Portion Size Effect for Children at High and Low Familial Risk for Obesity (Food and Brain Study)

Contents

1 Demographics

Table 1: Demographics

Characteristic	Risk Groups		Overall
	Low Risk, N = 50	**High Risk**, N = 36	**N = 86**
Sex			
Male	29 (58%)	16 (44%)	45 (52%)
Female	21 (42%)	20 (56%)	41 (48%)
Age, yr	7.8 (0.7)	7.7 (0.5)	7.8 (0.6)
Ethnicity			
Not Hispanic/Lantinx	50 (100%)	36 (100%)	86 (100%)
Race			
0	47 (94%)	36 (100%)	83 (97%)
2	3 (6.0%)	0 (0%)	3 (3.5%)
Income			
< $51,000	4 (8.2%)	7 (21%)	11 (13%)
>$100,000	23 (47%)	7 (21%)	30 (36%)
$51,000 - $100,000	22 (45%)	20 (59%)	42 (51%)
Unknown	1	2	3
BMI %tile	41.2 (24.4)	56.1 (24.3)	47.4 (25.3)
Mother's Education			
> Bachelor Degree	21 (43%)	5 (14%)	26 (31%)
AA/Technical Degree	3 (6.1%)	6 (17%)	9 (11%)
Bachelor Degree	22 (45%)	19 (53%)	41 (48%)
High School/GED	3 (6.1%)	6 (17%)	9 (11%)
Unknown	1	0	1
Father's Education			
> Bachelor Degree	27 (54%)	3 (9.4%)	30 (37%)
AA/Technical Degree	3 (6.0%)	11 (34%)	14 (17%)
Bachelor Degree	14 (28%)	12 (38%)	26 (32%)
High School/GED	6 (12%)	5 (16%)	11 (13%)
Other/NA	0 (0%)	1 (3.1%)	1 (1.2%)
Unknown	0	4	4

[1] n (%); Mean (SD)

Age - t-test

```
    Welch Two Sample t-test

data:  age_yr by risk_status_mom
t = 0.50681, df = 82.343, p-value = 0.6136
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
 -0.1939215  0.3265215
sample estimates:
 mean in group Low Risk mean in group High Risk
                 7.8138                  7.7475
```

BMI Percentile - t-test

```
    Welch Two Sample t-test

data:  bmi_percentile by risk_status_mom
t = -2.8105, df = 75.711, p-value = 0.006292
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
 -25.551839  -4.356339
sample estimates:
 mean in group Low Risk mean in group High Risk
               41.15980                56.11389

 Low Risk High Risk
 24.38858  24.30838
```

Sex - χ^2

```
    Pearson's Chi-squared test with Yates' continuity correction

data:  r01_intake$sex and r01_intake$risk_status_mom
X-squared = 1.0462, df = 1, p-value = 0.3064
```

Income - χ^2

```
    Pearson's Chi-squared test

data:  r01_intake$income and r01_intake$risk_status_mom
X-squared = 6.9633, df = 2, p-value = 0.03076
```

Mom Education - Fisher test

```
    Fisher's Exact Test for Count Data

data:  r01_intake$mom_ed and r01_intake$risk_status_mom
p-value = 0.01375
alternative hypothesis: two.sided
```

2 Meal Liking

Table 2: Regression Table: Portion Size for Liking

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	3.411	0.795	83.215	4.290	0.000
preFF	-0.002	0.001	307.463	-2.297	0.022
bmi	0.023	0.051	81.966	0.454	0.651
sexFemale	0.123	0.127	81.610	0.964	0.338
meal_order	0.018	0.014	254.666	1.275	0.203
risk_status_momHigh Risk	0.025	0.135	82.091	0.186	0.853
ps_prop	0.023	0.044	254.696	0.520	0.603

3 Portion Size Effect

Note - Portion Size was coded in ps_prop as the proportion increase in amount served: Portion Size 1 = 0, Portion Size 2 = 0.33, Portion Size 3 = 0.66, and Portion Size 4 = 0.99. This means that a 1 unit increase is equal to a 100% increase in amount served – the difference between Portion Size 1 and Portion Size 4.

3.1 Total Intake

Table 3: Intake by Portion Size

	Risk Groups		**Overall**
Characteristic	**Low Risk**, N = 50	**High Risk**, N = 36	**N = 86**
ps1_total_g	406.6 (170.2)	408.9 (165.6)	407.5 (167.3)
ps1_total_kcal	469.7 (201.2)	493.7 (197.2)	479.8 (198.7)
ps1_avg_vas	3.8 (0.6)	3.9 (0.6)	3.8 (0.6)
ps2_total_g	468.4 (178.6)	402.7 (173.8)	440.9 (178.6)
ps2_total_kcal	540.1 (221.4)	508.7 (273.5)	526.9 (243.5)
ps2_avg_vas	3.8 (0.6)	3.8 (0.7)	3.8 (0.6)
ps3_total_g	484.8 (191.5)	432.7 (189.3)	463.0 (191.2)
ps3_total_kcal	581.9 (239.1)	530.2 (287.2)	560.3 (260.0)
ps3_avg_vas	3.8 (0.6)	3.8 (0.7)	3.8 (0.6)
ps4_total_g	496.4 (192.8)	425.3 (168.4)	466.6 (185.4)
ps4_total_kcal	616.7 (249.1)	568.9 (253.5)	596.7 (250.6)
ps4_avg_vas	3.8 (0.7)	3.9 (0.6)	3.9 (0.6)

[1] Mean (SD)

3.2 Intake by Food

Table 4: High Risk: Intake by Portion Size

Characteristic	**PS-1**, N = 36	**PS-2**, N = 36	**PS-3**, N = 36	**PS-4**, N = 36
chnug_grams	64.8 (45.8)	73.6 (80.0)	77.1 (62.2)	85.6 (65.3)
chnug_kcal	162.1 (114.6)	184.0 (200.1)	192.7 (155.6)	214.1 (163.2)
mac_grams	133.0 (106.3)	132.8 (112.4)	136.1 (132.4)	142.5 (125.3)
mac_kcal	226.1 (180.8)	225.7 (191.1)	231.4 (225.1)	242.2 (213.1)
grape_grams	84.1 (65.6)	93.4 (76.2)	96.3 (88.7)	104.5 (91.4)
grape_kcal	58.4 (45.6)	64.9 (53.0)	66.9 (61.7)	72.6 (63.5)
broc_grams	32.7 (53.7)	23.1 (29.3)	24.6 (38.1)	23.9 (37.6)
broc_kcal	32.8 (53.9)	23.1 (29.4)	24.7 (38.2)	24.0 (37.7)
mac_vas	4.2 (0.8)	3.9 (1.1)	3.9 (1.1)	4.0 (1.0)
chnug_vas	4.3 (1.0)	4.2 (1.0)	4.1 (1.2)	4.3 (0.9)
broc_vas	2.9 (1.7)	2.8 (1.5)	2.8 (1.5)	2.9 (1.6)
grape_vas	4.2 (0.8)	4.4 (0.9)	4.4 (0.9)	4.4 (0.8)

[1] Mean (SD)

Table 5: Low Risk: Intake by Portion Size

Characteristic	**PS-1**, N = 50	**PS-2**, N = 50	**PS-3**, N = 50	**PS-4**, N = 50
chnug_grams	68.1 (42.0)	82.1 (52.5)	91.4 (59.9)	104.0 (67.9)
chnug_kcal	170.3 (104.9)	205.2 (131.3)	228.5 (149.8)	260.0 (169.7)
mac_grams	115.2 (91.8)	129.7 (103.8)	139.8 (116.9)	133.3 (108.7)
mac_kcal	195.8 (156.1)	220.5 (176.5)	237.7 (198.7)	226.6 (184.7)
grape_grams	95.9 (82.5)	105.5 (87.4)	105.8 (93.5)	117.9 (105.2)
grape_kcal	66.7 (57.3)	73.3 (60.7)	73.5 (65.0)	81.9 (73.1)
broc_grams	27.2 (41.3)	29.9 (55.2)	30.0 (55.4)	36.2 (66.6)
broc_kcal	27.3 (41.4)	30.0 (55.4)	30.1 (55.6)	36.3 (66.8)
mac_vas	3.6 (1.0)	3.7 (1.0)	3.8 (1.1)	3.7 (1.0)
chnug_vas	4.1 (0.9)	4.3 (0.7)	4.2 (0.7)	4.2 (0.9)
broc_vas	3.2 (1.2)	3.1 (1.1)	3.2 (1.2)	3.3 (1.3)
grape_vas	4.2 (0.9)	4.2 (1.0)	4.1 (1.1)	4.1 (1.0)

[1] Mean (SD)

3.3 Base Model - Test Quadratic Effect

All intake models are currently controlling for: pre-meal Freddy Fullness, child BMI, average VAS liking rating for the meal foods conducted at each meal, and meal order.

3.3.1 Grams

```
Data: intake_long
Models:
grams_ps_mod: grams ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + ps_prop + (1 | sub)
grams_psquad_mod: grams ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + ps_prop + ps_prop2 + (1 |
                 npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
grams_ps_mod       10 4281.8 4320.2 -2130.9   4261.8
grams_psquad_mod   11 4280.1 4322.4 -2129.1   4258.1 3.6923  1    0.05467 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Table 6: Regression Table: Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	72.715	297.250	84.717	0.245	0.807
preFF	-0.312	0.222	317.231	-1.406	0.161
bmi	22.010	13.212	80.329	1.666	0.100
sexFemale	-24.561	34.483	80.444	-0.712	0.478
age_yr	-12.476	28.163	79.958	-0.443	0.659
avg_vas	33.798	15.602	334.518	2.166	0.031
meal_order	-5.471	4.208	253.376	-1.300	0.195
ps_prop	57.987	12.729	252.805	4.555	0.000

3.3.2 kcal

```
Data: intake_long
Models:
kcal_ps_mod: kcal ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + ps_prop + (1 | sub)
```

```
kcal_psquad_mod: kcal ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + ps_prop + ps_prop2 + (1 | su
                 npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
kcal_ps_mod        10 4512.9 4551.3 -2246.5   4492.9
kcal_psquad_mod    11 4514.6 4556.8 -2246.3   4492.6 0.3154  1     0.5744
```

Table 7: Regression Table: Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	26.552	369.168	85.572	0.072	0.943
preFF	-0.864	0.315	329.457	-2.746	0.006
bmi	37.832	16.333	80.601	2.316	0.023
sexFemale	-38.812	42.633	80.713	-0.910	0.365
age_yr	-39.623	34.801	80.135	-1.139	0.258
avg_vas	54.038	21.633	319.016	2.498	0.013
meal_order	4.693	6.135	253.859	0.765	0.445
ps_prop	114.643	18.564	253.225	6.176	0.000

3.4 Risk Status x Portion Size (linear effect)

3.4.1 Grams

Adding an interaction between Risk Status and Portion Size significantly improved model fit.

```
Data: intake_long
Models:
grams_ps_mod: grams ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + ps_prop + (1 | sub)
grams_psxrisk_mod: grams ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + risk_status_mom * ps_prop
                  npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
grams_ps_mod        10 4281.8 4320.2 -2130.9   4261.8
grams_psxrisk_mod   12 4275.9 4322.0 -2125.9   4251.9 9.9351  2    0.00696 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Table 8: Regression Table: Risk x Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	3.209	294.658	84.122	0.011	0.991
preFF	-0.319	0.220	314.877	-1.447	0.149
bmi	29.670	13.652	79.937	2.173	0.033
sexFemale	-15.931	34.276	79.830	-0.465	0.643
age_yr	-17.315	27.859	79.303	-0.622	0.536
avg_vas	33.103	15.429	332.101	2.145	0.033
meal_order	-5.303	4.166	252.703	-1.273	0.204
risk_status_momHigh Risk	-36.430	38.424	100.723	-0.948	0.345
ps_prop	84.602	16.521	252.239	5.121	0.000
risk_status_momHigh Risk:ps_prop	-63.490	25.527	252.406	-2.487	0.014

Figure 1: Grams Consumed: Risk Status x Portion Size

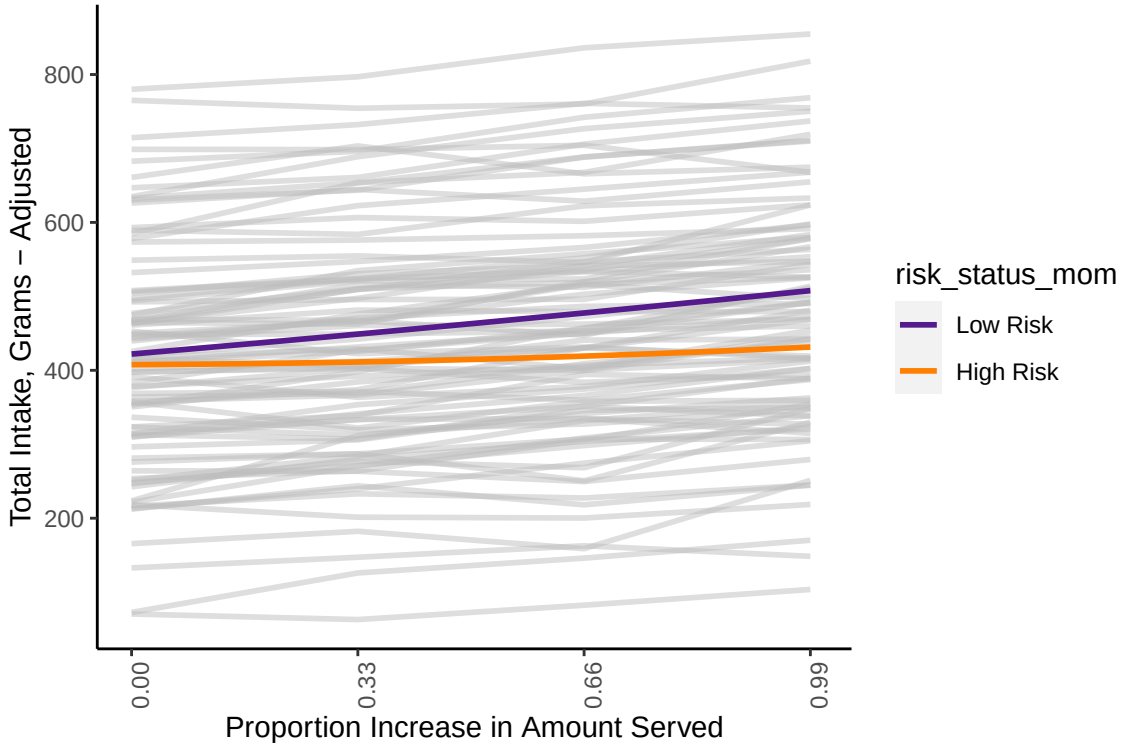

Table 9: Estimated Simple Slopes: Risk Status x Linear Portion Size for Grams

risk_status_mom	ps_prop.trend	SE	df	t.ratio	p.value
Low Risk	84.602	16.521	253.348	5.121	0.000
High Risk	21.112	19.470	253.393	1.084	0.279

Table 10: Estimated Marginal Means: Risk Status x Portion Size for Grams

	Low Risk	High Risk
0	421.961	406.913
0.33	449.015	413.557
0.66	477.460	416.879
0.99	507.758	432.191

```
    Welch Two Sample t-test

data:  grams_pred_rxps by risk_status_mom
t = 0.45429, df = 78.402, p-value = 0.6509
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
 -50.89059  80.98552
sample estimates:
```

```
 mean in group Low Risk mean in group High Risk
              421.9606                406.9131


    Welch Two Sample t-test

data:  grams_pred_rxps by risk_status_mom
t = 1.0657, df = 77.364, p-value = 0.2899
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
 -30.78792 101.70268
sample estimates:
 mean in group Low Risk mean in group High Risk
              449.0146                413.5572


    Welch Two Sample t-test

data:  grams_pred_rxps by risk_status_mom
t = 1.8071, df = 76.932, p-value = 0.07466
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
  -6.174775 127.336905
sample estimates:
 mean in group Low Risk mean in group High Risk
              477.4600                416.8789


    Welch Two Sample t-test

data:  grams_pred_rxps by risk_status_mom
t = 2.302, df = 79.297, p-value = 0.02396
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
  10.23102 140.90340
sample estimates:
 mean in group Low Risk mean in group High Risk
              507.7582                432.1910
```

3.4.1.1 No Plate Cleaners

Table 11: Regression Table: No Plate Cleaners - Risk x Portion Size for grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-16.921	287.502	81.941	-0.059	0.953
preFF	-0.298	0.217	308.094	-1.376	0.170
bmi	23.347	13.569	77.668	1.721	0.089
sexFemale	-3.806	33.656	77.695	-0.113	0.910
age_yr	-3.000	27.646	77.139	-0.109	0.914
avg_vas	31.643	15.293	322.753	2.069	0.039
meal_order	-6.076	4.147	246.535	-1.465	0.144
risk_status_momHigh Risk	-34.759	38.040	98.225	-0.914	0.363
ps_prop	87.304	16.418	246.210	5.317	0.000
risk_status_momHigh Risk:ps_prop	-61.249	25.436	246.397	-2.408	0.017

3.4.2 kcal

Adding an interaction between Risk Status and Portion Size (linear effect) significantly improved model fit.

```
Data: intake_long
Models:
kcal_ps_mod: kcal ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + ps_prop + (1 | sub)
kcal_psxrisk_mod: kcal ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + risk_status_mom * ps_prop +
                 npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
kcal_ps_mod        10 4512.9 4551.3 -2246.5   4492.9
kcal_psxrisk_mod   12 4511.1 4557.2 -2243.5   4487.1 5.8496  2    0.05368 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Table 12: Regression Table: Risk x Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-34.043	370.402	84.942	-0.092	0.927
preFF	-0.871	0.315	326.491	-2.768	0.006
bmi	44.081	17.089	80.262	2.579	0.012
sexFemale	-31.735	42.902	80.096	-0.740	0.462
age_yr	-43.575	34.851	79.467	-1.250	0.215
avg_vas	53.103	21.528	316.980	2.467	0.014
meal_order	4.897	6.097	253.145	0.803	0.423
risk_status_momHigh Risk	-17.341	49.069	108.962	-0.353	0.724
ps_prop	146.782	24.185	252.625	6.069	0.000
risk_status_momHigh Risk:ps_prop	-76.656	37.367	252.837	-2.051	0.041

Figure 2: kCal Consumed: Risk Status x Portion Size

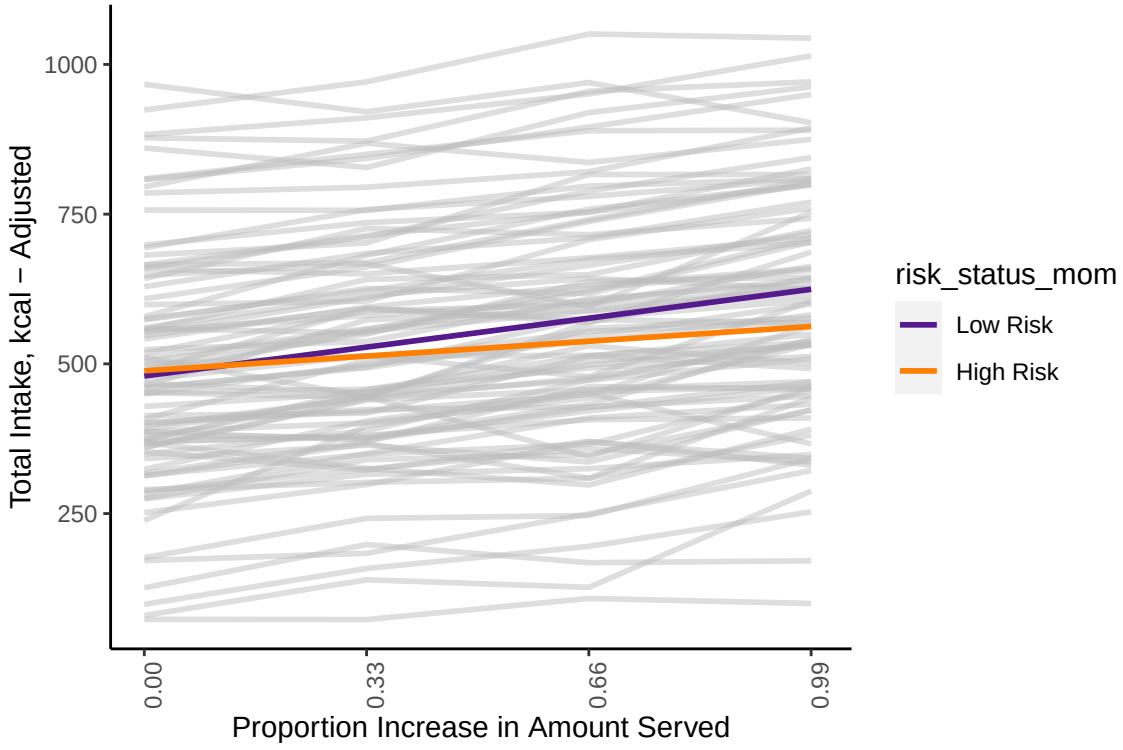

Table 13: Estimated Simple Slopes: Risk Status x Linear Portion Size for kcal

risk_status_mom	ps_prop.trend	SE	df	t.ratio	p.value
Low Risk	146.782	24.185	253.434	6.069	0.000
High Risk	70.126	28.502	253.518	2.460	0.015

Table 14: Estimated Marginal Means: Risk Status x Portion Size for kcal

	Low Risk	High Risk
0	479.364	490.535
0.33	527.406	513.533
0.66	578.289	530.145
0.99	623.321	567.373

```
    Welch Two Sample t-test

data:  kcal_pred_rxps by risk_status_mom
t = -0.25748, df = 72.259, p-value = 0.7975
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
 -97.65351  75.31196
sample estimates:
```

```
 mean in group Low Risk mean in group High Risk
              479.3638                490.5345


    Welch Two Sample t-test

data:  kcal_pred_rxps by risk_status_mom
t = 0.32773, df = 73.016, p-value = 0.7441
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
 -70.49155  98.23781
sample estimates:
 mean in group Low Risk mean in group High Risk
              527.4062                513.5331


    Welch Two Sample t-test

data:  kcal_pred_rxps by risk_status_mom
t = 1.0797, df = 70.21, p-value = 0.284
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
 -40.77944 137.06636
sample estimates:
 mean in group Low Risk mean in group High Risk
              578.2888                530.1453


    Welch Two Sample t-test

data:  kcal_pred_rxps by risk_status_mom
t = 1.3003, df = 74.735, p-value = 0.1975
alternative hypothesis: true difference in means between group Low Risk and group High Risk is not equal
95 percent confidence interval:
 -29.76802 141.66224
sample estimates:
 mean in group Low Risk mean in group High Risk
              623.3205                567.3734
```

3.4.2.1 No Plate Cleaners

Table 15: Regression Table: No Plate Cleaners - Risk x Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-53.220	363.961	82.793	-0.146	0.884
preFF	-0.862	0.310	318.865	-2.778	0.006
bmi	37.005	17.106	78.042	2.163	0.034
sexFemale	-18.035	42.431	78.048	-0.425	0.672
age_yr	-27.402	34.833	77.387	-0.787	0.434
avg_vas	51.263	21.356	306.557	2.400	0.017
meal_order	2.576	6.071	247.050	0.424	0.672
risk_status_momHigh Risk	-12.421	48.887	106.032	-0.254	0.800
ps_prop	150.572	24.037	246.690	6.264	0.000
risk_status_momHigh Risk:ps_prop	-80.963	37.235	246.929	-2.174	0.031

3.5 Exploratory Analyses: Effect of BMI

After controlling for age and sex, there was a difference in BMI by Risk Status such that the High Risk group had BMI that was 0.73 higher on average.

Table 16: Regression Table: BMI and Risk Status

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	14.008	1.757	7.972	0.000
age_yr	0.184	0.225	0.816	0.417
sexFemale	0.007	0.277	0.024	0.981
risk_status_momHigh Risk	0.794	0.280	2.841	0.006

Since BMI was associated with both total grams and kcal intake, I tested if adding a BMI x Poriton Size interaction improved the model.

3.5.1 Grams

Adding a BMI x Portion Size interaction did not improve the model for grams

```
Data: intake_long
Models:
grams_psxrisk_mod: grams ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + risk_status_mom * ps_prop
grams_psxrisk_psxbmi_mod: grams ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + risk_status_mom *
                          npar    AIC    BIC  logLik deviance  Chisq Df
grams_psxrisk_mod           12 4275.9 4322.0 -2125.9   4251.9
grams_psxrisk_psxbmi_mod    13 4277.8 4327.7 -2125.9   4251.8 0.0774  1
                          Pr(>Chisq)
grams_psxrisk_mod
grams_psxrisk_psxbmi_mod     0.7809
```

3.5.2 kcal

Adding a BMI x Portion Size interaction did not improve the model for kcal.

Data: intake_long Models: kcal_psxrisk_mod: kcal ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + risk_status_mom * ps_prop + (1 | sub) kcal_psxrisk_psxbmi_mod: kcal ~ preFF + bmi + sex + age_yr + avg_vas + meal_order + risk_status_mom * ps_prop + bmi * ps_prop + (1 | sub) npar AIC BIC logLik deviance Chisq Df kcal_psxrisk_mod 12 4511.1 4557.2 -2243.5 4487.1
kcal_psxrisk_psxbmi_mod 13 4511.4 4561.4 -2242.7 4485.4 1.6197 1 Pr(>Chisq) kcal_psxrisk_mod
kcal_psxrisk_psxbmi_mod 0.2031

4 Exploratory Analyses: Individual Foods

4.1 Chicken Nuggets

4.1.1 Grams

4.1.1.1 Base Model The difference between models with and without quadratic effect was not significant indicating the added model parameters/complexity did not improve model fit. Should only model chicken nugget gram intake with linear effect.

```
Data: intake_long
Models:
grams_chnug_ps_mod: chnug_grams ~ preFF + bmi + sex + age_yr + chnug_vas + meal_order + ps_prop + (1 | s
grams_chnug_ps_psquad_mod: chnug_grams ~ preFF + bmi + sex + age_yr + chnug_vas + meal_order + ps_prop +
                          npar    AIC    BIC  logLik deviance  Chisq Df
grams_chnug_ps_mod          10 3598.6 3637.1 -1789.3   3578.6
grams_chnug_ps_psquad_mod   11 3600.6 3642.9 -1789.3   3578.6 0.0339  1
                          Pr(>Chisq)
grams_chnug_ps_mod
grams_chnug_ps_psquad_mod     0.8538
```

Table 17: Chicken Nugget - Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-50.987	76.080	77.412	-0.670	0.505
preFF	-0.238	0.084	330.971	-2.845	0.005
bmi	4.859	3.348	71.927	1.451	0.151
sexFemale	-17.359	8.715	71.558	-1.992	0.050
age_yr	-4.050	7.150	71.937	-0.566	0.573
chnug_vas	20.478	3.683	278.107	5.560	0.000
meal_order	1.689	1.772	245.006	0.953	0.341
ps_prop	28.364	5.356	243.799	5.296	0.000

Table 18: Chicken Nugget - Risk x Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-67.416	76.061	76.866	-0.886	0.378
preFF	-0.232	0.084	329.868	-2.758	0.006
bmi	6.466	3.489	71.499	1.853	0.068
sexFemale	-15.537	8.734	70.890	-1.779	0.080
age_yr	-5.057	7.126	71.077	-0.710	0.480
chnug_vas	20.546	3.667	274.224	5.602	0.000
meal_order	1.724	1.768	244.153	0.975	0.330
ps_prop	35.146	7.004	242.978	5.018	0.000
risk_status_momHigh Risk	-6.126	10.727	127.350	-0.571	0.569
ps_prop:risk_status_momHigh Risk	-16.162	10.821	243.352	-1.494	0.137

4.1.1.2 Risk x Portion Size

4.1.2 kcal

4.1.2.1 Base Model The difference between models with and without quadratic effect was not significant indicating the added model parameters/complexity did not improve model fit. Should only model chicken nugget kcal intake with linear effect.

```
Data: intake_long
Models:
kcal_chnug_ps_mod: chnug_kcal ~ preFF + bmi + sex + age_yr + chnug_vas + meal_order + ps_prop + (1 | su
kcal_chnug_ps_psquad_mod: chnug_kcal ~ preFF + bmi + sex + age_yr + chnug_vas + meal_order + ps_prop + p
                         npar    AIC    BIC  logLik deviance  Chisq Df
kcal_chnug_ps_mod          10 4229.1 4267.5 -2104.5   4209.1
kcal_chnug_ps_psquad_mod   11 4231.0 4273.3 -2104.5   4209.0 0.0339  1
                         Pr(>Chisq)
kcal_chnug_ps_mod
kcal_chnug_ps_psquad_mod     0.8538
```

Table 19: Chicken - Nugget Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-127.468	190.200	77.412	-0.670	0.505
preFF	-0.596	0.210	330.971	-2.845	0.005
bmi	12.147	8.371	71.927	1.451	0.151
sexFemale	-43.397	21.788	71.558	-1.992	0.050
age_yr	-10.125	17.875	71.937	-0.566	0.573
chnug_vas	51.195	9.207	278.107	5.560	0.000
meal_order	4.224	4.430	245.006	0.953	0.341
ps_prop	70.909	13.390	243.799	5.296	0.000

Table 20: Chicken - Nugget Risk x Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-168.541	190.152	76.866	-0.886	0.378
preFF	-0.580	0.210	329.868	-2.758	0.006
bmi	16.166	8.723	71.499	1.853	0.068
sexFemale	-38.842	21.835	70.890	-1.779	0.080
age_yr	-12.642	17.814	71.077	-0.710	0.480
chnug_vas	51.365	9.169	274.224	5.602	0.000
meal_order	4.310	4.420	244.153	0.975	0.330
ps_prop	87.864	17.510	242.978	5.018	0.000
risk_status_momHigh Risk	-15.314	26.819	127.350	-0.571	0.569
ps_prop:risk_status_momHigh Risk	-40.406	27.052	243.352	-1.494	0.137

4.1.2.2 Risk x Portion Size

4.2 Mac and Cheese

4.2.1 Grams

4.2.1.1 Base Model The difference between models with and without quadratic effect was not significant indicating the added model parameters/complexity did not improve model fit. Should only model chicken nugget gram intake with linear effect.

```
Data: intake_long
Models:
grams_mac_ps_mod: mac_grams ~ preFF + bmi + sex + age_yr + mac_vas + meal_order + ps_prop + (1 | sub)
grams_mac_ps_psquad_mod: mac_grams ~ preFF + bmi + sex + age_yr + mac_vas + meal_order + ps_prop + ps_p
                        npar    AIC    BIC  logLik deviance  Chisq Df
grams_mac_ps_mod          10 3860.8 3899.2 -1920.4   3840.8
grams_mac_ps_psquad_mod   11 3861.8 3904.0 -1919.9   3839.8 0.9821  1
                        Pr(>Chisq)
grams_mac_ps_mod
grams_mac_ps_psquad_mod     0.3217
```

Table 21: Mac and Cheese - Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	21.422	171.042	78.884	0.125	0.901
preFF	-0.125	0.118	305.237	-1.062	0.289
bmi	14.944	7.740	78.720	1.931	0.057
sexFemale	5.912	20.157	78.298	0.293	0.770
age_yr	-27.791	16.468	77.863	-1.688	0.095
mac_vas	20.739	4.617	324.799	4.492	0.000
meal_order	2.290	2.220	250.228	1.032	0.303
ps_prop	16.113	6.730	250.279	2.394	0.017

Table 22: Mac and Cheese - Risk x Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	8.880	172.881	77.896	0.051	0.959
preFF	-0.123	0.119	302.146	-1.038	0.300
bmi	16.477	8.147	77.619	2.023	0.047
sexFemale	7.644	20.425	77.171	0.374	0.709
age_yr	-28.759	16.610	76.746	-1.731	0.087
mac_vas	20.619	4.654	323.318	4.431	0.000
meal_order	2.302	2.224	249.082	1.035	0.302
ps_prop	18.228	8.845	249.320	2.061	0.040
risk_status_momHigh Risk	-10.902	22.692	94.138	-0.480	0.632
ps_prop:risk_status_momHigh Risk	-5.045	13.728	250.287	-0.367	0.714

4.2.1.2 Risk x Portion Size The interaction between Risk Status and Portion Size was not significant so it was removed from the model.

Table 23: Mac and Cheese - Risk x Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	9.307	172.763	77.971	0.054	0.957
preFF	-0.120	0.118	302.935	-1.016	0.311
bmi	16.471	8.141	77.703	2.023	0.046
sexFemale	7.625	20.412	77.255	0.374	0.710
age_yr	-28.757	16.599	76.831	-1.733	0.087
mac_vas	20.786	4.622	323.874	4.497	0.000
meal_order	2.288	2.220	250.160	1.031	0.304
ps_prop	16.123	6.730	250.208	2.396	0.017
risk_status_momHigh Risk	-13.459	21.582	77.497	-0.624	0.535

4.2.2 kcal

4.2.2.1 Base Model The difference between models with and without quadratic effect was not significant indicating the added model parameters/complexity did not improve model fit. Should only model chicken nugget kcal intake with linear effect.

```
Data: intake_long
Models:
kcal_mac_ps_mod: mac_kcal ~ preFF + bmi + sex + age_yr + mac_vas + meal_order + ps_prop + (1 | sub)
kcal_mac_ps_psquad_mod: mac_kcal ~ preFF + bmi + sex + age_yr + mac_vas + meal_order + ps_prop + ps_pro
                        npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
kcal_mac_ps_mod           10 4225.8 4264.2 -2102.9   4205.8
kcal_mac_ps_psquad_mod    11 4226.9 4269.1 -2102.4   4204.9 0.9821  1     0.3217
```

Table 24: Mac and Cheese - Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	36.417	290.772	78.884	0.125	0.901
preFF	-0.213	0.201	305.237	-1.062	0.289
bmi	25.405	13.157	78.720	1.931	0.057
sexFemale	10.051	34.267	78.298	0.293	0.770
age_yr	-47.245	27.996	77.863	-1.688	0.095
mac_vas	35.257	7.848	324.799	4.492	0.000
meal_order	3.893	3.774	250.228	1.032	0.303
ps_prop	27.393	11.441	250.279	2.394	0.017

Table 25: Mac and Cheese - Risk x Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	15.096	293.898	77.896	0.051	0.959
preFF	-0.210	0.202	302.146	-1.038	0.300
bmi	28.010	13.849	77.619	2.023	0.047
sexFemale	12.995	34.723	77.171	0.374	0.709
age_yr	-48.890	28.237	76.746	-1.731	0.087
mac_vas	35.053	7.911	323.318	4.431	0.000
meal_order	3.914	3.781	249.082	1.035	0.302
ps_prop	30.988	15.037	249.320	2.061	0.040
risk_status_momHigh Risk	-18.533	38.576	94.138	-0.480	0.632
ps_prop:risk_status_momHigh Risk	-8.576	23.338	250.287	-0.367	0.714

4.2.2.2 Risk x Portion Size The interaction between Risk Status and Portion Size was not significant so it was removed from the model.

Table 26: Mac and Cheese - Risk x Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	15.822	293.697	77.971	0.054	0.957
preFF	-0.205	0.201	302.935	-1.016	0.311
bmi	28.001	13.840	77.703	2.023	0.046
sexFemale	12.962	34.700	77.255	0.374	0.710
age_yr	-48.888	28.218	76.831	-1.733	0.087
mac_vas	35.337	7.858	323.874	4.497	0.000
meal_order	3.890	3.774	250.160	1.031	0.304
ps_prop	27.409	11.442	250.208	2.396	0.017
risk_status_momHigh Risk	-22.880	36.690	77.497	-0.624	0.535

4.3 Grapes

4.3.1 Grams

4.3.1.1 Base Model The difference between models with and without quadratic effect was not significant indicating the added model parameters/complexity did not improve model fit. Should only model chicken nugget gram intake with linear effect.

```
Data: intake_long
Models:
grams_grape_ps_mod: grape_grams ~ preFF + bmi + sex + age_yr + grape_vas + meal_order + ps_prop + (1 | s
grams_grape_ps_psquad_mod: grape_grams ~ preFF + bmi + sex + age_yr + grape_vas + meal_order + ps_prop +
                          npar    AIC    BIC  logLik deviance  Chisq Df
grams_grape_ps_mod          10 3738.3 3776.8 -1859.2   3718.3
grams_grape_ps_psquad_mod   11 3740.3 3782.6 -1859.2   3718.3 0.0118  1
                          Pr(>Chisq)
grams_grape_ps_mod
grams_grape_ps_psquad_mod     0.9135
```

Table 27: Grapes - Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	20.153	142.049	78.710	0.142	0.888
preFF	-0.060	0.099	306.254	-0.611	0.542
bmi	-8.601	6.391	77.076	-1.346	0.182
sexFemale	-11.338	16.683	77.253	-0.680	0.499
age_yr	24.125	13.629	76.803	1.770	0.081
grape_vas	9.490	4.166	325.684	2.278	0.023
meal_order	-5.163	1.865	249.176	-2.768	0.006
ps_prop	18.670	5.653	249.170	3.303	0.001

Table 28: Grapes - Risk x Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	15.894	143.806	77.987	0.111	0.912
preFF	-0.061	0.100	302.848	-0.607	0.544
bmi	-8.197	6.740	76.311	-1.216	0.228
sexFemale	-10.909	16.924	76.265	-0.645	0.521
age_yr	23.865	13.763	75.854	1.734	0.087
grape_vas	9.610	4.202	323.921	2.287	0.023
meal_order	-5.156	1.869	248.168	-2.759	0.006
ps_prop	20.080	7.442	248.544	2.698	0.007
risk_status_momHigh Risk	-1.948	18.793	93.072	-0.104	0.918
ps_prop:risk_status_momHigh Risk	-3.364	11.537	249.189	-0.292	0.771

4.3.1.2 Risk x Portion Size The interaction between Risk Status and Portion Size was not significant so it was removed from the model.

Table 29: Grapes - Risk x Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	17.062	143.874	77.957	0.119	0.906
preFF	-0.059	0.099	303.746	-0.591	0.555
bmi	-8.187	6.745	76.370	-1.214	0.229
sexFemale	-10.864	16.937	76.321	-0.641	0.523
age_yr	23.865	13.774	75.917	1.733	0.087
grape_vas	9.445	4.173	324.421	2.263	0.024
meal_order	-5.164	1.865	249.233	-2.769	0.006
ps_prop	18.673	5.652	249.226	3.304	0.001
risk_status_momHigh Risk	-3.609	17.919	76.694	-0.201	0.841

4.3.2 kcal

4.3.2.1 Base Model The difference between models with and without quadratic effect was not significant indicating the added model parameters/complexity did not improve model fit. Should only model chicken nugget kcal intake with linear effect.

```
Data: intake_long
Models:
kcal_grape_ps_mod: grape_kcal ~ preFF + bmi + sex + age_yr + grape_vas + meal_order + ps_prop + (1 | su
kcal_grape_ps_psquad_mod: grape_kcal ~ preFF + bmi + sex + age_yr + grape_vas + meal_order + ps_prop + p
                         npar  AIC    BIC logLik deviance  Chisq Df Pr(>Chisq)
kcal_grape_ps_mod          10 3488 3526.4  -1734     3468
kcal_grape_ps_psquad_mod   11 3490 3532.3  -1734     3468 0.0118  1     0.9135
```

Table 30: Grapes - Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	14.006	98.724	78.710	0.142	0.888
preFF	-0.042	0.069	306.254	-0.611	0.542
bmi	-5.978	4.442	77.076	-1.346	0.182
sexFemale	-7.880	11.595	77.253	-0.680	0.499
age_yr	16.767	9.472	76.803	1.770	0.081
grape_vas	6.596	2.895	325.684	2.278	0.023
meal_order	-3.589	1.296	249.176	-2.768	0.006
ps_prop	12.976	3.929	249.170	3.303	0.001

Table 31: Grapes - Risk x Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	11.047	99.945	77.987	0.111	0.912
preFF	-0.042	0.069	302.848	-0.607	0.544
bmi	-5.697	4.684	76.311	-1.216	0.228
sexFemale	-7.582	11.762	76.265	-0.645	0.521
age_yr	16.586	9.565	75.854	1.734	0.087
grape_vas	6.679	2.921	323.921	2.287	0.023
meal_order	-3.584	1.299	248.168	-2.759	0.006
ps_prop	13.956	5.172	248.544	2.698	0.007
risk_status_momHigh Risk	-1.354	13.061	93.072	-0.104	0.918
ps_prop:risk_status_momHigh Risk	-2.338	8.018	249.189	-0.292	0.771

4.3.2.2 Risk x Portion Size The interaction between Risk Status and Portion Size was not significant so it was removed from the model.

Table 32: Grapes - Risk x Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	11.858	99.993	77.957	0.119	0.906
preFF	-0.041	0.069	303.746	-0.591	0.555
bmi	-5.690	4.688	76.370	-1.214	0.229
sexFemale	-7.551	11.771	76.321	-0.641	0.523
age_yr	16.586	9.573	75.917	1.733	0.087
grape_vas	6.565	2.900	324.421	2.263	0.024
meal_order	-3.589	1.296	249.233	-2.769	0.006
ps_prop	12.978	3.928	249.226	3.304	0.001
risk_status_momHigh Risk	-2.508	12.453	76.694	-0.201	0.841

4.4 Broccoli

4.4.1 Grams

4.4.1.1 Base Model The difference between models with and without quadratic effect was not significant indicating the added model parameters/complexity did not improve model fit. Should only model chicken nugget gram intake with linear effect.

```
Data: intake_long
Models:
grams_broc_ps_mod: broc_grams ~ preFF + bmi + sex + age_yr + broc_vas + meal_order + ps_prop + (1 | sub
grams_broc_ps_psquad_mod: broc_grams ~ preFF + bmi + sex + age_yr + broc_vas + meal_order + ps_prop + ps
                         npar    AIC  BIC  logLik deviance  Chisq Df Pr(>Chisq)
grams_broc_ps_mod          10 3442.6 3481 -1711.3   3422.6
grams_broc_ps_psquad_mod   11 3443.8 3486 -1710.9   3421.8 0.7693  1     0.3804
```

Table 33: Broccoli - Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-68.930	79.888	72.772	-0.863	0.391
preFF	0.007	0.066	322.853	0.113	0.910
bmi	-1.212	3.601	71.854	-0.337	0.737
sexFemale	9.278	9.375	71.564	0.990	0.326
age_yr	14.142	7.667	71.376	1.845	0.069
broc_vas	1.379	2.310	286.943	0.597	0.551
meal_order	-1.108	1.275	243.792	-0.869	0.386
ps_prop	1.258	3.867	244.068	0.325	0.745

Table 34: brocs - Risk x Portion Size for Grams

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-74.269	81.065	71.775	-0.916	0.363
preFF	0.001	0.066	318.370	0.017	0.986
bmi	-0.791	3.808	71.000	-0.208	0.836
sexFemale	9.841	9.554	70.784	1.030	0.306
age_yr	13.900	7.769	70.404	1.789	0.078
broc_vas	1.030	2.315	289.660	0.445	0.657
meal_order	-1.060	1.266	242.780	-0.838	0.403
ps_prop	7.808	5.033	243.222	1.551	0.122
risk_status_momHigh Risk	3.532	10.843	94.561	0.326	0.745
ps_prop:risk_status_momHigh Risk	-15.574	7.769	242.921	-2.005	0.046

4.4.1.2 Risk x Portion Size Unlike other models, none of the control variables were associated with broccoli intake.

There was a significant interaction between Risk Status and Portion Size.

Table 35: Estimated Simple Slopes: Risk Status x Portion Size for Broccoli grams

risk_status_mom	ps_prop.trend	SE	df	t.ratio	p.value
Low Risk	7.808	5.033	253.968	1.551	0.122
High Risk	-7.766	5.927	253.511	-1.310	0.191

contrast	estimate	SE	df	t.ratio	p.value
Low Risk - High Risk	15.574	7.769	253.691	2.005	0.046

4.4.2 kcal

4.4.2.1 Base Model The difference between models with and without quadratic effect was not significant indicating the added model parameters/complexity did not improve model fit. Should only model chicken nugget kcal intake with linear effect.

```
Data: intake_long
Models:
kcal_broc_ps_mod: broc_kcal ~ preFF + bmi + sex + broc_vas + age_yr + meal_order + ps_prop + (1 | sub)
kcal_broc_ps_psquad_mod: broc_kcal ~ preFF + bmi + sex + age_yr + broc_vas + meal_order + ps_prop + ps_
                        npar    AIC    BIC  logLik deviance  Chisq Df
kcal_broc_ps_mod          10 3444.6 3483.0 -1712.3   3424.6
kcal_broc_ps_psquad_mod   11 3445.9 3488.1 -1711.9   3423.9 0.7693  1
                        Pr(>Chisq)
kcal_broc_ps_mod
kcal_broc_ps_psquad_mod     0.3804
```

Table 36: Broccoli - Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-69.137	80.128	72.772	-0.863	0.391
preFF	0.007	0.066	322.853	0.113	0.910
bmi	-1.216	3.611	71.854	-0.337	0.737
sexFemale	9.306	9.404	71.564	0.990	0.326
broc_vas	1.383	2.317	286.943	0.597	0.551
age_yr	14.184	7.690	71.376	1.845	0.069
meal_order	-1.111	1.279	243.792	-0.869	0.386
ps_prop	1.262	3.879	244.068	0.325	0.745

Table 37: brocs - Risk x Portion Size for kcal

	Estimate	Std. Error	df	t value	Pr(>|t|)
(Intercept)	-74.491	81.308	71.775	-0.916	0.363
preFF	0.001	0.066	318.370	0.017	0.986
bmi	-0.794	3.820	71.000	-0.208	0.836
sexFemale	9.871	9.583	70.784	1.030	0.306
age_yr	13.942	7.793	70.404	1.789	0.078
broc_vas	1.033	2.321	289.660	0.445	0.657
meal_order	-1.064	1.270	242.780	-0.838	0.403
ps_prop	7.831	5.048	243.222	1.551	0.122
risk_status_momHigh Risk	3.543	10.876	94.561	0.326	0.745
ps_prop:risk_status_momHigh Risk	-15.621	7.792	242.921	-2.005	0.046

4.4.2.2 Risk x Portion Size Unlike other models, none of the control variables were associated with broccoli intake.

There was a significant interaction between Risk Status and Portion Size.

Table 38: Estimated Simple Slopes: Risk Status x Portion Size for Broccoli kcal

risk_status_mom	ps_prop.trend	SE	df	t.ratio	p.value
Low Risk	7.831	5.049	253.968	1.551	0.122
High Risk	-7.790	5.945	253.511	-1.310	0.191

contrast	estimate	SE	df	t.ratio	p.value
Low Risk - High Risk	15.621	7.792	253.691	2.005	0.046

5 Exploratory Analyses: Mediated Moderation

Since broccoli was the only food showing a Risk Status x Portion Size interaction, I tested whether broccoli intake mediates the overall Risk x Potion Size interaction using a mediated moderation model.

5.1 Grams

```
lavaan 0.6-12 ended normally after 126 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                        24

  Number of observations                           344
  Number of clusters [sub]                          86

Model Test User Model:
                                              Standard      Robust
  Test Statistic                                11.117       4.958
  Degrees of freedom                                 3           3
  P-value (Chi-square)                           0.011       0.175
  Scaling correction factor                                  2.242
    Yuan-Bentler correction (Mplus variant)
  Information                                 Observed

Parameter Estimates:

  Standard errors                          Robust.cluster
  Information                                    Expected
  Information saturated (h1) model          Structured

Regressions:
                   Estimate   Std.Err  z-value  P(>|z|)
  grams ~
    sub              -0.526    0.380   -1.384    0.166
    preFF            -1.037    0.362   -2.866    0.004
    bmi              23.683   13.368    1.772    0.076
    sex             -51.020   32.414   -1.574    0.115
    age_yr          -37.583   23.523   -1.598    0.110
    avg_vas          53.964   27.208    1.983    0.047
    meal_order       -4.146    4.291   -0.966    0.334
    rsk_stts_m      -22.663   37.063   -0.611    0.541
    ps_prop          75.151   15.078    4.984    0.000
    psxrisk_nt (c)  -49.116   25.283   -1.943    0.052
  broc_grams ~
    preFF            -0.077    0.073   -1.055    0.292
    bmi              -0.477    2.506   -0.190    0.849
    sex               6.838    8.370    0.817    0.414
    age_yr           13.061    8.351    1.564    0.118
    broc_vas         11.971    2.834    4.224    0.000
    meal_order       -1.260    1.465   -0.860    0.390
    rsk_stts_m        7.867    8.398    0.937    0.349
```

```
    ps_prop           6.537    5.764    1.134    0.257
    psxrisk_nt (a)  -15.362    7.487   -2.052    0.040
  grams ~
    broc_grams (b)    1.216    0.221    5.504    0.000

Intercepts:
                   Estimate   Std.Err  z-value  P(>|z|)
   .grams           287.187  310.863    0.924    0.356
   .broc_grams     -117.314   68.872   -1.703    0.088

Variances:
                   Estimate   Std.Err  z-value  P(>|z|)
   .grams         23620.236 2543.923    9.285    0.000
   .broc_grams     2056.090  714.579    2.877    0.004

Defined Parameters:
                   Estimate   Std.Err  z-value  P(>|z|)
    ab              -18.680    9.577   -1.951    0.051
    total           -67.796   27.269   -2.486    0.013
```

There was a significant level indirect effect (p = 0.036) indicating that broccoli intake mediated the interaction between risk status and portion size for gram intake.

5.2 kcal

```
lavaan 0.6-12 ended normally after 126 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                        24

  Number of observations                           344
  Number of clusters [sub]                          86

Model Test User Model:
                                              Standard      Robust
  Test Statistic                                12.382       5.449
  Degrees of freedom                                 3           3
  P-value (Chi-square)                           0.006       0.142
  Scaling correction factor                                  2.272
    Yuan-Bentler correction (Mplus variant)
  Information                                 Observed

Parameter Estimates:

  Standard errors                          Robust.cluster
  Information                                   Expected
  Information saturated (h1) model          Structured

Regressions:
                   Estimate   Std.Err  z-value  P(>|z|)
  kcal ~
```

```
    sub               -0.429    0.548   -0.782    0.434
    preFF             -1.642    0.454   -3.613    0.000
    bmi               38.677   17.755    2.178    0.029
    sex              -64.574   43.889   -1.471    0.141
    age_yr           -63.750   32.298   -1.974    0.048
    avg_vas           70.270   31.523    2.229    0.026
    meal_order         6.219    6.019    1.033    0.301
    rsk_stts_m        -4.152   47.821   -0.087    0.931
    ps_prop          136.936   22.355    6.126    0.000
    psxrisk_nt (c)   -61.575   38.435   -1.602    0.109
  broc_kcal ~
    preFF             -0.078    0.074   -1.055    0.292
    bmi               -0.479    2.514   -0.190    0.849
    sex                6.859    8.395    0.817    0.414
    age_yr            13.100    8.376    1.564    0.118
    broc_vas          12.006    2.843    4.224    0.000
    meal_order        -1.264    1.470   -0.860    0.390
    rsk_stts_m         7.890    8.423    0.937    0.349
    ps_prop            6.557    5.781    1.134    0.257
    psxrisk_nt (a)   -15.408    7.510   -2.052    0.040
  kcal ~
    broc_kcal  (b)     1.289    0.350    3.681    0.000

Intercepts:
                   Estimate   Std.Err  z-value  P(>|z|)
   .kcal             240.818  431.894    0.558    0.577
   .broc_kcal       -117.666   69.078   -1.703    0.088

Variances:
                   Estimate   Std.Err  z-value  P(>|z|)
   .kcal           42291.910 4799.530    8.812    0.000
   .broc_kcal       2068.445  718.873    2.877    0.004

Defined Parameters:
                   Estimate   Std.Err  z-value  P(>|z|)
    ab               -19.855   10.602   -1.873    0.061
    total            -81.431   39.584   -2.057    0.040
```

There was a significant level indirect effect ($p = 0.048$) indicating that broccoli intake mediated the interaction between risk status and portion size for kcal intake.