

R01-FBS: Task EF x Risk Status Paper

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1 Participant Characteristics (Demographics Database)

Table 1: Demographic Characteristics

Characteristic	Low Risk, N = 53	High Risk, N = 39	Test Statistic	p-value
Age, yr	7.8 [6.0 - 9.0]	7.8 [7.0 - 8.9]	0.37	0.7
Sex			1.0	0.3
Male	30 (57%)	18 (46%)		
Female	23 (43%)	21 (54%)		
Ethnicity				
Not Hispanic/Lantinx	53 (100%)	39 (100%)		
Race				0.3
Asian	3 (5.7%)	0 (0%)		
White/Caucasian	50 (94%)	39 (100%)		
Income			12	0.003
< \$51,000	4 (7.7%)	8 (22%)		
>\$100,000	26 (50%)	6 (16%)		
\$51,000 - \$100,000	22 (42%)	23 (62%)		
Unknown	1	2		
Mother's Education				0.009
> Bachelor Degree	23 (44%)	6 (15%)		
AA/Technical Degree	3 (5.8%)	7 (18%)		
Bachelor Degree	23 (44%)	20 (51%)		
High School/GED	3 (5.8%)	6 (15%)		
Unknown	1	0		
Father's Education				<0.001
> Bachelor Degree	29 (55%)	4 (12%)		
AA/Technical Degree	3 (5.7%)	11 (32%)		
Bachelor Degree	15 (28%)	13 (38%)		
High School/GED	6 (11%)	5 (15%)		
Other/NA	0 (0%)	1 (2.9%)		
Unknown	0	5		
BMI %tile	41.7 [3.9 - 86.8]	54.8 [9.4 - 89.3]	-2.6	0.010
Total Body Fat %	27.0 [19.9 - 35.7]	30.3 [23.6 - 38.6]	-3.7	<0.001
Unknown	2	2		
Total Fat Mass	6,816.8 [4,524.0 - 11,510.0]	8,057.4 [5,784.0 - 12,677.0]	-3.4	0.001
Unknown	2	2		
Visceral Fat Mass	159.6 [57.9 - 286.0]	163.0 [52.1 - 245.0]	-0.30	0.8
Unknown	2	2		
Lean Fat Mass	17,476.1 [13,488.2 - 25,165.4]	17,475.3 [12,619.2 - 23,592.7]	0.00	>0.9
Unknown	2	2		
IQ	116.1 [77.0 - 160.0]	110.9 [91.0 - 133.0]	1.6	0.12
Unknown	11	13		

¹ Mean [Range]; n (%)

² Welch Two Sample t-test; Pearson's Chi-squared test; Fisher's exact test

2 Go-NoGo

Table 2: Go-NoGo Performance Summary

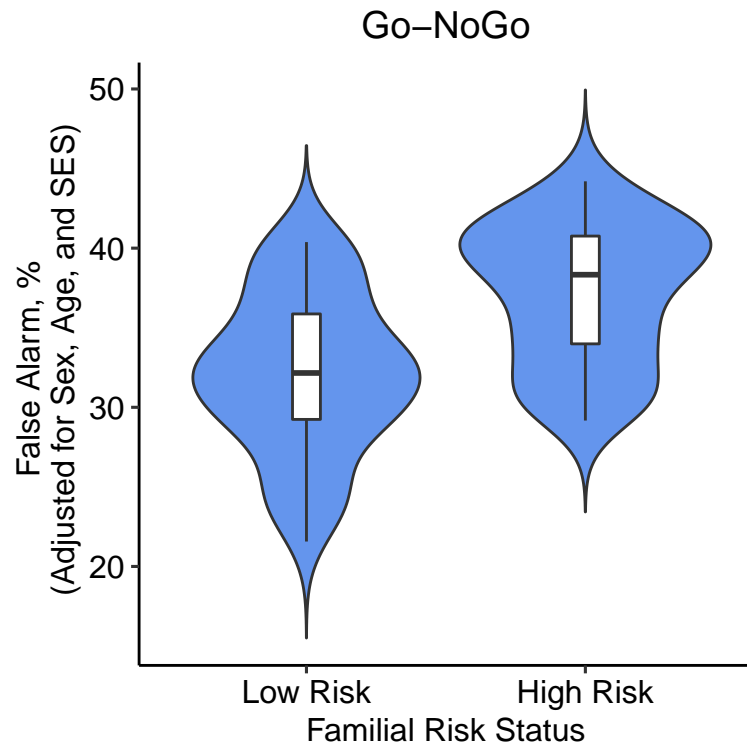
Characteristic	Low Risk, N = 53	High Risk, N = 39
Missed, N	4.6 (5.2)	3.9 (3.7)
False Alarm, N	16.0 (8.2)	18.9 (7.9)
Missed, %	3.1 (3.5)	2.6 (2.5)
False Alarm, %	32.0 (16.4)	37.8 (15.7)
Mean Hit RT, ms	543.6 (60.9)	544.9 (61.6)
Mean False Alarm RT, ms	432.5 (53.2)	426.6 (53.9)
d', loglinear	2.5 (0.7)	2.3 (0.6)

¹ Mean (SD)

2.1 Percent False Alarms

Table 3: Go-NoGo Percent False Alarms

	Df	Sum.Sq	Mean.Sq	F.value	Pr..F.	sig
mom_ed	3	437.242	145.747	0.596	0.619	NA
income	2	298.023	149.011	0.609	0.546	NA
sex	1	456.736	456.736	1.868	0.176	NA
age_yr	1	261.999	261.999	1.072	0.304	NA
risk_status_mom	1	998.965	998.965	4.086	0.047	*
Residuals	79	19315.354	244.498	NA	NA	NA



There was a significant effect of familial obesity risk such that children with high risk had a false alarm percentage that was 7.8 points higher than those with low risk. SES, age, and sex were not associated with false alarm percentage.

2.2 Percent Hits

Table 4: Go-NoGo - Percent Hits

	Df	Sum.Sq	Mean.Sq	F.value	Pr..F.	sig
mom_ed	3	30.828	10.276	1.045	0.378	NA
income	2	15.483	7.741	0.787	0.459	NA
sex	1	19.036	19.036	1.935	0.168	NA
age_yr	1	6.139	6.139	0.624	0.432	NA
risk_status_mom	1	0.093	0.093	0.009	0.923	NA
Residuals	79	777.131	9.837	NA	NA	NA

Correct responses to go stimuli did not differ by risk status, age, sex, or SES.

2.3 Go Reaction Time

Table 5: Go-NoGo - Go Reaction Time

	Df	Sum.Sq	Mean.Sq	F.value	Pr..F.	sig
mom_ed	3	3312.644	1104.215	0.314	0.815	NA
income	2	3355.935	1677.967	0.477	0.622	NA
sex	1	3791.772	3791.772	1.078	0.302	NA
age_yr	1	21155.799	21155.799	6.013	0.016	*
risk_status_mom	1	170.210	170.210	0.048	0.826	NA
Residuals	79	277958.459	3518.462	NA	NA	NA

Correct responses to go stimuli did not differ by risk status, sex, or SES. However, older children responded more quickly than younger children.

2.4 d'

Table 6: Go-NoGo - d'

	Df	Sum.Sq	Mean.Sq	F.value	Pr..F.	sig
mom_ed	3	0.016	0.005	0.013	0.998	NA
income	2	0.093	0.047	0.110	0.896	NA
sex	1	1.103	1.103	2.608	0.110	NA
age_yr	1	0.733	0.733	1.732	0.192	NA
risk_status_mom	1	1.145	1.145	2.708	0.104	NA
Residuals	79	33.414	0.423	NA	NA	NA

Sensitivity indexed by d' did not differ by risk status, age, sex, or SES.

3 Stop-Signal Task

Table 7: Stop-Signal Task Performance Summary: Risk Status by Energy Density Condition

Characteristic	Low ED		High ED	
	Low Risk, N = 30	High Risk, N = 25	Low Risk, N = 30	High Risk, N = 25
Go RT, ms	673.6 (115.2)	668.9 (144.3)	677.1 (95.7)	656.5 (139.1)
L/R Response Error, N	2.6 (3.9)	2.3 (2.1)	1.6 (2.0)	2.3 (2.2)
Misses, N	1.6 (2.8)	2.9 (4.1)	1.3 (1.7)	2.4 (4.0)
SSD, ms	326.4 (97.1)	283.8 (98.9)	324.4 (77.9)	266.6 (87.1)
SSRT - Mean Method, ms	342.3 (49.2)	378.2 (92.5)	347.7 (49.3)	386.4 (92.5)
SSRT - Integration Method, ms	299.4 (70.1)	367.6 (174.6)	294.8 (46.0)	373.1 (111.5)

¹ Mean (SD)

Table 8: Stop-Signal Task Performance Summary: Risk Status by Portion Size Condition

Characteristic	Small PS		Large PS	
	Low Risk, N = 33	High Risk, N = 25	Low Risk, N = 33	High Risk, N = 25
Go RT, ms	664.1 (112.5)	664.8 (139.9)	672.4 (117.9)	666.0 (142.9)
L/R Response Error, N	2.4 (3.4)	1.9 (1.7)	1.8 (2.9)	2.8 (2.4)
Misses, N	1.8 (3.1)	2.9 (4.4)	1.5 (2.0)	2.4 (3.8)
SSD, ms	304.6 (95.9)	272.7 (90.0)	322.6 (92.0)	288.2 (86.6)
SSRT - Mean Method, ms	355.0 (53.5)	381.4 (92.3)	346.2 (60.4)	373.0 (90.2)
SSRT - Integration Method, ms	309.8 (66.4)	375.3 (121.6)	307.3 (67.9)	345.5 (113.8)

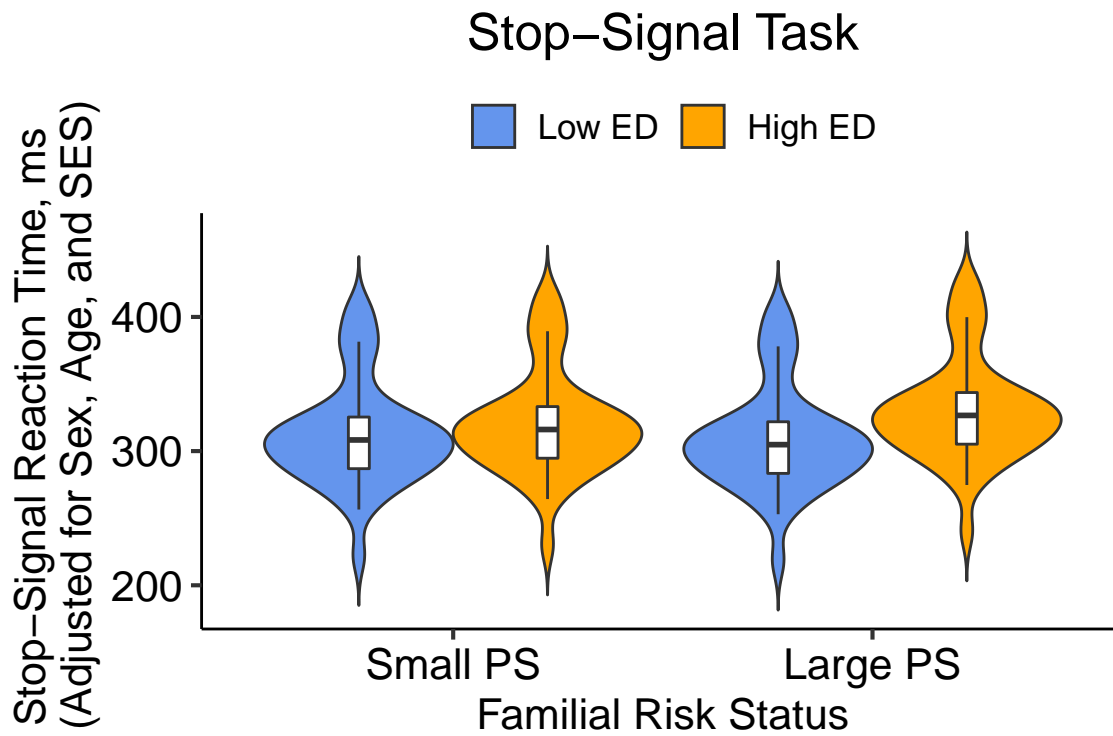
¹ Mean (SD)

3.1 Stop Signal Reaction Time

3.1.1 Design

Table 9: Stop-Signal Task SSRT - ED x PS

	F	Df	Df.res	Pr..F.	sig
mom_ed	1.732	3	32	0.180	NA
income	2.008	2	32	0.151	NA
sex	0.809	1	32	0.375	NA
age_yr	1.183	1	32	0.285	NA
PS	0.044	1	117	0.834	NA
ED	0.790	1	117	0.376	NA
PS:ED	0.177	1	117	0.675	NA

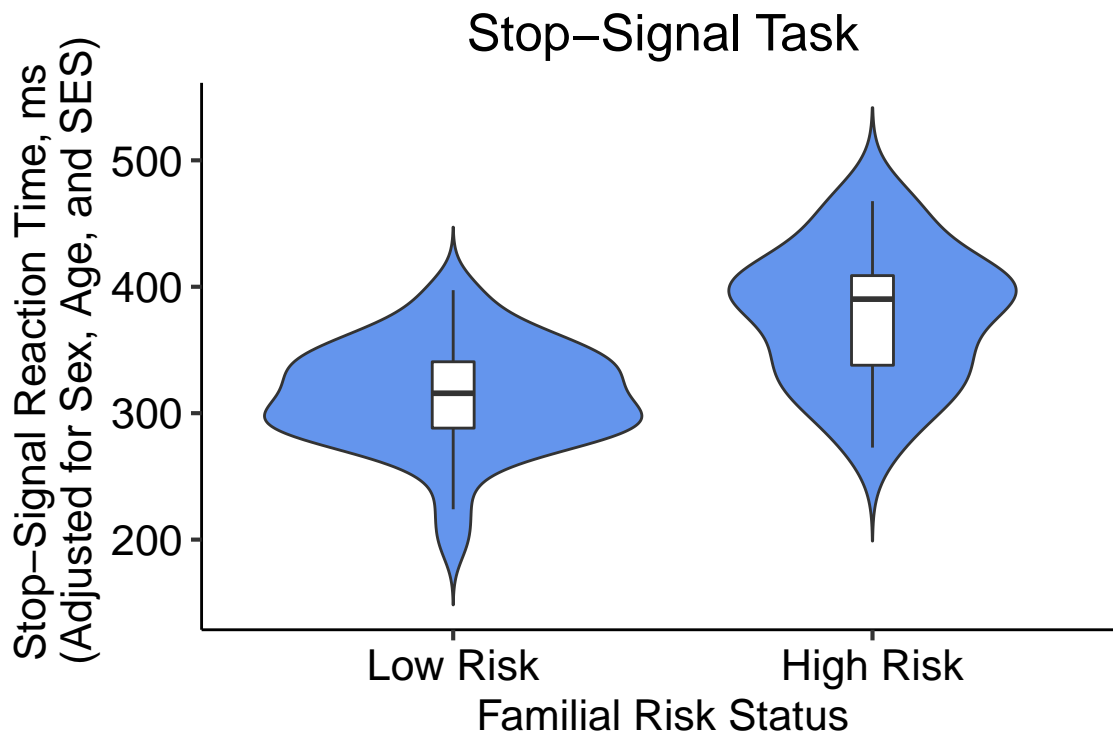


No effect of energy density, portion size, or interaction.

3.1.2 Overall

Table 10: Stop-Signal Task SSRT - Risk Status

	Sum.Sq	Df	F.value	Pr..F.	sig
mom_ed	46512.443	3	1.669	0.183	NA
income	1931.039	2	0.104	0.901	NA
sex	2949.795	1	0.318	0.575	NA
age_yr	45937.169	1	4.945	0.030	*
risk_status_mom	58526.380	1	6.300	0.015	*
Residuals	557375.397	60	NA	NA	NA



Across all trials, there was a significant effect of familial obesity risk on stop-signal reaction time (SSRT). SSRT was slower (worse) in children with high risk compared to those with low risk. Additionally, older children were showed faster SSRT. There was no association with sex or SES.

```
$emmeans
risk_status_mom emmean SE df lower.CL upper.CL
Low Risk      315 20.1 60    274    355
High Risk     384 22.3 60    339    428
```

Results are averaged over the levels of: mom_ed, income, sex
Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Low Risk - High Risk	-69.1	27.5	60	-2.510	0.0148

Results are averaged over the levels of: mom_ed, income, sex

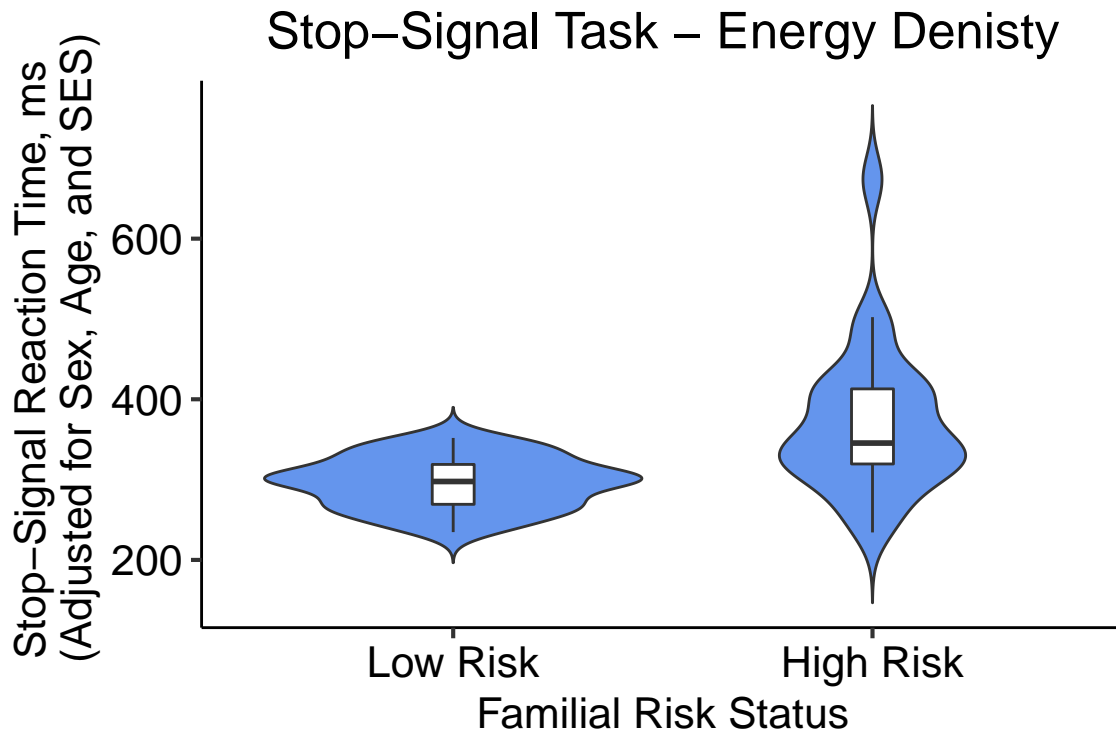
age_yr	age_yr.trend	SE	df	t.ratio	p.value
7.78	-44.5	20	60	-2.224	0.0299

Results are averaged over the levels of: mom_ed, income, sex, risk_status_mom

3.1.3 Energy Density Trials

Table 11: Stop-Signal Task SSRT - ED x Risk Status

	F	Df	Df.res	Pr..F.	sig
mom_ed	2.795	3	43	0.052	.
income	0.195	2	43	0.823	NA
sex	0.016	1	43	0.899	NA
age_yr	3.275	1	43	0.077	.
ED	0.037	1	50	0.848	NA
risk_status_mom	10.147	1	43	0.003	**
ED:risk_status_mom	0.103	1	50	0.749	NA



SSRT was slower (worse) in children with high risk compared to those with low risk.

```
$emmeans
risk_status_mom emmean   SE df lower.CL upper.CL
Low Risk          301 22.4 43      256      346
High Risk          392 22.6 43      346      438
```

Results are averaged over the levels of: mom_ed, income, sex, ED
Degrees-of-freedom method: kenward-roger
Confidence level used: 0.95

```

$contrasts
  contrast      estimate    SE df t.ratio p.value
Low Risk - High Risk    -90.8 28.5 43  -3.185  0.0027

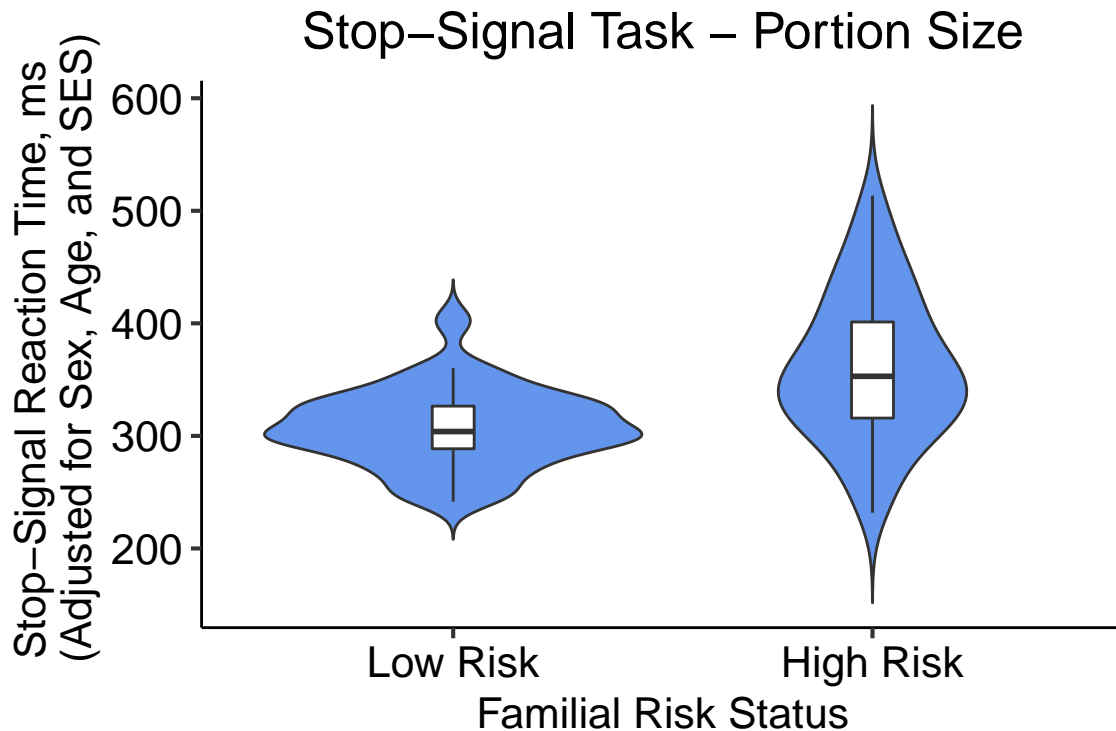
Results are averaged over the levels of: mom_ed, income, sex, ED
Degrees-of-freedom method: kenward-roger

```

3.1.4 Portion Size Trials

Table 12: Stop-Signal Task SSRT - PS x Risk Status

	F	Df	Df.res	Pr..F.	sig
mom_ed	1.550	3	45	0.215	NA
income	0.303	2	45	0.740	NA
sex	0.386	1	45	0.538	NA
age_yr	2.547	1	45	0.117	NA
PS	0.406	1	52	0.527	NA
risk_status_mom	6.676	1	45	0.013	*
PS:risk_status_mom	1.484	1	52	0.229	NA



SSRT was slower (worse) in children with high risk compared to those with low risk.

```
$emmeans
risk_status_mom emmean SE df lower.CL upper.CL
Low Risk        294 18.1 45    258    331
High Risk       355 20.4 45    314    396
```

Results are averaged over the levels of: mom_ed, income, sex, PS
 Degrees-of-freedom method: kenward-roger
 Confidence level used: 0.95

```

$contrasts
  contrast      estimate    SE df t.ratio p.value
Low Risk - High Risk    -60.7 23.5 45  -2.584  0.0131

Results are averaged over the levels of: mom_ed, income, sex, PS
Degrees-of-freedom method: kenward-roger

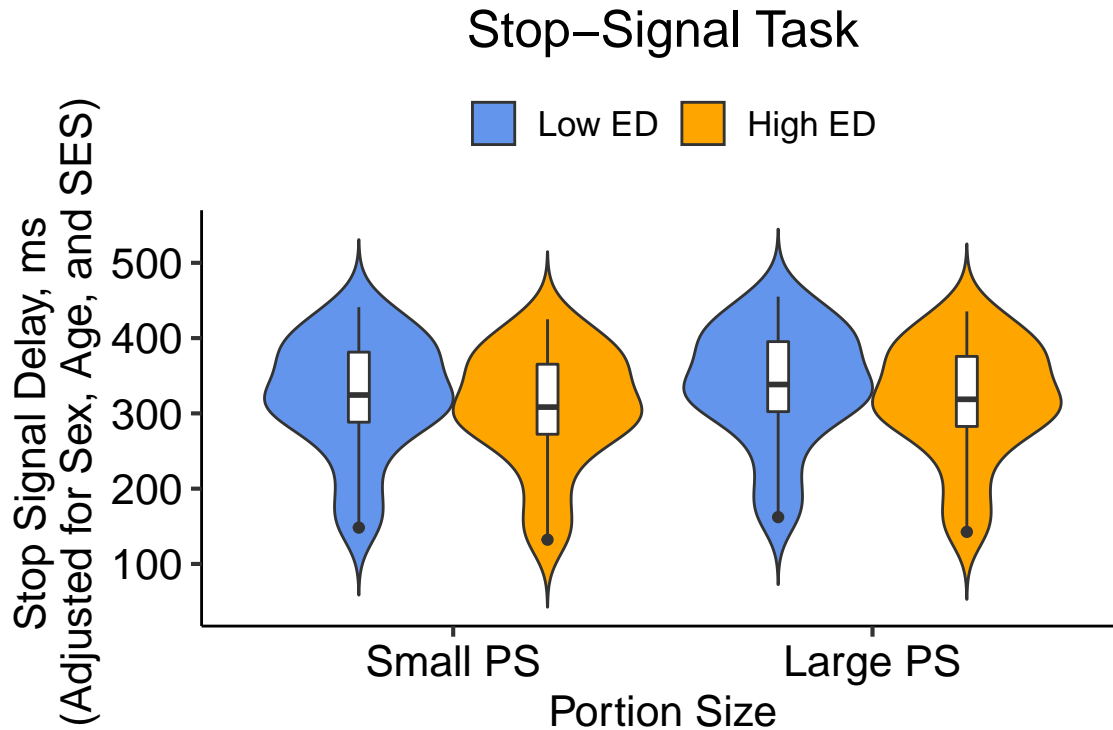
```

3.2 Stop Signal Delay

3.2.1 Design

Table 13: Stop-Signal Task SSD - ED x PS

	F	Df	Df.res	Pr..F.	sig
mom_ed	1.282	3	32	0.297	NA
income	0.322	2	32	0.727	NA
sex	1.865	1	32	0.182	NA
age_yr	0.200	1	32	0.658	NA
PS	1.797	1	117	0.183	NA
ED	3.866	1	117	0.052	.
PS:ED	0.039	1	117	0.843	NA



No effect of portion size or interaction. A trend for an effect of energy density such that there was a lower SSD (worse) for high ED compared to low ED blocks.

\$emmeans

ED	emmean	SE	df	lower.CL	upper.CL
Low ED	316	18.5	36.2	279	354
High ED	298	18.5	36.2	261	336

Results are averaged over the levels of: mom_ed, income, sex, PS

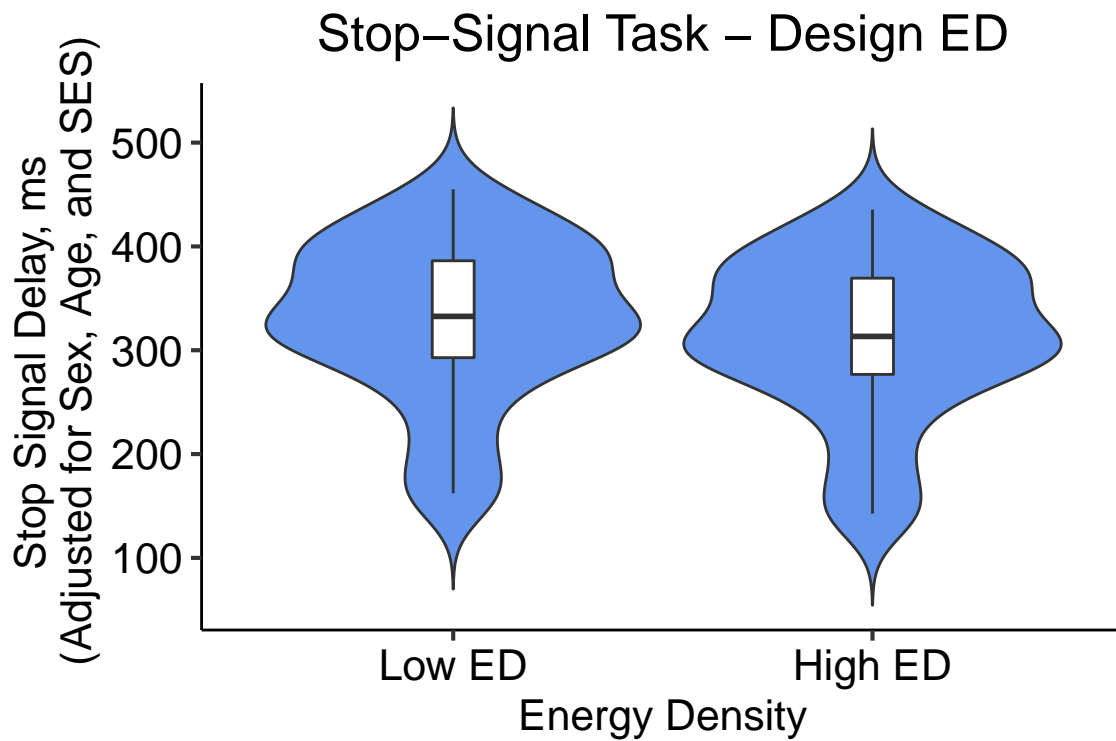
Degrees-of-freedom method: kenward-roger
Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Low ED - High ED	17.8	9.07	117	1.966	0.0516

Results are averaged over the levels of: mom_ed, income, sex, PS

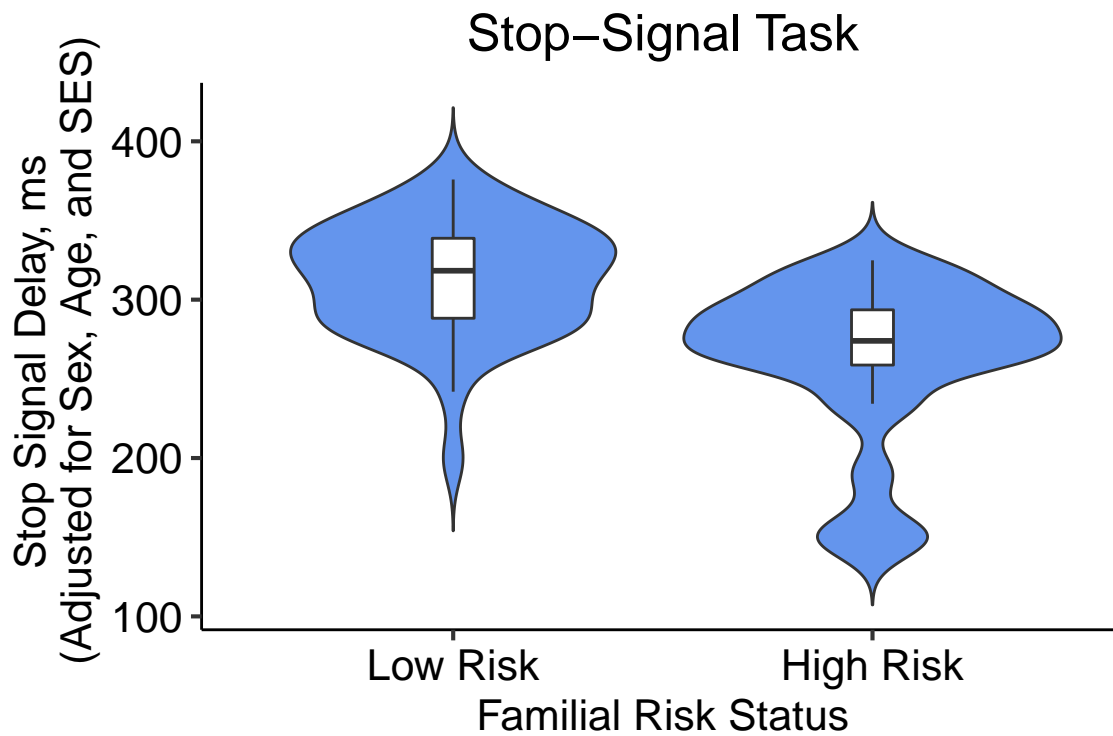
Degrees-of-freedom method: kenward-roger



3.2.2 All Trials

Table 14: Stop-Signal Task SSD - Risk Status

	Sum.Sq	Df	F.value	Pr..F.	sig
mom_ed	47936.657	3	2.549	0.064	.
income	2627.619	2	0.210	0.811	NA
sex	24615.871	1	3.927	0.052	.
age_yr	7383.444	1	1.178	0.282	NA
risk_status_mom	33313.459	1	5.315	0.025	*
Residuals	376072.969	60	NA	NA	NA



Main effect of risk status such that children at high risk have shorter stop signal delays (worse) than children at low risk.

```
$emmeans
risk_status_mom emmean SE df lower.CL upper.CL
Low Risk      300 16.5 60    267    333
High Risk     248 18.3 60    211    285
```

Results are averaged over the levels of: mom_ed, income, sex
Confidence level used: 0.95

```
$contrasts
```

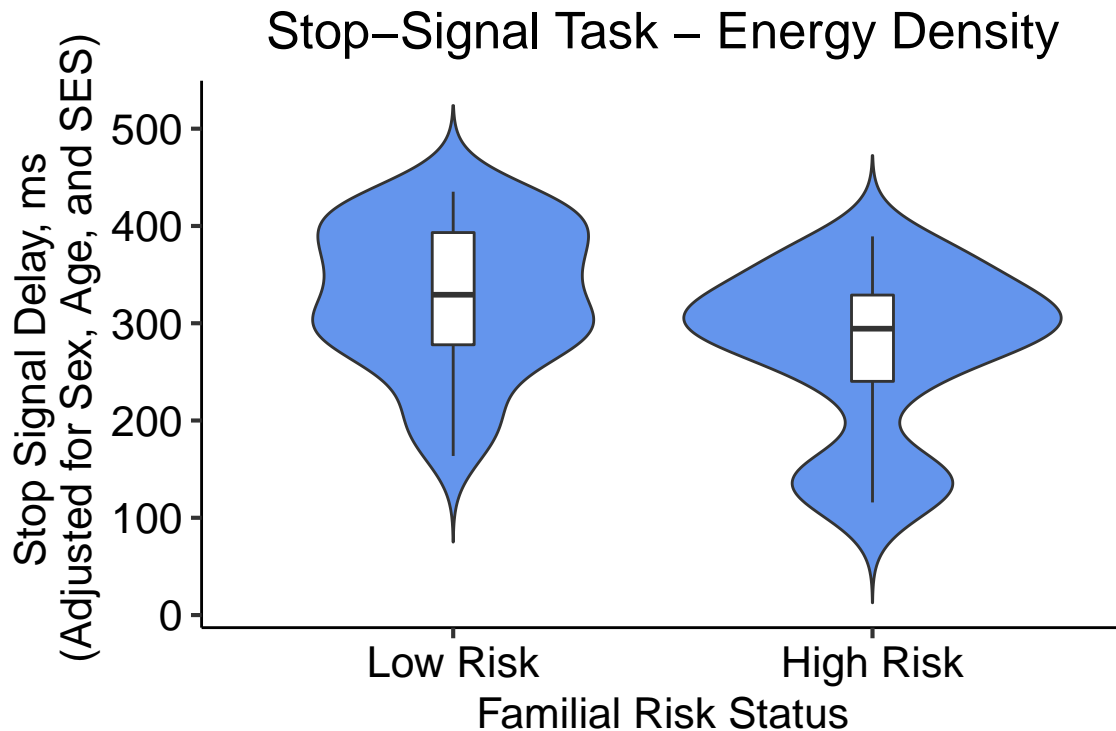

contrast	estimate	SE	df	t.ratio	p.value
Low Risk - High Risk	52.1	22.6	60	2.305	0.0246

Results are averaged over the levels of: mom_ed, income, sex

3.2.3 Energy Density Trials

Table 15: Stop-Signal Task SSD - Risk Status x ED

	F	Df	Df.res	Pr..F.	sig
mom_ed	1.035	3	43	0.387	NA
income	0.133	2	43	0.876	NA
sex	5.052	1	43	0.030	*
age_yr	0.484	1	43	0.491	NA
ED	1.953	1	50	0.168	NA
risk_status_mom	6.238	1	43	0.016	*
ED:risk_status_mom	0.846	1	50	0.362	NA



Main effect of risk status such that children at high risk have shorter stop signal delays (worse) than children at low risk. Boys also have shorter stop signal delays than girls.

```
$emmeans
risk_status_mom emmean SE df lower.CL upper.CL
Low Risk        321 21.1 43      278      363
High Risk        254 21.3 43      211      297
```

Results are averaged over the levels of: mom_ed, income, sex, ED
 Degrees-of-freedom method: kenward-roger
 Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Low Risk - High Risk	67.1	26.9	43	2.498	0.0164

Results are averaged over the levels of: mom_ed, income, sex, ED

Degrees-of-freedom method: kenward-roger

\$emmeans

sex	emmean	SE	df	lower.CL	upper.CL
Male	259	21.0	43	217	302
Female	316	20.2	43	275	356

Results are averaged over the levels of: mom_ed, income, ED, risk_status_mom

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Male - Female	-56.1	25	43	-2.248	0.0298

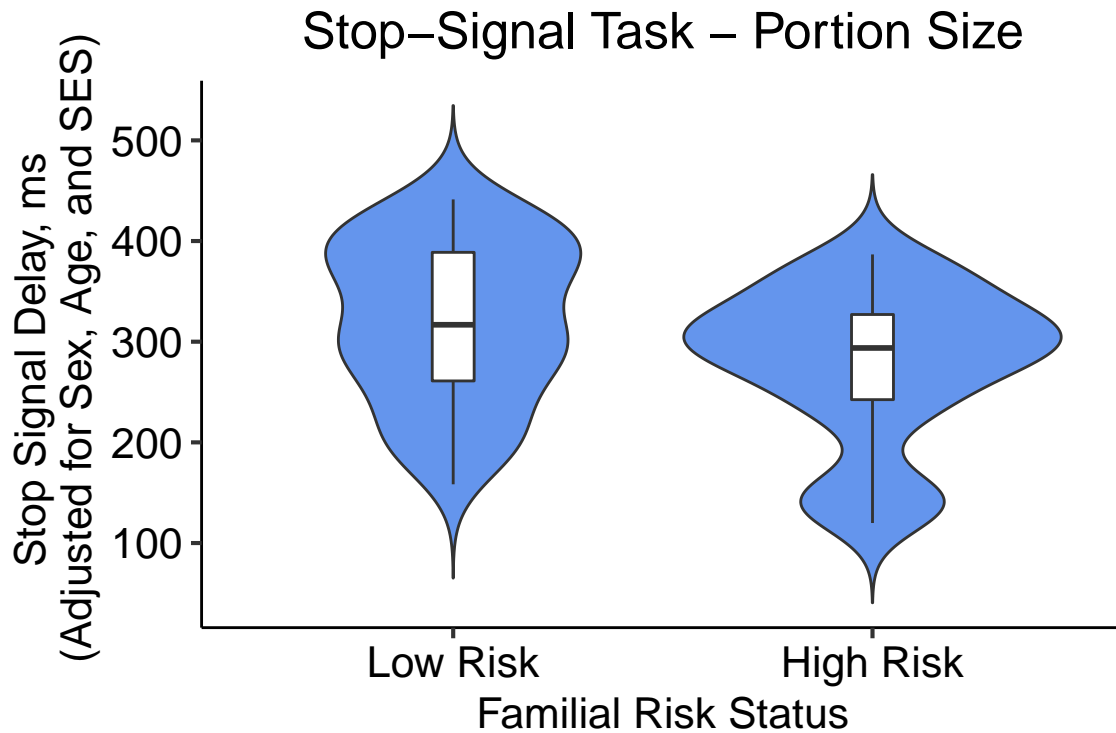
Results are averaged over the levels of: mom_ed, income, ED, risk_status_mom

Degrees-of-freedom method: kenward-roger

3.2.4 Portion Size Trials

Table 16: Stop-Signal Task SSD - Risk Status x PS

	F	Df	Df.res	Pr..F.	sig
mom_ed	1.156	3	45	0.337	NA
income	0.052	2	45	0.949	NA
sex	4.172	1	45	0.047	*
age_yr	0.476	1	45	0.494	NA
PS	3.481	1	52	0.068	.
risk_status_mom	4.844	1	45	0.033	*
PS:risk_status_mom	0.016	1	52	0.901	NA



Main effect of risk status such that children at high risk have shorter stop signal delays (worse) than children at low risk. Boys also have shorter stop signal delays than girls.

```
$emmeans
risk_status_mom emmean SE df lower.CL upper.CL
Low Risk        317 20.1 45    277    358
High Risk       260 22.6 45    214    305
```

Results are averaged over the levels of: mom_ed, income, sex, PS
 Degrees-of-freedom method: kenward-roger
 Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Low Risk - High Risk	57.3	26	45	2.201	0.0329

Results are averaged over the levels of: mom_ed, income, sex, PS

Degrees-of-freedom method: kenward-roger

\$emmeans

PS	emmean	SE	df	lower.CL	upper.CL
Small PS	281	17.4	50.5	246	316
Large PS	296	17.4	50.5	261	331

Results are averaged over the levels of: mom_ed, income, sex, risk_status_mom

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Small PS - Large PS	-15.6	8.39	52	-1.864	0.0680

Results are averaged over the levels of: mom_ed, income, sex, risk_status_mom

Degrees-of-freedom method: kenward-roger

\$emmeans

sex	emmean	SE	df	lower.CL	upper.CL
Male	264	22.0	45	219	308
Female	314	19.8	45	274	353

Results are averaged over the levels of: mom_ed, income, PS, risk_status_mom

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Male - Female	-50	24.5	45	-2.043	0.0470

Results are averaged over the levels of: mom_ed, income, PS, risk_status_mom

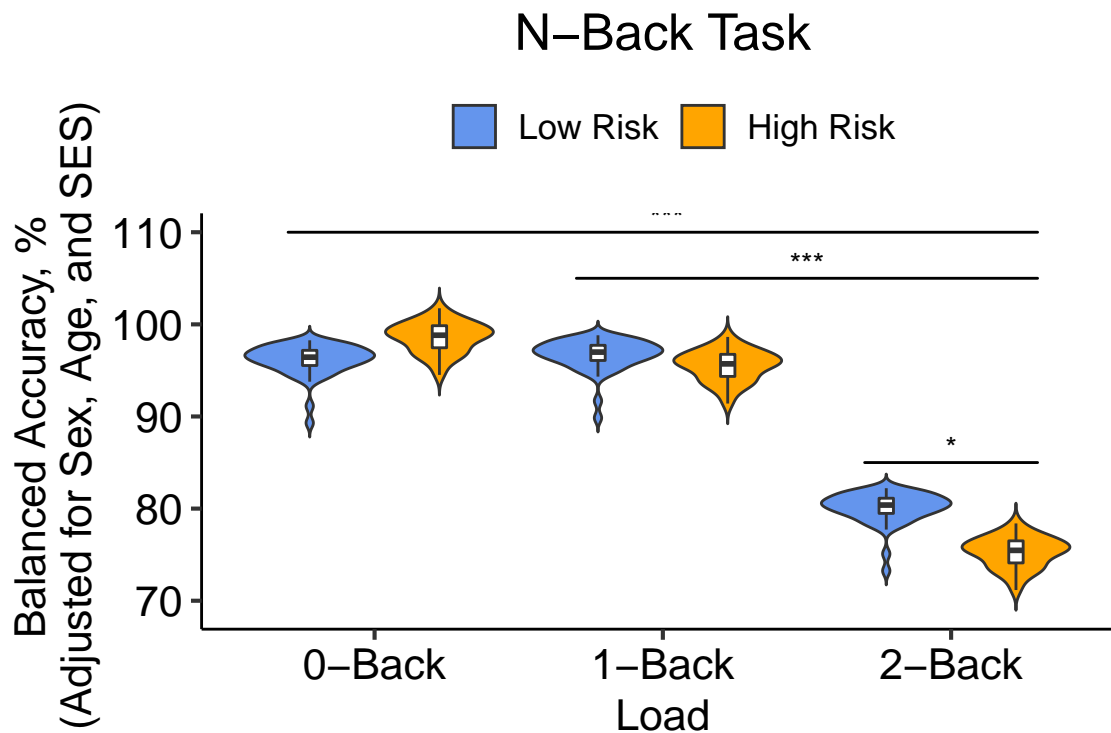
Degrees-of-freedom method: kenward-roger

4 N-back

4.1 Ballanced Accuracy

Table 17: Nback Balanced Accuracy - Risk Status x Load

	F	Df	Df.res	Pr..F.	sig
mom_ed	1.248	3	74	0.299	NA
income	0.583	2	74	0.561	NA
sex	0.616	1	74	0.435	NA
age_yr	0.128	1	74	0.722	NA
block	166.810	2	162	0.000	***
risk_status_mom	0.196	1	74	0.659	NA
block:risk_status_mom	4.672	2	162	0.011	*



Interaction between risk and load shows that children at high familial risk for obesity perform worse at the highest working memory load compared to children at low risk.

\$emmeans

block	emmean	SE	df	lower.CL	upper.CL
0-Back	96.4	1.01	191	94.4	98.4
1-Back	95.1	1.01	191	93.1	97.1
2-Back	76.7	1.01	191	74.7	78.7

Results are averaged over the levels of: mom_ed, income, sex, risk_status_mom
Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
(0-Back) - (1-Back)	1.28	1.19	162	1.072	0.2854
(0-Back) - (2-Back)	19.70	1.19	162	16.501	<.0001
(1-Back) - (2-Back)	18.42	1.19	162	15.429	<.0001

Results are averaged over the levels of: mom_ed, income, sex, risk_status_mom

Degrees-of-freedom method: kenward-roger

P value adjustment: fdr method for 3 tests

\$emmeans

block	risk_status_mom	emmean	SE	df	lower.CL	upper.CL
0-Back	Low Risk	94.9	1.31	194	92.3	97.4
1-Back	Low Risk	95.4	1.31	194	92.8	98.0
2-Back	Low Risk	78.8	1.31	194	76.2	81.4
0-Back	High Risk	98.0	1.44	213	95.1	100.8
1-Back	High Risk	94.8	1.44	213	92.0	97.7
2-Back	High Risk	74.6	1.44	213	71.8	77.4

Results are averaged over the levels of: mom_ed, income, sex

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
(0-Back Low Risk) - (1-Back Low Risk)	-0.54908	1.55	162	-0.354	0.8200
(0-Back Low Risk) - (2-Back Low Risk)	16.05248	1.55	162	10.352	<.0001
(0-Back Low Risk) - (0-Back High Risk)	-3.10395	1.85	218	-1.675	0.1301
(0-Back Low Risk) - (1-Back High Risk)	0.00482	1.85	218	0.003	0.9979
(0-Back Low Risk) - (2-Back High Risk)	20.24836	1.85	218	10.924	<.0001
(1-Back Low Risk) - (2-Back Low Risk)	16.60156	1.55	162	10.706	<.0001
(1-Back Low Risk) - (0-Back High Risk)	-2.55487	1.85	218	-1.378	0.2119
(1-Back Low Risk) - (1-Back High Risk)	0.55390	1.85	218	0.299	0.8200
(1-Back Low Risk) - (2-Back High Risk)	20.79745	1.85	218	11.221	<.0001
(2-Back Low Risk) - (0-Back High Risk)	-19.15643	1.85	218	-10.335	<.0001
(2-Back Low Risk) - (1-Back High Risk)	-16.04766	1.85	218	-8.658	<.0001
(2-Back Low Risk) - (2-Back High Risk)	4.19588	1.85	218	2.264	0.0410
(0-Back High Risk) - (1-Back High Risk)	3.10877	1.82	162	1.712	0.1301
(0-Back High Risk) - (2-Back High Risk)	23.35231	1.82	162	12.859	<.0001
(1-Back High Risk) - (2-Back High Risk)	20.24354	1.82	162	11.147	<.0001

Results are averaged over the levels of: mom_ed, income, sex

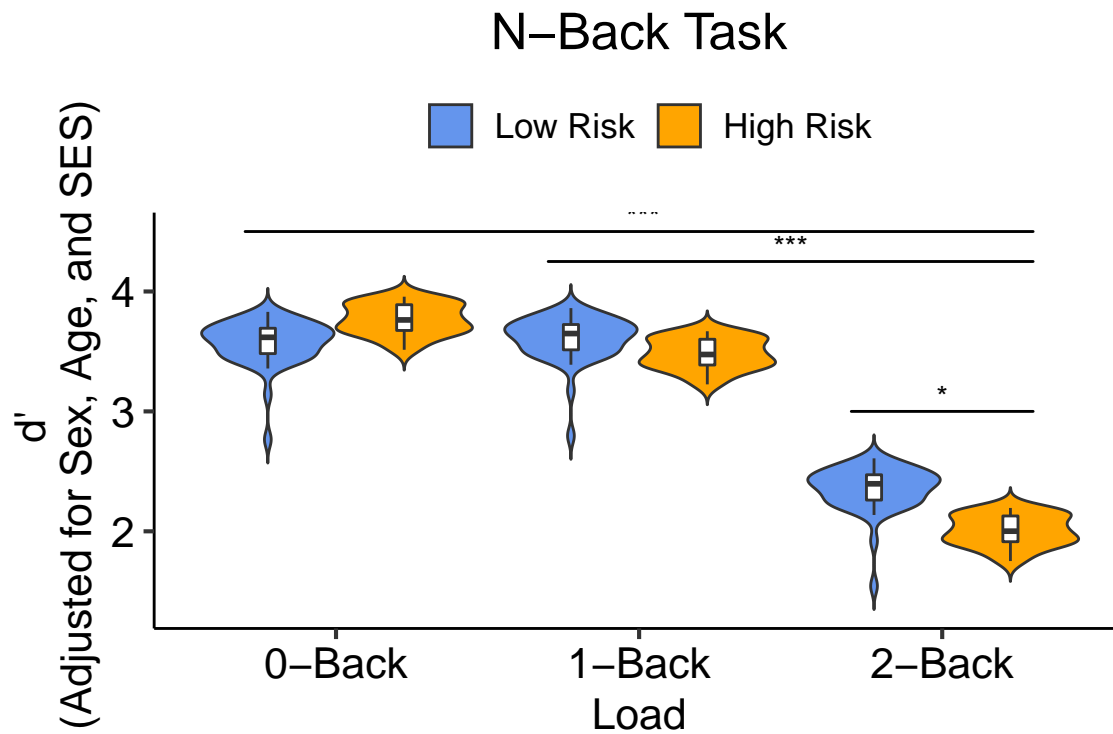
Degrees-of-freedom method: kenward-roger

P value adjustment: fdr method for 15 tests

4.2 d'

Table 18: Nback Balanced Accuracy - Risk Status x Load

	F	Df	Df.res	Pr..F.	sig
mom_ed	0.798	3	74	0.499	NA
income	0.331	2	74	0.720	NA
sex	0.001	1	74	0.972	NA
age_yr	0.001	1	74	0.973	NA
block	150.661	2	162	0.000	***
risk_status_mom	0.446	1	74	0.506	NA
block:risk_status_mom	4.143	2	162	0.018	*



Interaction between risk and load shows that children at high familial risk for obesity perform worse at the highest working memory load compared to children at low risk.

\$emmeans

block	risk_status_mom	emmean	SE	df	lower.CL	upper.CL
0-Back	Low Risk	3.50	0.108	181	3.29	3.71
1-Back	Low Risk	3.53	0.108	181	3.32	3.74
2-Back	Low Risk	2.28	0.108	181	2.07	2.49
0-Back	High Risk	3.72	0.118	201	3.48	3.95
1-Back	High Risk	3.43	0.118	201	3.20	3.66
2-Back	High Risk	1.95	0.118	201	1.72	2.19

Results are averaged over the levels of: mom_ed, income, sex

Degrees-of-freedom method: kenward-roger
Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
(0-Back Low Risk) - (1-Back Low Risk)	-0.0313	0.123	162	-0.255	0.7990
(0-Back Low Risk) - (2-Back Low Risk)	1.2217	0.123	162	9.972	<.0001
(0-Back Low Risk) - (0-Back High Risk)	-0.2157	0.152	207	-1.419	0.2148
(0-Back Low Risk) - (1-Back High Risk)	0.0725	0.152	207	0.477	0.6791
(0-Back Low Risk) - (2-Back High Risk)	1.5461	0.152	207	10.168	<.0001
(1-Back Low Risk) - (2-Back Low Risk)	1.2530	0.123	162	10.227	<.0001
(1-Back Low Risk) - (0-Back High Risk)	-0.1844	0.152	207	-1.213	0.2831
(1-Back Low Risk) - (1-Back High Risk)	0.1038	0.152	207	0.683	0.5719
(1-Back Low Risk) - (2-Back High Risk)	1.5773	0.152	207	10.374	<.0001
(2-Back Low Risk) - (0-Back High Risk)	-1.4374	0.152	207	-9.453	<.0001
(2-Back Low Risk) - (1-Back High Risk)	-1.1492	0.152	207	-7.558	<.0001
(2-Back Low Risk) - (2-Back High Risk)	0.3244	0.152	207	2.133	0.0568
(0-Back High Risk) - (1-Back High Risk)	0.2882	0.143	162	2.009	0.0693
(0-Back High Risk) - (2-Back High Risk)	1.7618	0.143	162	12.280	<.0001
(1-Back High Risk) - (2-Back High Risk)	1.4735	0.143	162	10.271	<.0001

Results are averaged over the levels of: mom_ed, income, sex
Degrees-of-freedom method: kenward-roger
P value adjustment: fdr method for 15 tests

\$emmeans

block	emmean	SE	df	lower.CL	upper.CL
0-Back	3.61	0.0838	178	3.44	3.77
1-Back	3.48	0.0838	178	3.31	3.65
2-Back	2.12	0.0838	178	1.95	2.28

Results are averaged over the levels of: mom_ed, income, sex, risk_status_mom
Degrees-of-freedom method: kenward-roger
Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
(0-Back) - (1-Back)	0.128	0.0943	162	1.362	0.1751
(0-Back) - (2-Back)	1.492	0.0943	162	15.814	<.0001
(1-Back) - (2-Back)	1.363	0.0943	162	14.452	<.0001

Results are averaged over the levels of: mom_ed, income, sex, risk_status_mom
Degrees-of-freedom method: kenward-roger
P value adjustment: fdr method for 3 tests

5 Exploratory Analyses with Total Body Fat Percentage

5.1 Go-NoGo

5.1.1 Percent False Alarms

Table 19: Go-NoGo Percent False Alarms - Body Fat Percentage

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	41.933	27.423	1.529	0.130
mom_edAA/Technical Degree	4.763	6.882	0.692	0.491
mom_edBachelor Degree	1.337	4.132	0.324	0.747
mom_edHigh School/GED	-3.508	8.383	-0.418	0.677
income>\$100,000	2.405	7.044	0.341	0.734
income\$51,000 - \$100,000	-1.410	6.332	-0.223	0.824
sexFemale	-5.938	4.103	-1.447	0.152
age_yr	-2.631	2.918	-0.902	0.370
dxa_total_body_perc_fat	0.517	0.456	1.133	0.261

5.1.2 Percent Hits

Table 20: Go-NoGo - Percent Hits - Body Fat Percentage

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	94.340	5.356	17.614	0.000
mom_edAA/Technical Degree	1.834	1.344	1.365	0.176
mom_edBachelor Degree	1.102	0.807	1.365	0.176
mom_edHigh School/GED	-0.809	1.637	-0.494	0.623
income>\$100,000	-1.415	1.376	-1.029	0.307
income\$51,000 - \$100,000	-1.541	1.237	-1.246	0.217
sexFemale	1.032	0.801	1.288	0.202
age_yr	0.408	0.570	0.716	0.476
dxa_total_body_perc_fat	-0.011	0.089	-0.119	0.905

Correct responses to go stimuli did not differ by risk status, age, sex, or SES.

5.1.3 Go Reaction Time

Table 21: Go-NoGo - Go Reaction Time

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	795.332	100.524	7.912	0.000
mom_edAA/Technical Degree	-11.886	25.226	-0.471	0.639
mom_edBachelor Degree	-19.933	15.146	-1.316	0.192
mom_edHigh School/GED	-18.892	30.730	-0.615	0.541
income>\$100,000	-22.714	25.819	-0.880	0.382
income\$51,000 - \$100,000	-17.437	23.210	-0.751	0.455
sexFemale	19.783	15.040	1.315	0.192
age_yr	-26.914	10.697	-2.516	0.014
dxa_total_body_perc_fat	-0.659	1.672	-0.394	0.694

5.1.4 d'

Table 22: Go-NoGo - d'

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.699	1.144	1.485	0.142
mom_edAA/Technical Degree	0.009	0.287	0.030	0.976
mom_edBachelor Degree	0.026	0.172	0.152	0.880
mom_edHigh School/GED	-0.080	0.350	-0.229	0.820
income>\$100,000	-0.189	0.294	-0.643	0.522
income\$51,000 - \$100,000	-0.117	0.264	-0.444	0.658
sexFemale	0.252	0.171	1.473	0.145
age_yr	0.147	0.122	1.204	0.232
dxa_total_body_perc_fat	-0.014	0.019	-0.757	0.451

5.2 Stop-Signal Task

5.2.1 Stop Signal Reaction Time

Table 23: Stop-Signal Task SSRT - Body Fat Percentage

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	489.034	199.047	2.457	0.017
mom_edAA/Technical Degree	86.084	52.288	1.646	0.105
mom_edBachelor Degree	-12.133	28.196	-0.430	0.669
mom_edHigh School/GED	-78.074	55.311	-1.412	0.164
income>\$100,000	-16.570	51.056	-0.325	0.747
income\$51,000 - \$100,000	-8.852	47.599	-0.186	0.853
sexFemale	9.556	26.800	0.357	0.723
age_yr	-34.471	20.409	-1.689	0.097
dxa_total_body_perc_fat	4.427	3.187	1.389	0.170

5.2.1.1 Overall

5.2.2 Energy Density Trials

Table 24: Stop-Signal Task SSRT - ED x Body Fat Percentage

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	375	229	44	2	0
mom_edAA/Technical Degree	132	66	40	2	0
mom_edBachelor Degree	-23	33	40	-1	0
mom_edHigh School/GED	-90	59	40	-2	0
income>\$100,000	-33	54	40	-1	1
income\$51,000 - \$100,000	-25	49	40	-1	1
sexFemale	6	32	40	0	1
age_yr	-24	24	40	-1	0
EDHigh ED	50	102	47	0	1
dxa_total_body_perc_fat	6	4	59	1	0
EDHigh ED:dxa_total_body_perc_fat	-1	4	47	0	1

Table 25: Stop-Signal Task SSRT - ED + Body Fat Percentage

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	375	229	44	2	0
mom_edAA/Technical Degree	132	66	40	2	0
mom_edBachelor Degree	-23	33	40	-1	0
mom_edHigh School/GED	-90	59	40	-2	0
income>\$100,000	-33	54	40	-1	1
income\$51,000 - \$100,000	-25	49	40	-1	1
sexFemale	6	32	40	0	1
age_yr	-24	24	40	-1	0
EDHigh ED	50	102	47	0	1
dxa_total_body_perc_fat	6	4	59	1	0
EDHigh ED:dxa_total_body_perc_fat	-1	4	47	0	1

5.2.3 Portion Size Trials

Table 26: Stop-Signal Task SSRT - PS x Body Fat Percentage

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	357	193	48	2	0
mom_edAA/Technical Degree	-40	54	43	-1	0
mom_edBachelor Degree	-17	27	43	-1	1
mom_edHigh School/GED	-95	50	43	-2	0
income>\$100,000	-38	45	43	-1	0
income\$51,000 - \$100,000	-15	41	43	0	1
sexFemale	9	25	43	0	1
age_yr	-18	19	43	-1	0
PSLarge PS	56	92	50	1	1
dxa_total_body_perc_fat	6	3	67	2	0
PSLarge PS:dxa_total_body_perc_fat	-2	3	50	-1	0

Table 27: Stop-Signal Task SSRT - PS + Body Fat Percentage

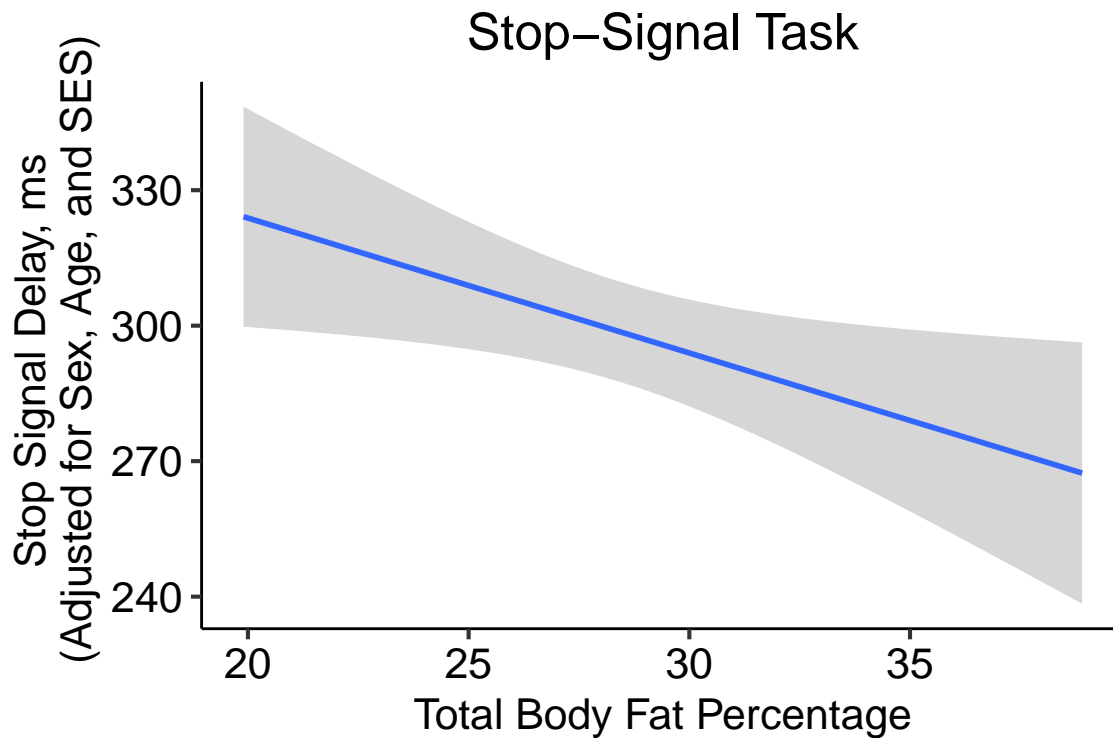
	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	357	193	48	2	0
mom_edAA/Technical Degree	-40	54	43	-1	0
mom_edBachelor Degree	-17	27	43	-1	1
mom_edHigh School/GED	-95	50	43	-2	0
income>\$100,000	-38	45	43	-1	0
income\$51,000 - \$100,000	-15	41	43	0	1
sexFemale	9	25	43	0	1
age_yr	-18	19	43	-1	0
PSLarge PS	56	92	50	1	1
dxa_total_body_perc_fat	6	3	67	2	0
PSLarge PS:dxa_total_body_perc_fat	-2	3	50	-1	0

5.2.4 Stop Signal Delay

Table 28: Stop-Signal Task SSD - Body Fat Percentage

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	375	165	2	0
mom_edAA/Technical Degree	-94	43	-2	0
mom_edBachelor Degree	-20	23	-1	0
mom_edHigh School/GED	36	46	1	0
income>\$100,000	22	42	1	1
income\$51,000 - \$100,000	14	40	0	1
sexFemale	55	22	2	0
age_yr	8	17	0	1
dxa_total_body_perc_fat	-6	3	-2	0

5.2.4.1 Overall



There was an effect of body fat percentage such that higher body fat percentage was associated with shorter stop signal delays (worse).

5.2.4.2 Energy Density Trials

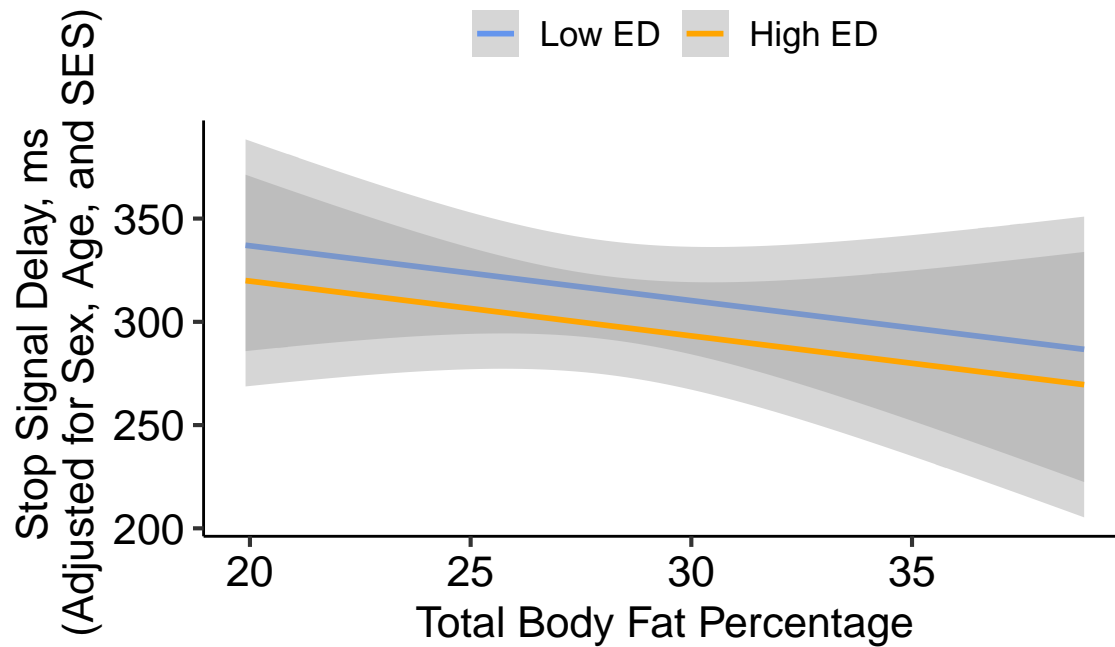
Table 29: Stop-Signal Task SSD - Body Fat Percentage x ED

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	488	198	41	2	0
mom_edAA/Technical Degree	-58	58	40	-1	0
mom_edBachelor Degree	-15	29	40	-1	1
mom_edHigh School/GED	51	52	40	1	0
income>\$100,000	29	47	40	1	1
income\$51,000 - \$100,000	16	43	40	0	1
sexFemale	77	28	40	3	0
age_yr	-2	21	40	0	1
EDHigh ED	-14	53	47	0	1
dxa_total_body_perc_fat	-8	3	47	-2	0
EDHigh ED:dxa_total_body_perc_fat	0	2	47	0	1

Table 30: Stop-Signal Task SSD - Body Fat Percentage + ED

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	490	196	40	2	0
mom_edAA/Technical Degree	-58	58	40	-1	0
mom_edBachelor Degree	-15	29	40	-1	1
mom_edHigh School/GED	51	52	40	1	0
income>\$100,000	29	47	40	1	1
income\$51,000 - \$100,000	16	43	40	0	1
sexFemale	77	28	40	3	0
age_yr	-2	21	40	0	1
EDHigh ED	-17	8	48	-2	0
dxa_total_body_perc_fat	-8	3	40	-2	0

Stop-Signal Task – Energy Density



There was no interaction between energy density and body fat percentage. There was, however, an effect of energy density and an effect of body fat percentage. Children had shorter stop signal delays (worse) during high energy dense blocks compared to low energy density blocks. Higher body fat percentage was associated with shorter stop signal delays (worse).

\$emmeans

ED	emmean	SE	df	lower.CL	upper.CL
Low ED	310	18.3	44	273	347
High ED	293	18.3	44	256	330

Results are averaged over the levels of: mom_ed, income, sex

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Low ED - High ED	17.1	7.97	48	2.146	0.0369

Results are averaged over the levels of: mom_ed, income, sex

Degrees-of-freedom method: kenward-roger

dxa_total_body_perc_fat	dxa_total_body_perc_fat.trend	SE	df	t.ratio	p.value
28.1	-7.66	3.23	40	-2.375	0.0224

Results are averaged over the levels of: mom_ed, income, sex, ED

Degrees-of-freedom method: kenward-roger

Table 31: Stop-Signal Task SSD - Body Fat Percentage x PS

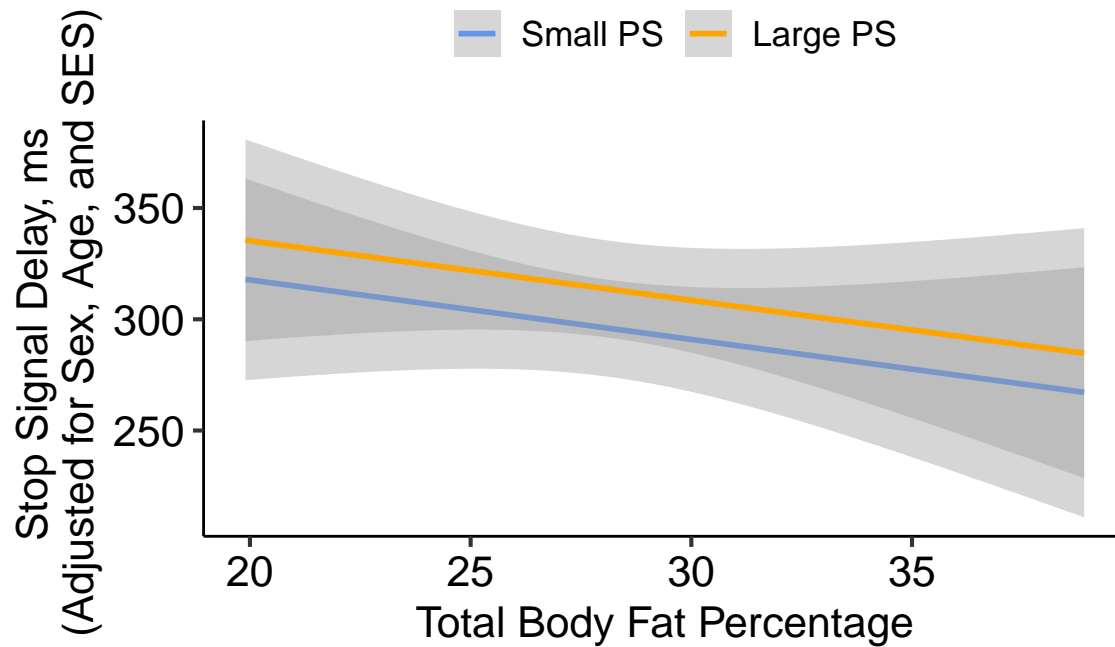
	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	439	200	45	2	0
mom_edAA/Technical Degree	-40	57	43	-1	0
mom_edBachelor Degree	-20	28	43	-1	0
mom_edHigh School/GED	44	53	43	1	0
income>\$100,000	26	47	43	1	1
income\$51,000 - \$100,000	12	43	43	0	1
sexFemale	63	27	43	2	0
age_yr	2	21	43	0	1
PSLarge PS	-18	53	50	0	1
dxa_total_body_perc_fat	-7	3	51	-2	0
PSLarge PS:dxa_total_body_perc_fat	1	2	50	1	0

Table 32: Stop-Signal Task SSD - Body Fat Percentage + PS

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	421	198	43	2	0
mom_edAA/Technical Degree	-40	57	43	-1	0
mom_edBachelor Degree	-20	28	43	-1	0
mom_edHigh School/GED	44	53	43	1	0
income>\$100,000	26	47	43	1	1
income\$51,000 - \$100,000	12	43	43	0	1
sexFemale	63	27	43	2	0
age_yr	2	21	43	0	1
PSLarge PS	18	8	51	2	0
dxa_total_body_perc_fat	-6	3	43	-2	0

5.2.4.3 Portion Size Trials

Stop-Signal Task – Portion Size



There was no interaction between portion size and body fat percentage. There was, however, an effect of portion size and an effect of body fat percentage. Children had longer stop signal delays (better) during blocks where 80% of stop trials were large portion compared to small portion. Higher body fat percentage was associated with shorter stop signal delays (worse).

\$emmeans

PS	emmean	SE	df	lower.CL	upper.CL
Small PS	297	18.6	47.6	260	335
Large PS	315	18.6	47.6	278	352

Results are averaged over the levels of: mom_ed, income, sex

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Small PS - Large PS	-17.6	8.38	51	-2.100	0.0407

Results are averaged over the levels of: mom_ed, income, sex

Degrees-of-freedom method: kenward-roger

dxa_total_body_perc_fat	dxa_total_body_perc_fat.trend	SE	df	t.ratio	p.value
28.1	-6.39	3.14	43	-2.039	0.0477

Results are averaged over the levels of: mom_ed, income, sex, PS

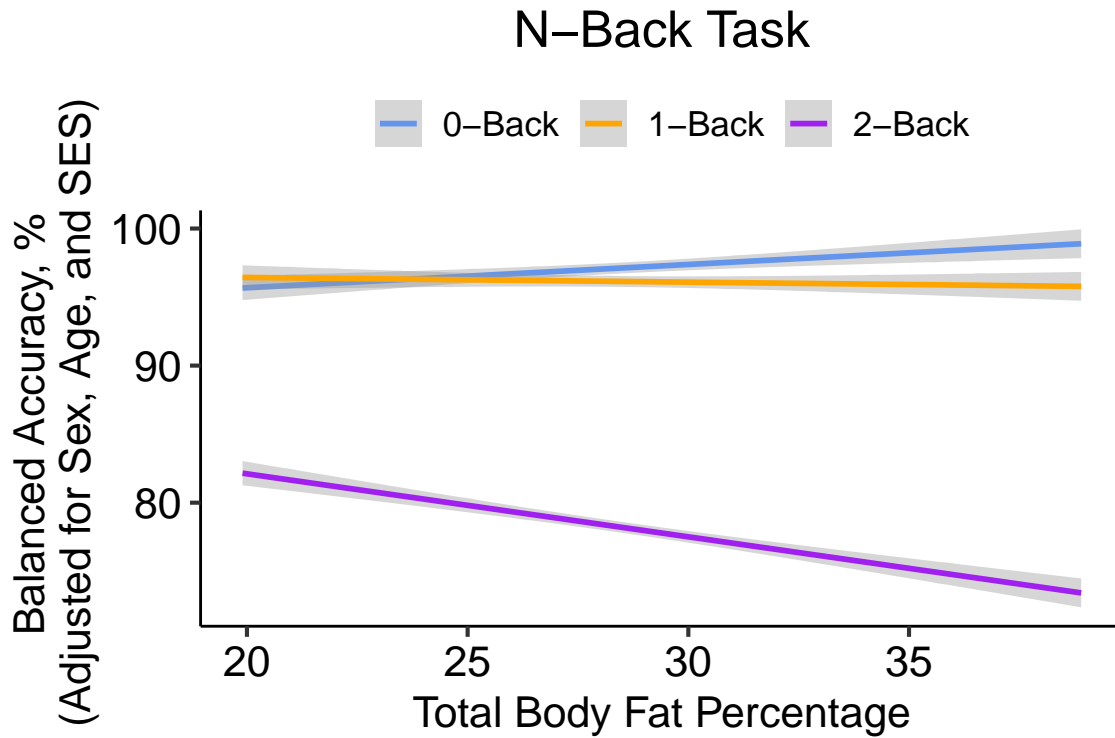
Degrees-of-freedom method: kenward-roger

5.3 N-back

5.3.1 Ballanced Accuracy

Table 33: Nback Ballanced Accuracy - Body Fat Percentage x Load

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	87.873	10.542	108.550	8.336	0.000
mom_edAA/Technical Degree	-3.743	2.245	70.000	-1.667	0.100
mom_edBachelor Degree	0.495	1.354	70.000	0.366	0.716
mom_edHigh School/GED	0.383	2.559	70.000	0.150	0.881
income>\$100,000	2.502	2.292	70.000	1.092	0.279
income\$51,000 - \$100,000	2.220	2.067	70.000	1.074	0.287
sexFemale	-0.809	1.337	70.000	-0.605	0.547
age_yr	0.275	0.996	70.000	0.276	0.783
block1-Back	4.839	8.357	154.000	0.579	0.563
block2-Back	-0.984	8.357	154.000	-0.118	0.906
dxa_total_body_perc_fat	0.195	0.227	205.576	0.858	0.392
block1-Back:dxa_total_body_perc_fat	-0.204	0.291	154.000	-0.702	0.484
block2-Back:dxa_total_body_perc_fat	-0.630	0.291	154.000	-2.164	0.032



Interaction between total body fat percentage and load shows that higher body fat percentages are associated with worse working memory at the highest load (2-back)

```
$emmeans
  block emmean   SE   df lower.CL upper.CL
```

0-Back	96.0	1.06	180	93.9	98.1
1-Back	95.0	1.06	180	92.9	97.1
2-Back	77.1	1.06	180	75.0	79.2

Results are averaged over the levels of: mom_ed, income, sex
Degrees-of-freedom method: kenward-roger
Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
(0-Back) - (1-Back)	0.965	1.25	154	0.774	0.7198
(0-Back) - (2-Back)	18.862	1.25	154	15.127	<.0001
(1-Back) - (2-Back)	17.898	1.25	154	14.353	<.0001

Results are averaged over the levels of: mom_ed, income, sex
Degrees-of-freedom method: kenward-roger
P value adjustment: tukey method for comparing a family of 3 estimates

block	dxa_total_body_perc_fat	dxa_total_body_perc_fat.trend	SE	df	t.ratio
0-Back	28.4	0.19462	0.227	206	0.858
1-Back	28.4	-0.00973	0.227	206	-0.043
2-Back	28.4	-0.43488	0.227	206	-1.918

p.value
0.3918
0.9658
0.0565

Results are averaged over the levels of: mom_ed, income, sex
Degrees-of-freedom method: kenward-roger

5.3.2 d'

Table 34: Nback Balanced Accuracy - Risk Status x Load

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	3.475	0.887	103.769	3.919	0.000
mom_edAA/Technical Degree	-0.265	0.191	70.000	-1.387	0.170
mom_edBachelor Degree	0.030	0.115	70.000	0.261	0.795
mom_edHigh School/GED	0.042	0.218	70.000	0.190	0.850
income>\$100,000	0.162	0.195	70.000	0.831	0.409
income\$51,000 - \$100,000	0.144	0.176	70.000	0.815	0.418
sexFemale	0.010	0.114	70.000	0.089	0.929
age_yr	-0.003	0.085	70.000	-0.032	0.975
block1-Back	0.235	0.667	154.000	0.352	0.726
block2-Back	-0.831	0.667	154.000	-1.246	0.214
dxa_total_body_perc_fat	0.002	0.019	197.048	0.133	0.894
block1-Back:dxa_total_body_perc_fat	-0.012	0.023	154.000	-0.510	0.611
block2-Back:dxa_total_body_perc_fat	-0.022	0.023	154.000	-0.928	0.355