between a diet high in consumption of *adequacy* components and the community class using longitudinal diet and community class assignment data

- Hypothesis — low *adequacy* scores will be associated with increased odds of molecular BV (class D) and high *adequacy* diet quality scores will have decreased odds of molecular BV (class D) at respective timepoints (T_1, T_2, & T_3)



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METHODS

Aim 2a

n = 54	ß	*SE*	Wald	*df*	*p*	OR	95% CI Lower	95% CI Upper
Adequacy score	0.004	0.026	0.018	1	0.893	1.004	0.954	1.056
African American	0.929	0.6026	2.379	1	0.123	2.533	0.778	8.254
Obesity	-0.532	0.5259	1.024	1	0.312	0.587	0.209	1.646
6 Month	0.797	0.3462	5.294	1	0.021*	2.218	1.125	4.371
7 Month	0.056	0.249	0.05	1	0.822	1.058	0.649	1.723

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Aim 2a

n = 52	ß	*SE*	Wald	*df*	*p*	OR	95% CI	
							Lower	Upper
Adequacy score	0.004	0.0288	0.019	1	0.889	1.004	0.949	1.062
Single	1.339	0.6979	3.681	1	0.055	3.816	0.972	14.983
Income > $75	-1.195	1.009	1.402	1	0.236	0.303	0.042	2.188
University Degree	2.062	0.8172	6.369	1	0.012*	7.864	1.585	39.012
Age	-0.109	0.0611	3.199	1	0.074	0.897	0.795	1.011
Gestation at Delivery	-0.598	0.173	11.971	1	0.001*	0.55	0.392	0.771
6 Month	1.035	0.4414	5.493	1	0.019*	2.814	1.185	6.684
7 Month	-0.06	0.3042	0.038	1	0.845	0.942	0.519	1.71

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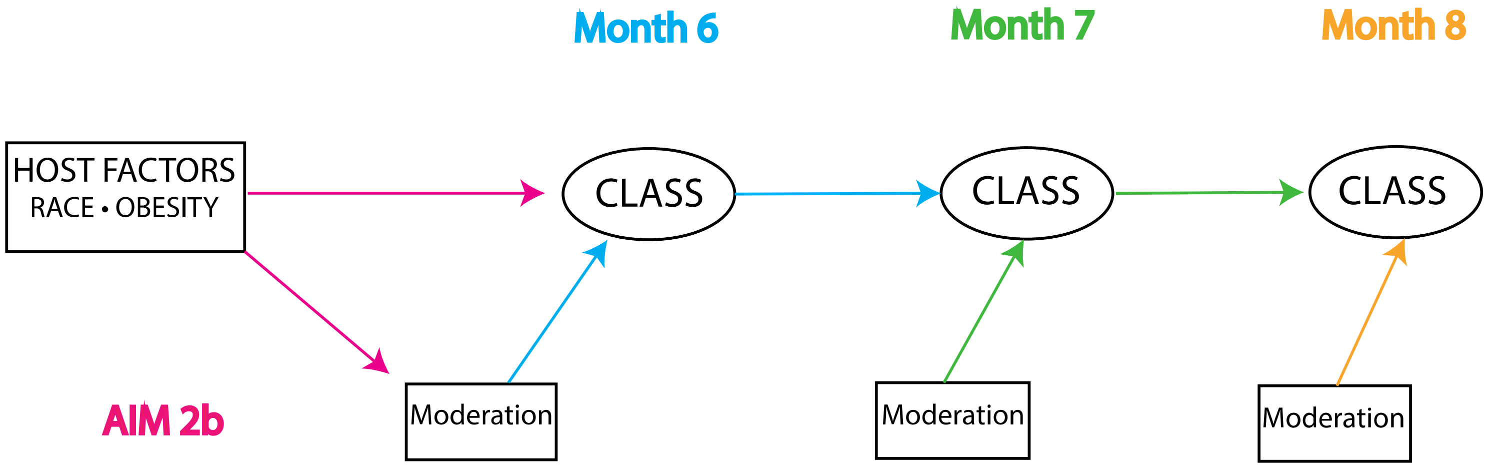
METHODS

Specific Aim 2b

Analyze the relationship between a diet high in consumption of *moderation* components and the community class using longitudinal diet and community class assignment data

- Hypothesis — low *moderation* scores will be associated with increased odds of molecular BV (class D) and high *moderation* diet quality scores will have decreased odds of molecular BV (class D) at respective timepoints (T_1, T_2, & T_3)



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Aim 2b

n = 55	ß	*SE*	Wald	*df*	*p*	OR	95% CI Lower	95% CI Upper
Moderation score	0.02	0.0324	0.39	1	0.532	1.02	0.958	1.087
African American	0.837	0.6405	1.706	1	0.191	2.308	0.658	8.1
Obesity	-0.498	0.5447	0.837	1	0.36	0.608	0.209	1.767
6 Month	0.947	0.3317	8.159	1	0.004*	2.579	1.346	4.94
7 Month	0.24	0.2617	0.843	1	0.359	1.272	0.761	2.124

METHODS

Aim 2b

n = 53	ß	*SE*	Wald	*df*	*p*	OR	95% CI Lower	95% CI Upper
Moderation score	0.03	0.038	0.603	1	0.437	1.03	0.956	1.11
Single	1.203	0.7744	2.413	1	0.12	3.33	0.73	15.19
Income > $75K	-1.615	1.0212	2.501	1	0.114	0.199	0.027	1.472
University Degree	2.248	0.8236	7.452	1	0.006*	9.471	1.885	47.57
Age	-0.125	0.0616	4.146	1	0.042*	0.882	0.782	0.995
Gestation at Delivery	-0.615	0.1757	12.229	1	0.000*	0.541	0.383	0.763
6 Month	1.22	0.4288	8.101	1	0.004*	3.389	1.462	7.852
7 Month	0.215	0.3608	0.354	1	0.552	1.239	0.611	2.514

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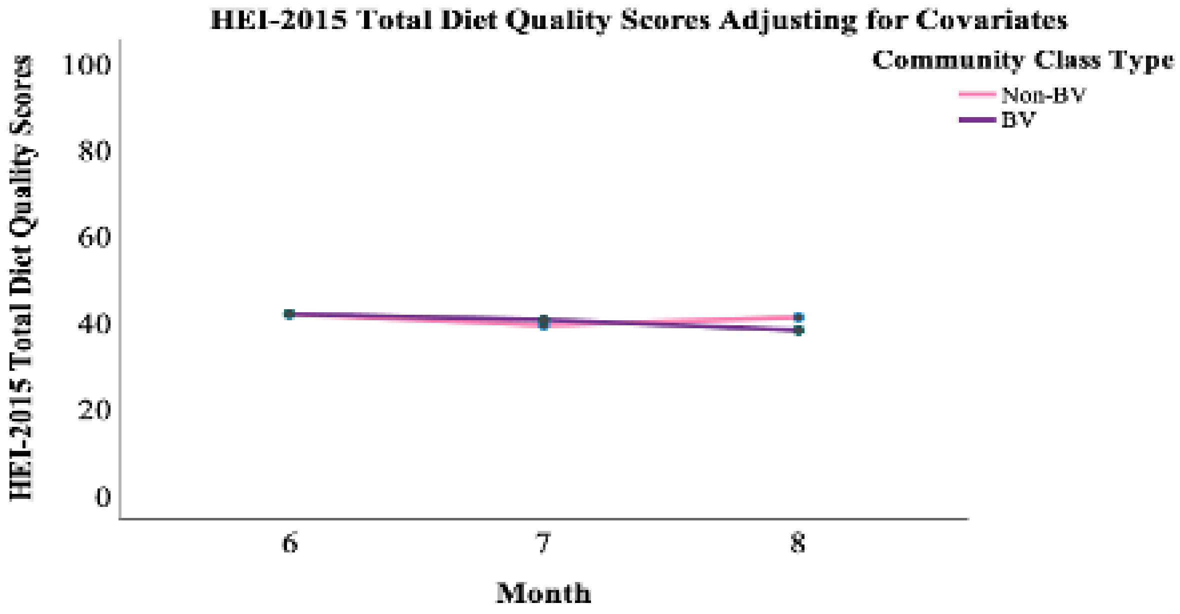
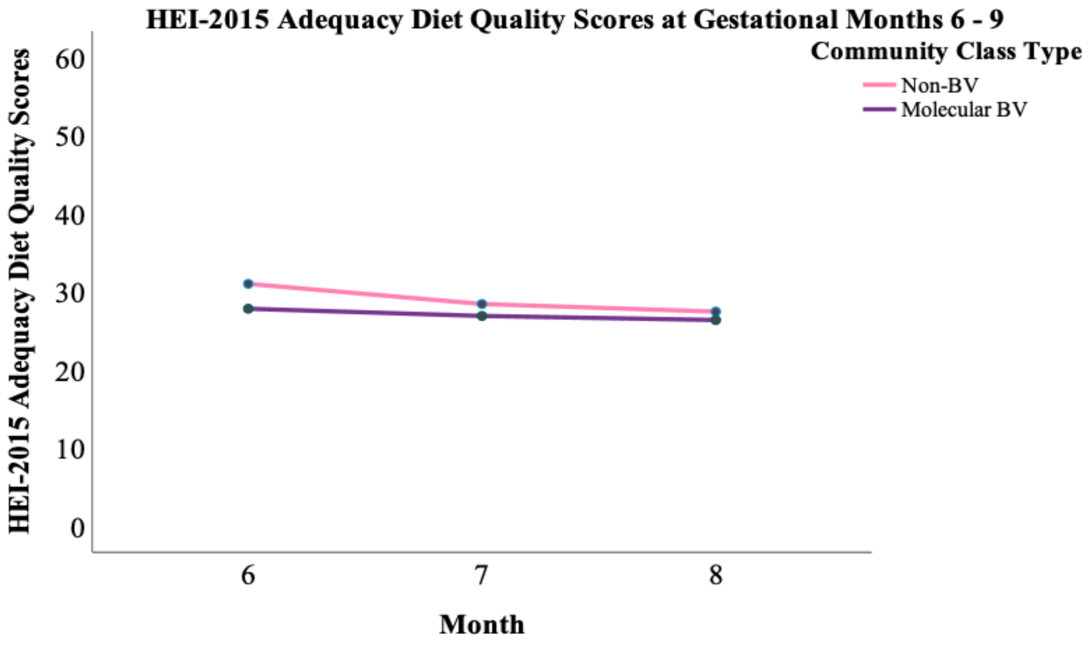
METHODS

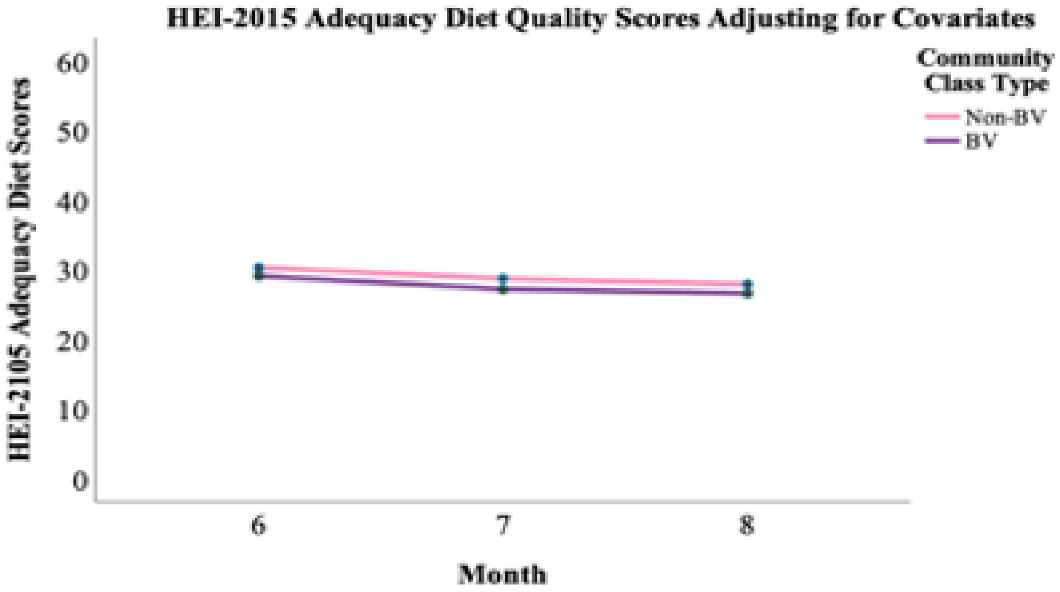
HEI-2015 Total Diet Scores



METHODS

HEI-2015 Adequacy Diet Scores





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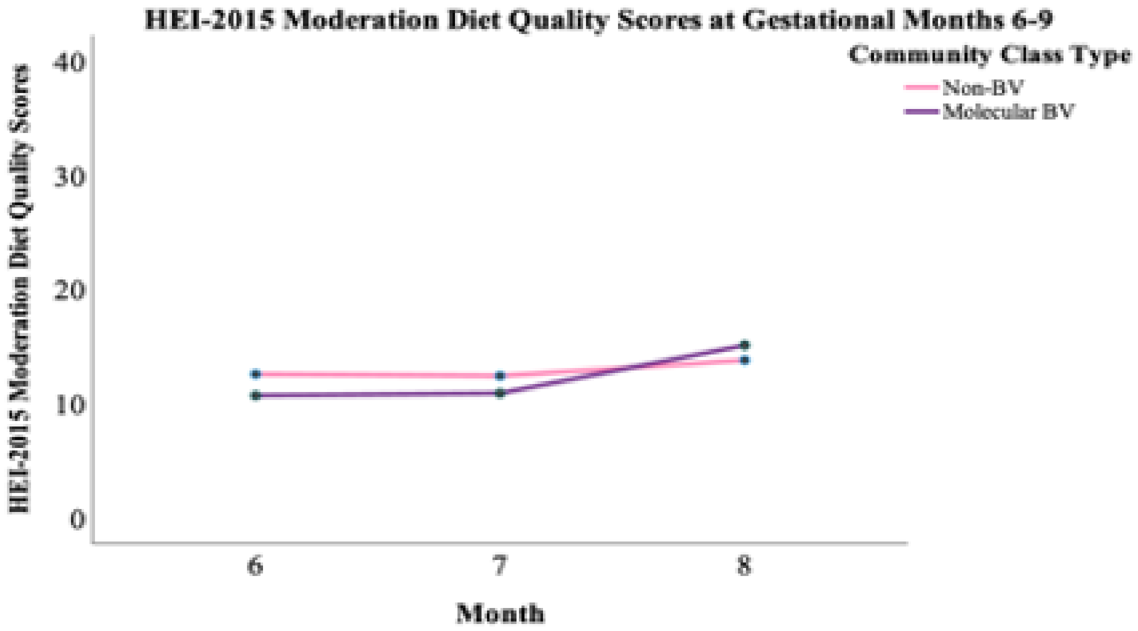
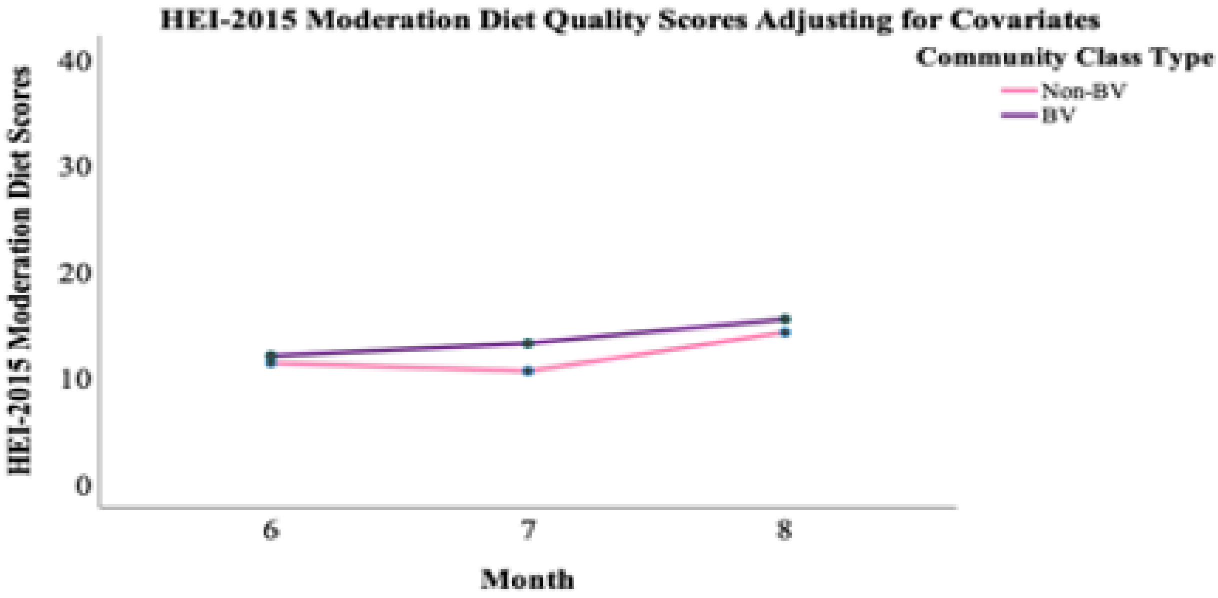
METHODS

HEI-2015 Moderation Diet Scores





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METHODS

Assumptions

- Diet influences the composition of the gut microbiota that, in turn, shapes the composition of vaginal microbiota either systemically or proximally by way of the perineum
- Diet quality is related to diet scores

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Military Implications

- Majority of women report experiencing vaginal symptoms in austere environments
- Symptoms interfere with duty
- BV is a significant predictor for repeat chlamydia infections

Practice Implications

- Treatment of BV needs a systemic approach
- Modifiable factors
- Younger women at greater risk

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Nursing Implications

- Nursing education linking microbiome to health outcomes are lacking

Research Implications

- Explore the association between obesity and molecular BV
- Demographic characteristics associated with molecular BV

METHODS

Limitations

- Underpowered
- Assumptions may not be true
- Generalizability of findings
- Self selected photos
- Self-collected vaginal swabs
- Could not isolate for pre- and pro-biotic foods
- Inability to control for other confounding variables


https://taskandpurpose.com/thelongmarch/us-military-support-women/

METHODS

Strengths

- First known longitudinal study of the influence of diet on molecular BV
- Leveraged data from $5M NINR funded project
- Expands on findings from the parent project


https://www.todaysmilitary.com/joining-eligibility/enlisting-military

Thank you

Questions?

https://www.shfpact.org.au/development-training/category/61-training-for-general-community

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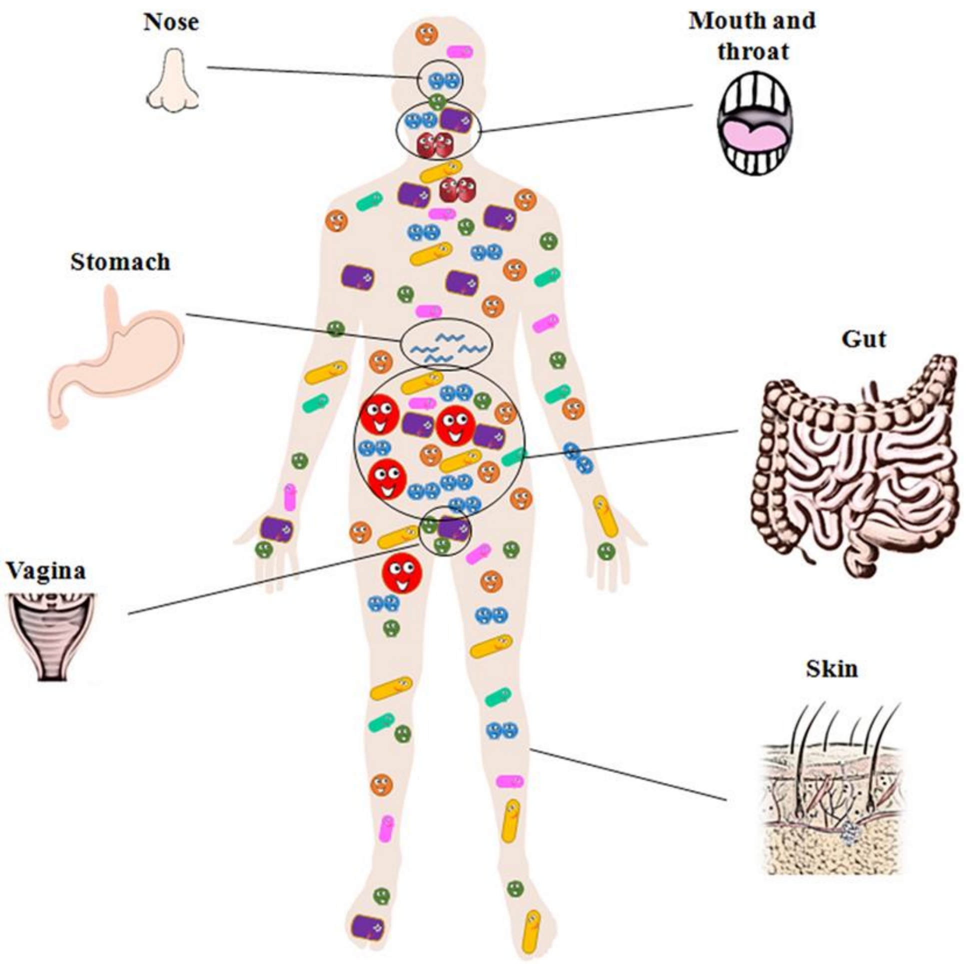
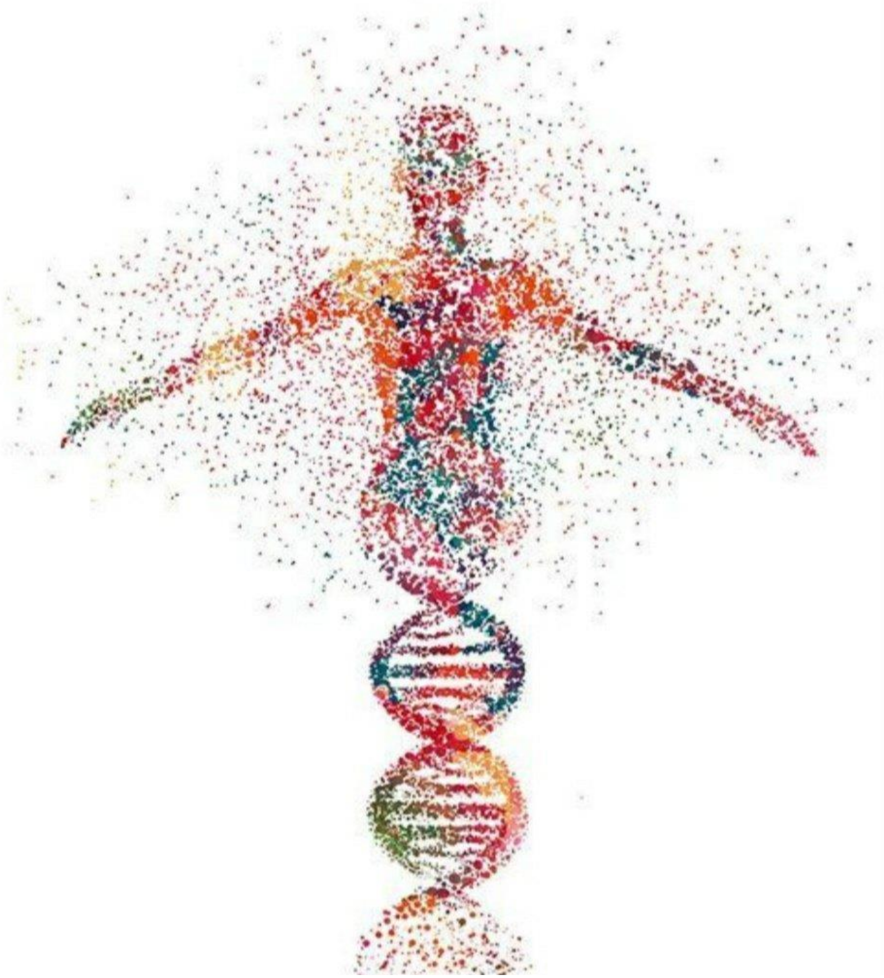
BACKSLIDES

MY JOURNEY





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METHODS

Significance

Understanding the role diet plays in shaping the vaginal microbiota is critical because diet is readily modifiable and may be leveraged as an alternate or adjunct therapy in the treatment of BV toward improving women's health outcomes

https://www.researchgate.net/figure/The-vaginal-environment-during-alternative-states-of-eubiosis-and-BV-A-During_fig1_278731618

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METHODS

Sample Characteristics

$n = 55$	Range	$\bar{x}$ (*SD*)
Age	18 - 34	25.6 (4.9)
Weeks' gestation at Delivery	34 - 41	38.6 (1.5)
Body Mass Index	17.9 - 60	28.7 (8.4)

		f	%
Obesity	BMI ≥ 30	22	40
	BMI < 30	33	60
Race	African American	39	70.9
	Non-African American	16	29.1
Education	University degree	20	36.4
	Non-university degree	34	63.6
Household Income	≥ 75K	11	20
	< 75K	42	76.4
	Missing	2	3.6
Employment Status	Unemployed	15	27.3
	Employed/Student	40	72.7
Marital Status	Single	30	54.5
	Married/with partner	25	45.5

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METHODS

Tests of Associations

Characteristic		Non-BV f (%)	Molecular BV f (%)	p
Single	Yes	13 (43.3%)	17 (56.7%)	0.033*
	No	18 (72%)	7 (28%)	
African American	Yes	19 (48.7%)	20 (51.3%)	0.074
	No	12 (75%)	4 (25%)	
Income ≥ $75K	Yes	10 (90.9%)	1 (9.1%)	0.015*
	No	20 (47.6%)	22 (52.4%)	
Unemployed	Yes	9 (60%)	6 (40%)	0.739
	No	22 (55%)	18 (45%)	
University Degree	Yes	15 (75%)	5 (25%)	0.035*
	No	16 (45.7%)	19 (54.3%)	
Obesity	Yes	13 (59.1%)	9 (40.9%)	0.739
	No	18 (54.5%)	15 (45.5%)	

METHODS

Tests of Associations

Characteristic		Non-BV *f* (%)	Molecular BV *f* (%)	*p*
Single	Yes	13 (43.3%)	17 (56.7%)	0.033*
	No	18 (72%)	7 (28%)	
African American	Yes	19 (48.7%)	20 (51.3%)	0.074
	No	12 (75%)	4 (25%)	
Income ≥ $75K	Yes	10 (90.9%)	1 (9.1%)	0.015*
	No	20 (47.6%)	22 (52.4%)	
Unemployed	Yes	9 (60%)	6 (40%)	0.739
	No	22 (55%)	18 (45%)	
University Degree	Yes	15 (75%)	5 (25%)	0.035*
	No	16 (45.7%)	19 (54.3%)	
Obesity	Yes	13 (59.1%)	9 (40.9%)	0.739
	No	18 (54.5%)	15 (45.5%)	

METHODS

Tests of Associations

$\bar{x}$ (*SD*)	Non-BV *f* (%) *n* = 31	Molecular BV *f* (%) *n* = 24	*p*
Age	27.2 (5)	23.4 (3.39)	0.003*
Weeks' gestation at delivery	39 (1.3)	38 (1.7)	0.031*
Overall HEI 2015 Total Score	41.6 (10.6)	38.1 (8.1)	0.183
Overall HEI 2015 Adequacy Score	28 (7.5)	25.9 (5.5)	0.263
Overall HEI 2015 Moderation Score	13.7 (4.8)	13 (4.1)	0.559

METHODS

Univariate Analysis

n = 55	ß	*SE*	Wald	*df*	*p*	OR	95% CI	
							Lower	Upper
Total scores	-0.041	0.031	1.758	1	0.185	0.96	0.904	1.02
Adequacy scores	-0.048	0.042	1.269	1	0.26	0.953	0.877	1.036
Moderation scores	-0.037	0.063	0.353	1	0.552	0.963	0.852	1.09
African American	1.15	0.66	3.033	1	0.082	3.158	0.866	11.519
Obesity	-0.185	0.557	0.111	1	0.739	0.831	0.279	2.475
Unemployment	0.205	0.615	0.111	1	0.739	1.227	0.367	4.1
Single	1.213	0.578	4.401	1	0.036*	3.363	1.083	10.441
Income > $75K	-2.398	1.093	4.81	1	0.028*	0.091	0.011	0.775
University degree	-1.501	0.667	5.062	1	0.024*	0.223	0.06	0.824
age	-0.18	0.065	7.615	1	0.006*	0.835	0.734	0.949
Gestational week at delivery	-0.419	0.204	4.239	1	0.04*	0.658	0.441	0.98

Aim 1a, Model 2

Table 8. Aim 1a, Model 2.

n = 53	ß	*SE*	Wald	*df*	*p*	OR	95% CI Lower	95% CI Upper
Total diet quality	-0.017	0.052	0.101	1	0.751	0.984	0.888	1.09
African American	-1.409	1.465	0.925	1	0.336	0.244	0.014	4.315
Single	0.883	0.901	0.96	1	0.327	2.419	0.413	14.148
Income > 75K	-2.449	1.434	2.919	1	0.088	0.086	0.005	1.434
University degree	0.73	1.161	0.396	1	0.529	2.076	0.213	20.222
Age	-0.182	0.093	3.782	1	0.052	0.834	0.695	1.001
Gestation	-0.659	0.285	5.358	1	0.021*	0.517	0.296	0.904
Forward Stepwise								
Age	-0.187	0.068	7.467	1	0.006*	0.83	0.726	0.949
Gestation at Del	-0.506	0.236	4.594	1	0.032*	0.603	0.379	0.958
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