

Web Appendix for

The Effect of Fast Food Restaurants on Obesity and Weight Gain

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This appendix contains additional specifications referred to in our paper.

In the schools data, we have considered a number of alternative specifications. Table 1 shows specifications on the heterogeneity of the fast-food effect on schools by gender. Table 2 shows: (1) estimates from models that include an indicator for more than one restaurant within .1 miles; (2) the number of other restaurants within .1 miles; (3) an optimal trimming model, where we include only schools that have a propensity score between .1 and .9; (4) a nearest neighborhood matching specification, where we match on all the school level and block level covariates; and (5) a “proximity regression” where we use only the subsample of schools that are within .25 miles of a fast food restaurant and examine the effect of being within .1 miles. All of these specifications yield estimates similar to those described in the text.

Table 3 shows estimates of effect of fast food restaurants on alternative measures of fitness including: abdominal strength, aerobic capacity, flexibility, trunk strength and upper body strength. Cross-sectional estimates point to a negative effect of fast food restaurant on flexibility. However, fixed effects estimates are generally insignificant except for obesity.

In Table 4A we regress the availability of fast-food at different distances from schools on the set of demographic variables, essentially reversing the dependent and independent variables relative to Table 4 in the main text. This alternative specification allows us to conduct F-tests for on the significance of all the controls. The finding, as in Table 4, is that there is no evidence of selection at very close distances from a fast-food restaurant.

Turning to the results for mothers, Table 4B shows models that predict weight gain during pregnancy as a function of maternal characteristics, and models that predict proximity to restaurants as a function of the same characteristics. These models show

that, for example, being African American is associated with a smaller probability of gaining over 20kg during pregnancy, but with a higher propensity to live very close to a fast food restaurant. Similarly, Panel B shows that a single index predictor of the probability of high weight gain during pregnancy is negatively related to proximity to fast food in models with mother fixed effects. These estimates suggest that if the mother estimates are biased by omitted characteristics, they are likely to be biased towards zero.

Table 5 presents a placebo test based on timing. This specification asks whether changes in obesity rates are a function of *future* fast-food restaurant locations and *past* fast-food restaurant locations while controlling for current fast food restaurant locations. If fast-food restaurants open in areas that experience unobserved upward trends in the demand for fast food, it is possible that current obesity rates may be correlated with future (or lagged) fast-food restaurant availability. Otherwise, we expect that future fast-food restaurant exposure should not affect obesity rates. Similarly, lagged fast-food restaurant presence near the school should not affect obesity rates since students in 9th grade are typically starting high-school in a different location from where they attended middle school. The coefficient on the availability of fast-food restaurants 3 years later is not statistically significant at conventional levels. We also do not find any significant effect of the presence of a fast-food restaurant within .1 mile of the school 3 years prior, even though the estimates are noisy and the contemporaneous effect is no longer significant.

Turning back to mothers, Table 6 shows 1) estimates from models that include an indicator for more than one restaurant within .5 miles; (2) the number of other restaurants within .5 miles; (3) an optimal trimming model, where we include only mothers who have a propensity score between .1 and .9; (4) a “proximity regression” where we use only mothers who lived within a mile of a fast food restaurant. The estimates are similar to those reported in the text.

Table 7 shows estimates of the effects of proximity to fast food on alternative health outcomes. The most interesting result is that proximity to fast food is associated with a higher probability of diabetes during pregnancy in models with mother fixed effects.

WEB APPENDIX TABLE 1
HETEROGENEITY IN IMPACT OF FAST-FOOD ON OBESITY IN SCHOOLS

Dep. Var.:	% of obese 9th graders in demographic group		
	Whites	Males	Females
	(1)	(4)	(5)
Panel A. Cross-Sectional Regression			
Availability of Fast Food Rest.	2.8149	1.3833	1.9248
Within .1 miles	(1.0163)***	(0.8002)*	(1.0002)*
Availability of Other Rest.	-0.8204	-0.5993	-0.6006
Within .1 miles	(0.7328)	(0.5425)	(0.6526)
R ²	0.284	0.401	0.4246
Panel B. Fixed-Effect Regression			
Availability of Fast Food Rest.	3.7168	3.9964	8.554
Within .1 miles	(2.5520)	(2.3144)*	(2.6775)***
Availability of Other Rest.	0.7213	0.2259	1.5046
Within .1 miles	(1.4140)	(1.7925)	(1.6370)
R ²	0.5482	0.6209	0.6469
Year Fixed Effects	X	X	X
School Controls	X	X	X
Census Block Controls	X	X	X
Controls for Restaurants at .25	X	X	X
Average of Dep. Var.	28.2286	33.7454	30.7471
N	6513	7780	7502

Notes: Each column is a different regression. The unit of observation is a school-grade-race-(or gender)-year in the years 1999 and 2001-2007.. The sample varies across racial groups (across genders) because race-specific (gender-specific) obesity is reported only for races (genders) that have at least 10 students in a given grade-school-year. Panel A presents the results of a cross-sectional regression which includes the full set of school-level and Census-block controls employed for the benchmark results, including controls for the availability of fast-food restaurants and other restaurants within .25 and .5 miles. Panel B presents the results of a fixed-effect regression which includes, in addition to the controls listed in Panel A, school fixed effects. Standard errors clustered by school in parenthesis.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

WEB APPENDIX TABLE 2
IMPACT OF FAST-FOOD ON OBESITY IN SCHOOLS: ADDITIONAL ROBUSTNESS CHECKS

Dep. Var.:	(1)	(2)	(3)	(4)	(5)
Availability of Fast Food Rest.	1.668	2.0754	2.0234	1.7916	2.0046
Within .1 miles	(0.9080)*	(0.9415)**	(1.2898)	(.9361)*	(0.9658)**
Availability of Other Rest.	-0.6205		1.7044		-1.0868
Within .1 miles	(0.5702)		(2.0437)		(0.8638)
Avail. of >=2 Fast Food Rest.	0.415				
Within .1 miles	(2.0676)				
No. of Other Rest.		-0.4091			
Within .1 miles		(0.2196)*			
School Fixed Effects	-	-	-	-	-
Year Fixed Effects	X	X	X	X	X
School Controls	X	X	X	X	X
Census Block Controls	X	X	X	X	X
Controls for Restaurants at .25 and .5 miles	X	X	X	-	-
Specification:	Cross-Section OLS	Cross-Section OLS	Optimal Trimming	Matching Estimator	Proximity Regression
Sample:	All Schools	All Schools	Schools with Prop. Score >=.1 and <=.9	All Schools	Schools with Fast Food Within .25 m.
R ²	0.4296	0.4309	0.5116	.	0.4519
N	8373	8373	992	8373	1486

Notes: Each column is a different OLS regression. The regressions are weighted by the number of students. The dependent variable is the percentage of students in the 9th grade who are classified as obese. The mean of the dependent variable is 32.9494. The unit of observation is a school-grade-year for schools in California in the years 1999 and 2001-2007. Entries in row 1 and 2 are the coefficient on a dummy for the existence of a fast fast food restaurant and a non-fast food restaurant closer than .1 miles from the school. The entry in row 3 is the coefficient on a dummy for whether there are 2+ fast food restaurants less than .1 miles from the school. The entry in row 4 is the coefficient on the number of non-fast food restaurants within .1 from the school. The school-level controls are from the Common Core of Data, with the addition of Star test scores for the 9th grade. The Census block controls are from the closest block to the address of the school. Table 1A lists the School and Census block controls. Standard errors clustered by school in parenthesis.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

WEB APPENDIX TABLE 3
IMPACT OF FAST-FOOD ON OBESITY IN SCHOOLS: ALL FITNESS MEASURES

Dep. Var.:	Percent of 9th graders not fit in test					
	Obesity (Low Fat Content)	Abdominal Strength	Aerobic Capacity	Flexibility	Trunk Strength	Upper Body Strength
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Cross-Sectional Regression						
Availability of Fast Food Rest.	1.7385	-0.1839	-1.3924	-3.042	1.1195	-2.9478
Within .1 miles	(0.8740)**	(1.5629)	(1.8191)	(1.4496)**	(1.3782)	(1.7474)*
Availability of Other Rest.	-0.6162	1.0865	-1.1673	0.8202	-0.7297	-0.5012
Within .1 miles	(0.5704)	(0.8886)	(1.1207)	(0.8803)	(0.8452)	(1.1798)
R ²	0.4296	0.3638	0.495	0.2174	0.212	0.2794
Panel B. School Fixed-Effect Panel						
Availability of Fast Food Rest.	6.3337	2.8363	0.8663	0.2044	6.0142	2.0322
Within .1 miles	(2.8750)**	(2.3496)	(2.5744)	(3.2311)	(3.5905)*	(3.7033)
Availability of Other Rest.	1.0026	0.5883	-0.0915	0.1753	3.1242	-0.8593
Within .1 miles	(1.8236)	(1.9910)	(1.8125)	(2.4934)	(2.1723)	(2.2253)
R ²	0.6512	0.6874	0.8011	0.5469	0.5472	0.6645
Year Fixed Effects	X	X	X	X	X	X
School Controls	X	X	X	X	X	X
Census Block Controls	X	X	X	X	X	X
Average of Dep. Var.	32.9591	21.2723	51.0022	31.4660	17.3974	34.9211
N	8373	8191	8106	8159	7975	8283

Notes: Each column is a different OLS regression with a different measure of lack of fitness as dependent variable. The regressions are weighted by the number of students. The unit of observation is a school-grade-year for schools in California in the years 1999 and 2001-2007. Panel A presents the results of a cross-sectional regression which includes the full set of school-level and Census-block controls employed for the benchmark results, including controls for the availability of fast-food restaurants and other restaurants within .25 and .5 miles. Panel B presents the results of a fixed-effect regression which includes, in addition to the controls listed in Panel A, school fixed effects. Table 1A lists the School and Census Block controls. Standard errors clustered by school in parenthesis.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

WEB APPENDIX TABLE 4A
 PREDICTORS OF OBESITY AND FAST-FOOD PRESENCE NEAR SCHOOLS: CROSS-SECTION AND PANEL

Dep. Var.:	Availability of fast-food within distance from school							
	% Obese 9th graders		.5 miles	.25 miles	.1 miles	.5 miles	.25 miles	.1 miles
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. All Controls								
Share African American students in school	13.8132 (2.7498)***	3.852 (12.0263)	0.3224 (0.2217)	0.0395 (0.1934)	-0.0422 (0.0715)	-0.3886 (0.2809)	0.009 (0.1810)	-0.0877 (0.0990)
Share Asian students in school	-3.5712 (2.4789)	-28.3859 (9.7706)***	-0.0071 (0.1712)	0.1433 (0.1495)	-0.0407 (0.0755)	0.2402 (0.2558)	0.3009 (0.1717)*	0.0026 (0.0628)
Share Hispanic students in school	7.176 (1.9494)***	19.9484 (7.5594)***	-0.0582 (0.1432)	0.155 (0.1190)	0.0381 (0.0524)	-0.1575 (0.2241)	-0.0102 (0.1268)	-0.0369 (0.0614)
Share of closest Census block that is urban	1.0413 (0.9509)	-	0.1005 (0.0475)**	-0.0189 (0.0360)	0.0431 (0.0185)**	-	-	-
Test Scores in 9th grade	-0.1953 (0.0182)***	-0.0441 (0.0210)**	0.0014 (0.0010)	0.0013 (0.0009)	-0.0004 (0.0004)	-0.0016 (0.0005)***	-0.0002 (0.0003)	-0.0001 (0.0001)
Availability of Other Restaurants within same distance			0.4206 (0.0319)***	0.3218 (0.0276)***	0.1684 (0.0383)***	0.0116 (0.0305)	0.0057 (0.0217)	0.0328 (0.0273)
F-Test Demographic Controls = 0	F=52.20***	F=3.93***	F=4.43***	F=1.16	F=0.99	F=1.31	F=0.65	F=0.57
R ²	0.4284	0.6503	0.2836	0.228	0.133	0.926	0.9385	0.9287
Panel B. Single Predictor of Obesity								
Predicted Share of Obese 9th Graders (Based on Controls)			0.0051 (0.0021)**	-0.0009 (0.0017)	0.0008 (0.0007)	-0.0048 (0.0029)*	-0.0015 (0.0027)	-0.0004 (0.0010)
Availability of Other Restaurants within same distance			0.5431 (0.0243)***	0.3485 (0.0265)***	0.1681 (0.0377)***	0.0124 (0.0309)	0.0047 (0.0216)	0.0332 (0.0271)
R ²	0.4284	0.6503	0.198	0.1932	0.0879	0.9251	0.9383	0.9283
School Fixed Effects	-	X	-	-	-	X	X	X
Year Fixed Effects	X	X	X	X	X	X	X	X
Additional School Controls	X	X	X	X	X	X	X	X
Census Block Controls	X	X	X	X	X	X	X	X
Average of Dep. Var.	32.9494	32.9494	0.4696	0.1775	0.0397	0.4696	0.1775	0.0397
N	8373	8373	8373	8373	8373	8373	8373	8373

Notes: Each column is a different OLS regression. The regressions are weighted by the number of students. The dependent variable in Columns 1 and 2 is the percentage of students in the 9th grade who are classified as obese. The dependent variables in columns 3-8 are indicator variables for the presence of at least one fast-food restaurant within the prescribed distance from the school. The unit of observation is a school-grade-year for schools in California in the years 1999 and 2001-2007. The school-level controls are from the Common-Core data, with the addition of Star test scores for the 9th grade. The Census block controls are from the closest block to the address of the school. Standard errors clustered by school in parenthesis.

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WEB APPENDIX TABLE 4B
 PREDICTORS OF FAST-FOOD PRESENCE NEAR MATERNAL RESIDENCE: PANEL

Dep. Var.:	Weight Gain Larger than 20kg		Availability of fast-food within distance from mother's residence					
			.5 miles	.25 miles	.1 miles	.5 miles	.25 miles	.1 miles
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. All Controls								
African American mother	-0.0065 (0.0013)***	.	0.0013 (0.0059)	-0.0004 (0.0025)	0.0022 (0.0008)***	.	.	.
Hispanic mother	-0.0292 (0.0010)***	.	0.0101 (0.0033)***	0.0034 (0.0019)*	0.0019 (0.0007)***	.	.	.
Mother smokes	0.0137 (0.0009)***	-0.0048 (0.0013)***	0.0028 (0.0013)**	0.0006 (0.0007)	0.0001 (0.0003)	0.0035 (0.0011)***	0.0013 (0.0008)*	0.0003 (0.0003)
Mother is married	-0.0132 (0.0007)***	-0.00545 (0.0009)***	-0.0036 (0.0013)***	-0.0017 (0.0007)**	-0.0007 (0.0003)***	0.0023 (0.0010)**	0.0010 (0.0007)	0.0001 (0.0003)
Availability other restaurants within same distance			0.263 (0.0049)***	0.154 (0.0033)***	0.0812 (0.0031)***	0.281 (0.0008)***	0.153 (0.0006)***	0.0792 (0.0006)***
F-Test Controls=0	F=372.1***	F=82.01***	F=2928.96***	F=18547.05***	F=20.26***	F=29.53***	F=7.426***	F=2.957***
R ²	0.008	0.006	0.072	0.068	0.043	0.073	0.063	0.039
Panel B. Single Predictor of Weight Gain								
Predicted probability of weight gain > 20 kg (probit, based on controls)			0.169*** (0.0203)	0.0754*** (0.0107)	0.0242*** (0.0038)	-0.455*** (0.0142)	-0.118*** (0.0094)	-0.0096** (0.0043)
Availability other restaurants within same distance			0.272*** (0.0048)	0.157*** (0.0034)	0.0817*** (0.0031)	0.282*** (0.0008)	0.153*** (0.0006)	0.0792*** (0.0006)
R ²			0.066	0.066	0.042	0.069	0.062	0.039
Zip-Code Fixed Effects	X	-	X	X	X	-	-	-
Mother Fixed Effects	-	X	-	-	-	X	X	X
Maternal Characteristics	X	X	X	X	X	X	X	X
N	3019194	3019194	3531087	3531087	3531087	3531154	3531154	3531154

Notes: Each column is a different OLS regression. The unit of observation is a pregnancy for mothers with at least two births in the sample. The dependent variable in Column 1 and 2 is the indicator for pregnancy weight gain larger than 20kg. The dependent variables in columns 3-8 are indicator variables for the presence of at least one fast-food restaurant within the prescribed distance from the residence of the mother. All the regressions in Panel A include a full set of demographic controls listed in the text. Standard errors clustered by zip code (columns 1 and 3-5) or by mother (columns 2 and 6-8) in parenthesis.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

WEB APPENDIX TABLE 5
IMPACT OF FAST-FOOD ON OBESITY IN SCHOOLS: PLACEBOS USING TIMING

Dep. Var.:	Placebos based on lead		Placebo based on lag
	% of obese 9th graders		% of obese 9th graders
	(1)	(2)	(3)
Availability of Fast Food Rest.	5.9191	-	1.0343
Within .1 miles	(2.3877)**	-	(1.3777)
Availability of Other Restaurant	0.414	0.2828	1.1174
Within .1 miles	(1.6475)	(1.7644)	(1.0583)
Availability of Fast Food Rest.	-4.0011	-1.1628	
Within .1 miles 3 Years Later	(2.1361)*	(1.9063)	
Availability of Other Restaurant	-0.5785	-0.6153	
Within .1 miles 3 Years Later	(1.6646)	(1.7710)	
Availability of Fast Food Rest.			0.7887
Within .1 miles 3 Years Earlier			(1.3720)
Availability of Other Restaurant			-2.0254
Within .1 miles 3 Years Earlier			(1.0353)*
Sample:	All Schools	Schools with no Fast-Food at .1 miles	All Schools
School Fixed Effects	-	-	-
Year Fixed Effects	X	X	X
School Controls	X	X	X
Census Block Controls	X	X	X
Controls for Restaurants at .25 and .5 miles	X	X	X
R ²	0.3877	0.3869	0.4302
N	4734	4551	8373

Notes: The regressions are weighted by the number of students. The dependent variable is the percentage of students in the relevant grade who are classified as obese. The unit of observation is a school-grade-year for schools in California in the years 1999 and 2001-2005. The sample in column 2 includes only schools that in that year do not have a fast food restaurant located within .1 mile. Entries in row 1 (respectively, row 2) are the coefficient on a dummy for the existence of a fast food restaurant (respectively, non-fast-food restaurant) less than .1 miles from the school. The entry in row 3 (respectively, row 4) is the coefficient on a dummy for the existence of a fast food restaurant (respectively, non-fast-food restaurant) less than .1 miles from the school 3 years after obesity is measured. The entry in row 5 (respectively, row 6) is the coefficient on a dummy for the existence of a fast food restaurant (respectively, non-fast-food restaurant) less than .1 miles from the school 3 years before obesity is measured. The school-level controls are from the Common Core of Data. The Census block controls are from the closest block to the address of the school. Table 1A lists the School and Census Block controls. Standard errors clustered by school in parenthesis.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

WEB APPENDIX TABLE 6
IMPACT OF FAST-FOOD ON WEIGHT GAIN LARGER THAN 20KG: ADDITIONAL
ROBUSTNESS CHECKS WITH MOTHER FIXED EFFECT MODELS

Dep. Var.:	Weight Gain During Pregnancy Larger Than 20kg			
	(1)	(2)	(3)	(4)
Availability of Fast Food Rest.	0.0029	0.0026	0.0019	0.0019
Within .5 miles	(0.0008)***	(0.0007)***	(0.0008)**	(0.0009)**
Availability of Other Rest.	0.0002		-0.0323	0.0003
Within .5 miles	(0.0008)		(0.0067)***	(0.0015)
Avail. of >=2 Fast Food Rest.	-0.0012			
Within .5 miles	(0.0011)			
No. of Other Rest.		0.0017		
Within .5 miles (100s)		(0.0040)		
Zip-Code Fixed Effects	-	-	-	-
Mother Fixed Effects	X	X	X	X
Maternal Characteristics	X	X	X	X
Specification:	Mother	Mother	Optimal	Proximity
	Fixed Effects	Fixed Effects	Trimming	Regression
Sample:	All Births	All Births	Births with	Mothers with
			Prop. Score	Fast Food
			>=.1 and <=.9	Within 1 mile
R ²	0.006	0.006	0.005	0.005
N	3019256	3019256	2189305	1842733

Notes: Each column is a different OLS regression. The unit of observation is a pregnancy for mothers with at least two births in the sample. Entries in row 1 and 2 are the coefficient on a dummy for the existence of a fast fast food restaurant and a non-fast food restaurant closer than the prescribed distance from the mother's residence. The entry in row 3 is the coefficient on a dummy for whether there are 2+ fast food restaurants less than .5 miles from the mother's residence. The entry in row 4 is the coefficient on the number of non-fast food restaurants within .5 miles from the mother's residence. All the regressions include a full set of demographic controls listed in the text. Standard errors clustered by mother in parenthesis.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

WEB APPENDIX TABLE 7
IMPACT OF FAST-FOOD ON VARIOUS OUTCOMES FOR PREGNANT MOTHERS

Dep. Var.:	Weight gain < 7.26kg Low birth weight			
	Diabetes (1)	Hypertension (2)	Weight gain < 7.26kg (3)	Low birth weight (4)
Panel A. Zip-Code Fixed Effects				
Availability of Fast Food Rest.	0.000799	0.000113	0.000862	0.000404
Within .1 miles	(0.000240)***	(0.000110)	(0.000613)	(0.000333)
Availability of Other Rest.	0.000427	0.000438	0.00467	0.00166
Within .1 miles	(0.000244)*	(0.000118)***	(0.000571)***	(0.000350)***
N	3503350	3503350	3019194	3522400
R ²	0.008	0.003	0.017	0.012
Panel B. Mother Fixed Effects				
Availability of Fast Food Rest.	0.000510	0.000150	-0.000856	-0.000028
Within .1 miles	(0.000286)*	(0.000149)	(0.000737)	(0.000471)
Availability of Other Rest.	-0.000711	0.000456	0.00226	0.00156
Within .1 miles	(0.000305)**	(0.000158)***	(0.000745)***	(0.000473)***
Maternal Characteristics	X	X	X	X
N	3503417	3503417	3019256	3522467
R ²	0.005	0.002	0.014	0.002

Note: Each column is a different OLS regression. The unit of observation is a pregnancy for mothers with at least two births in the sample. Entries in row 1 are coefficients on a dummy for the existence of a fast food restaurant at within 0.5 miles from the mother's residence. Entries in row 2 are coefficients on a dummy for the existence of a non-fast food restaurant within 0.5 miles from the mother's residence. All the regressions include a full set of demographic controls listed in the text. The regressions in Panel A also include zip-code fixed effects, while the regressions in Panel B include mother fixed effects. Standard errors clustered by zip or mother in parenthesis.

* significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent