Published in final edited form as:

Pediatr Obes. 2019 March ; 14(3): e12477. doi:10.1111/ijpo.12477.

Home and Neighborhood Built Environment Features in Family-Based Treatment for Childhood Obesity

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Abstract

Background: Family-based behavioral weight loss treatment for childhood obesity (FBT) helps families develop strategies to facilitate healthy choices in their home and other environments (e.g., home neighborhood). The current study examines how the home food environment, both pre- and post-FBT, and the neighborhoods in which families live are associated with child weight and weight-related outcomes in FBT.

Method: Parent-child dyads (n=181) completed a 16-session FBT program and completed home environment, anthropometric, and child dietary/activity assessments at pre- and post-FBT. Parents reported on availability of food, electronics, and physical activity equipment in the home. The neighborhood food and recreation environment around each dyad's residence was characterized using existing data within a geographic information system (GIS).

Results: Families successfully made healthy home environment modifications during FBT. Regression models showed reducing RED (e.g., high energy-dense and low nutrient-dense) foods and electronics in the home during FBT had positive effects on child weight and weight-related

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Author Contributions

Thank you to Dr. Lauren Fowler and Dr. Joshua Jackson for consultation on the statistical analysis and to Dr. Christine Hoehner and Dr. J. Aaron Hipp for their work compiling the GIS database.

Ms. Hayes, Dr. Saelens, Dr. Balantekin, Dr. Kolko, and Ms. Brown made substantial contributions to the conception and design of the current study, analysis and interpretation of the data, and drafting and revising of the article.

Drs. Stein, Welch, Perri, Schechtman, Epstein, and Wilfley made substantial contributions to the conception and design of the study, and revised the article critically for important intellectual content.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Conflict of Interest: Dr. Wilfley reports grants from National Institute of Child Health and Human Development, grants from National Institute of Mental Health, other from St. Louis Children's Hospital Foundation, during the conduct of the study; All other authors have no conflicts of interest relevant to this article to disclose

Clinical Trial Registration: Childhood Obesity Treatment: A Maintenance Approach (COMPASS), [ClinicalTrials.gov](https://clinicaltrials.gov) Identifier: NCT00759746

outcomes. No neighborhood food or recreation environment variables were significantly related to outcomes, although having a larger density of public recreation spaces was associated with increases in physical activity at the trend-level.

Conclusions: Modifying the home environment, specifically reducing RED foods and electronics, may be particularly important for FBT success.

Keywords

childhood obesity; family-based treatment; Geographic Information System; home environment; treatment predictors

Introduction

Family-based behavioral weight loss treatment (FBT) is effective at reducing childhood obesity in the short and long-term.¹ Empirical evidence and conceptual models highlight the role that aspects of different environments (e.g., home, neighborhood, school) might play in weight and weight-related behaviors.^{2,3} However, little is known about which, if any, features of environmental contexts impact children's success in changing weight and related energy-balance behaviors during treatment.

Changing the home environment is a treatment target of FBT, with families encouraged to modify both the food and activity environment to support healthy choices.^{4,5} For the food environment, this means reducing access to high-fat/high-calorie foods and increasing availability of fruits and vegetables. For the activity environment, families are encouraged to reduce the number of screens at home (e.g., television, computers) and set limits on their use, and to increase equipment that facilitates children's physical activity. Cross-sectional studies highlight correlations between eating and activity patterns and the availability and access to foods and activity spaces/equipment within and around the home.⁶⁻⁹ However, a dearth of studies examine how the home environment, both upon entering a program and changes made throughout the program, relate to weight outcomes.

Homes exist in the broader context of neighborhoods, whose characteristics might also influence children's success at improving health behaviors and weight management. Many studies highlight the relation between the neighborhood food and recreation environment (e.g., restaurants, parks) and weight and weight-related behaviors; however, relatively few have examined the role of the neighborhood food and recreation environment in weight management treatment outcomes.^{10,11} For example, living closer to a park may facilitate physical activity whereas living near many fast-food restaurants may make it more difficult to limit intake of high energy-dense foods. Studies of children participating in obesity treatments have shown that closer proximity of a large supermarket,¹² more park density,¹³ greater nearby parkland,¹⁴ and reduced density of convenience stores and supermarkets¹⁴ are associated with better weight and weight-related behavioral (e.g., fruit and vegetable consumption) outcomes; however, studies assessing this issue are few and focus on longer-term effects. Given behaviors may change across the course of treatment, neighborhood features may differentially impact weight and behaviors in the initial weight loss stage. Moreover, many existing studies only focus on a single neighborhood characteristic, which

does not provide an adequate characterization of an entire neighborhood and the multiple factors that may be influencing eating and activity behaviors. Recent studies highlight the importance of addressing childhood obesity through the lens of systems science,¹⁵ which considers the multilevel factors and broader context in which childhood obesity exists, such as the physical spaces with which children interact regularly.

The current study seeks to understand how the home environment (pre- and post-FBT) as well as the neighborhood recreation and food environments around the home are related to child weight and behavioral outcomes in 16 weekly sessions of FBT. Moreover, given the convenience of utilizing spaces close to the home for food purchasing or physical activity, a second aim of the study is to examine associations between the neighborhood food and recreation environment at baseline and changes in the home environment. This second aim is included to understand if certain features of the neighborhood environment promote the ability to make changes in the home.

Methods

Participants

Study participants were 181 parent-child dyads who completed FBT as part of a larger randomized-clinical trial described in detail elsewhere that assessed the dose and content of maintenance interventions.¹⁶ Data included in the current analysis were from the first four months of the trial during which all participants engaged in FBT (i.e., prior to randomization). Participants were recruited from across the St. Louis, Missouri and Seattle, Washington metropolitan areas via media, referrals, and word of mouth. Children were ages 7–11y with a body mass index (BMI) ≥ 85th percentile for age and sex and had at least one parent with a BMI ≥ 25 kg/m². Exclusion criteria included participation in another weight control program, major psychiatric problems, and significant dietary or physical activity limitations. All parents provided written consent and children provided written assent. The study was approved by the Washington University Institutional Review Board.

Intervention

Participants engaged in a weekly, 16-session FBT, a duration chosen based on existing trials showing clinically-significant outcomes could be achieved over this time period¹⁷ as did computer simulations completed using data from previous trials.¹⁸ Sessions were comprised of concurrent 45-minute parent and child groups and a 30-minute individual family session. FBT is an empirically-supported treatment for childhood obesity that targets diet, physical activity, behavioral modification, and parenting skills to support child weight loss.^{16,19} FBT has been developed and refined over the past 35 years and has demonstrated consistent and reliable improved weight outcomes in children.¹ At the heart of FBT is the Traffic Light System, which is used to categorize food and activities. RED foods and activities were high-energy dense foods and screen time, respectively, while GREEN foods and activities were low-energy dense foods (e.g., most fruits and vegetables) and moderate-to-vigorous physical activity (MVPA), respectively.²⁰ Pre-planning, such as developing grocery lists for the week, and stimulus-control strategies, such as keeping RED foods out of the home, were taught for

modification of the home environment. Additional details regarding the intervention and trial can be found in the recent manuscript published by Wilfley and colleagues (2017).¹⁶

Measures

All measures were obtained pre- and post-FBT unless otherwise noted.

Demographics.—Parents reported child age and sex and completed the Barratt Simplified Measure of Social Status,^{21–22} which uses a summary score based on occupation and education as a measure of socioeconomic status.

Anthropometrics.—Height and weight were measured in triplicate using an electronic scale and wall-mounted stadiometer, and means of the three measures were calculated. Children wore light clothing and removed shoes for measurements. Child BMI was calculated and BMI z-scores (zBMI) were generated using the growth curves for age and sex published by the Centers for Disease Control and Prevention.²³

Diet.—Child dietary intake was assessed by trained, expert interviewers using three telephone-administered 24-hour recalls via the Nutrition Data System for Research (NDSR version 2009, Nutrition Coordinating Center, University of Minnesota). Parents reported child's intake for the prior 24 hours, and if present, the child assisted in the recall. Recalls were conducted on non-consecutive random days following standard protocols using the multiple-pass method, and included at least one weekday and one weekend day. Twenty-four hour dietary recalls by phone with parent report have been validated in children aged 4–11 and have shown high reliability.²⁴ The variables assessed in the current study were average daily kilocalories, fruit and vegetable servings, and percentage intake from fat. These variables were selected because they are directly related to the foods assessed in the home environment and were targets of treatment.

Physical Activity.—ActiGraph® accelerometers were used for objective measurements of child physical activity. Children wore the accelerometer on a belt around their waist oriented above the right hip for seven consecutive days for a minimum of 10 hours per day, removing them for sleep and water-based activities. Age-specific cut points (to the half year) for 4 METs were used to identify MVPA by 30-second epochs.²⁵ Children were included in the analysis if they had 4 or more valid days of wear time. For screen time, parents reported the number of hours children spent a day engaging in screen time behaviors (e.g., watching television, playing computer or video games, and using the computer for leisure), which were summed to reflect the number of hours per week.²⁶

Home Environment.—The home environment was measured with items adapted from the Active Where Parent-Child Survey.²⁶ For the food environment, parents responded to the following questions about certain foods: Are they in the home (yes/no)? Can the child immediately eat them (yes/no)? How much is there (a little/some/a lot)? Yes and no responses were coded as 1 and 0, and amounts ranged from a little (1) to a lot (3). Scores for each food item were tallied to create a final availability score for that item. Summed subscales were then generated to reflect the availability of RED and GREEN foods in the

home. Items about RED foods (11 items) asked about energy-rich and nutrient-poor foods, which included high-calorie snack foods, confectionary items, high-fat meats, sweetened cereals and sugar-sweetened beverages. Items about GREEN foods (4 items) asked about fresh and frozen fruits and vegetables and 100% fruit juice. Similar scales have demonstrated positive relations between food availability in the home and consumption patterns in children.²⁷ The home activity environment was operationalized using the electronic and physical activity equipment in the home. For electronic equipment, parents reported on the number of 18 different electronic devices (e.g., TV, computer) in the house, and these were summed to create a home electronic equipment score. For physical activity equipment, 13 common equipment pieces (e.g., bike, jump rope) were given a score based on availability in the home and were summed to provide a total physical activity equipment score. The activity environment questions have been used previously and have shown acceptable psychometrics.^{28,29}

Neighborhood Recreation and Food Environment.—The food and activity environment were assessed using existing and compiled data within the two regions using Geographic Information Systems (GIS). A one-mile Euclidian buffer was generated around each family's home to define the home neighborhood. The neighborhood food environment was operationalized by the count of number of healthy stores, unhealthy stores, and restaurants. Healthy stores included supermarkets, grocery stores, produce markets, and supercenters, whereas unhealthy stores included general stores and convenience stores. These are similar to the classifications used by Vernez-Moudon and colleagues.³⁰ Restaurants included both full and quick service restaurants, including chain “fast-food” restaurants. The choice was made to combine full and quick service restaurants into one variable given the extremely high correlation ($r=0.82$) between the two categories. The number of parks within the 1-mile buffer, shortest distance to the nearest park from home, and number of public recreation facilities within the 1-mile buffer characterized the neighborhood physical activity environment. The public recreation category included establishments with a variety of recreational uses that were open to the general public. Children living inside their respective metropolitan areas (rather than in further-away suburbs) were included in the GIS analyses ($n=115$). Neighborhood environment measures were only derived once and based on the date most proximal to 2010–2011 (when FBT was conducted).

Statistical Analysis

T-tests were used to determine statistically significant changes in weight, diet, activity, and home environment changes over FBT. Linear regressions predicting four-month outcomes while controlling for baseline values were used to both identify individual relations between each home (pre- and post-FBT) and neighborhood environment variable and each relevant weight, diet, and physical activity outcome (i.e., separate models) as well as relations with outcomes controlling for all relevant home and neighborhood environment variables (i.e., combined models). Covariates in all models included child age, child sex, and family socioeconomic status, given their potential impact on weight, diet, home/neighborhood, and physical activity. Finally, Pearson-product correlations were utilized to assess the relation between baseline home environment variables and baseline neighborhood environment

variables, and regressions with baseline neighborhood environment variables predicting post-FBT home environment variables controlling for baseline home environment variables were used to assess the relation between the neighborhood environment and changes in the home environment. Significance levels were set at $p < 0.05$ and SPSS Version 25 was used for all analyses³¹.

Results

Children ($n=181$) enrolled in the study at baseline were primarily female (62.7%), primarily White (71.8%), approximately 9.5 years old (9.43 ± 1.32), with a baseline average zBMI score of 2.17 ± 0.39 [Table 1]. The subgroup of children for whom GIS data were available did not differ on any baseline variable from children in the larger study who did not; thus, these data are not presented. Furthermore, only 70% ($n=127$) of children met measurement standards for accelerometer data at both pre- and post-FBT and were included in analyses involving accelerometer data.

Changes across treatment

Children improved in all outcome measures from pre- to post-FBT with the exception of MVPA [Table 1]. Most measures of the home environment demonstrated improvements, although physical activity equipment in the house did not change.

Environment Variables Associated with Weight and Behavioral Outcomes: Separate Models

Results of the linear regressions are shown in Tables 2 and 3. For child zBMI, greater electronic equipment at baseline, a greater decrease in electronic equipment post-FBT, and a greater decrease in RED foods post-FBT were associated with greater child zBMI loss. No other associations with child weight status change were found.

For diet outcomes, greater baseline GREEN food availability predicted a greater increase in fruit and vegetable consumption post-FBT, while greater decreases in RED food availability post-FBT predicted greater decreases in change in child percentage intake from fat. For activity outcomes, a larger number of nearby public recreation facilities was related to increases in MVPA post-FBT at the trend-level ($p=0.055$). No other associations with diet or activity outcomes were found.

Environment Variables Associated with Weight and Behavioral Outcomes: Combined Models

In combined models, living closer to a park predicted decreases in child zBMI, $b=0.16$, $t(92)=2.06$, $p=0.043$, and decreases in RED foods in the home post-FBT predicted decreases in child percentage intake from fat, $b=0.16$, $t(92)=1.99$, $p=0.049$. No other associations were found.

Relation between Home (Pre- and Post-FBT) and Neighborhood Environment

Baseline physical activity equipment in the home was positively associated with distance to parks, $r(113) = 0.31$, $p=0.001$ and negatively associated with density of parks, $r(113) =$

–0.22, $p=0.025$. Post-FBT, an increase in GREEN foods in the home was related to lower density of healthy stores, $b=-0.434$, $t(92)=-2.75$, $p=0.007$. No other significant relations of either baseline or change home environment variables with neighborhood environment were found.

Discussion

The results from this study suggest that children participating in FBT were successful at improving their weight, dietary behaviors, and screen time. Additionally, families generally complied with treatment recommendations to modify the home. In doing so, decreasing child access to RED foods (e.g., not purchasing RED food items at the grocery store, limiting number of RED items) was related to lower child zBMI and a reduction in the percentage of calories from fat. As families make changes to reduce the availability of these foods, children may have more difficulty accessing them, thus promoting weight loss. Cross-sectional studies have found relations between high-fat food availability in the home and child consumption,^{7,32} and other treatment studies have shown decreasing RED food consumption to support weight management.³³ Additionally, reducing the number of electronics in the home (e.g., removing electronics such as televisions or computers in bedrooms) was associated with improved child weight outcome. Time spent engaging with electronics is generally sedentary, thus as the number of electronics reduces, children may substitute sedentary behavior for more active behavior. This finding is in line with other research suggesting screen time as well as quantity and location of electronics are associated with obesity status.^{34,35}

Interestingly, baseline home environment variables, namely greater GREEN food availability and greater electronics were also positively related to outcomes. Children who begin a program with greater exposure to GREEN foods may have an easier time consuming them, while children with more electronics at the start of the program may have more room for change, although a moderation analysis would be required to definitively confirm this assertion. Relatively fewer relations were found between the neighborhood food and recreation environment and outcomes, suggesting that in the short-term, these built environment features may not impact weight loss or weight-related behavior change. One exception was the density of recreational facilities, which was related to physical activity, suggesting that having a greater number of these resources around the home may increase their usage and physical activity behavior when participating in a 4-month intervention, although caution should be taken in this interpretation as this was a trend-level finding.

In more comprehensive models that combined home and neighborhood environment variables, many of these findings disappeared, indicating overlap in these variables in explaining the variance in the outcomes. One relation that remained was the significant positive association between changes in RED foods in the home and changes in child percentage intake from fat. Moreover, a positive relation between distance to a park and child weight loss was observed that was not observed in the independent models, suggesting this may be an important factor once other related variables are controlled. This is in line with previous long-term studies showing the positive impact of park density and greater parkland around the house on child weight outcomes in obesity treatment.^{13,14}

In addition to the observed significant relations, a number of non-significant associations were observed in both models. Changes in the food home environment for GREEN foods did not affect weight loss or the diet quality variables (e.g., fruit and vegetable consumption, percentage intake from fat). It may be that increasing the availability of GREEN foods in the home without decreasing RED foods may not be enough to improve weight and consumption patterns. Additionally, while decreasing electronic equipment was associated with greater weight loss, it was not related to changes in children's screen time or MVPA, suggesting reductions may be influencing weight-related factors other than activity. Finally, increasing physical activity equipment in the home was not associated with MVPA or weight, suggesting that physical activity equipment in the home does not necessarily support greater amounts of MVPA. A review completed in 2013 found that only four out of eleven cross-sectional studies and no longitudinal studies showed a relation between physical activity equipment in the home and measures of physical activity in children, although a larger percentage of studies suggested that greater physical activity equipment may be related to reduced sedentary time.³⁶ It is possible that greater physical activity equipment promotes more light activity, but not MVPA in children, but this was not assessed in the current study.

No food-related and few activity-related features of the neighborhood environment were shown to be associated with weight outcomes following FBT. As families are generally unable to make significant changes to their built environment or move residences for the purposes of weight management, the current null finding may be considered encouraging. Behaviorally, the food-related neighborhood environment (e.g., restaurants, grocery stores, etc.) did not impact diet outcomes. This may reflect previous findings that families do not necessarily shop at food outlets that are closest to their home.³⁷ Additionally, while stores were categorized into healthy and unhealthy, healthier options are often available at all stores. Finally, no neighborhood environment variables were related to screen time, suggesting that physical activity spaces do not impact screen time reductions throughout treatment.

Assessment of the relation between the neighborhood environment and changes in the home environment across treatment did not show much evidence to support the hypothesis that the spaces around the home influence a family's home environment or their ability to make changes to the home. This may be a promising finding as it suggests there may be other, more modifiable factors at play that are influencing a family's choice to change their home environment. There were a few exceptions to this generally null result. Specifically, at baseline, findings demonstrated that further distance from a park and a lower density of parks around the home were associated with a greater number of physical activity equipment. Post-FBT, a lower density of healthy stores around the home was associated with improvements in GREEN foods in the home. The findings may reflect that people who live further away from parks and food outlets may need to keep more physical activity equipment and healthy food on-hand, as going out for these items would be less convenient.

This study has many strengths, including the use of 24-hour recalls for diet, which is considered to be the most accurate form of measurement for diet,²⁴ and objective assessment of activity using accelerometers as well as inclusion of both home and neighborhood

recreation and food environment variables in the analysis. Notably, there were some limitations in the assessments. The home environment variables were self-reported, potentially introducing bias; however, given the dearth of literature on changes in home environment in obesity treatment, these measures provide an initial examination of this research question. Relatedly, there are a number of different ways to operationalize the home and neighborhood environments, and results may have been different if different categorizations were chosen (e.g., separating restaurants into full service and quick service). Another limitation was that only a subsample of participants was included in the neighborhood environment analysis as well as the accelerometer analyses due to measurement constraints. It is possible that a different pattern of results could be found with all treatment completers. Finally, a large number of tests were performed assessing individual effects of home and neighborhood variables on FBT outcomes, increasing the possibility of a Type 1 error. Given the exploratory nature of the study, the relatively small sample size, and anticipated small effect sizes, we were interested in avoiding a Type II error and did not adjust p-values, but have provided observed statistics in Tables 2 and 3.

Conclusion

This study found that changes to the home environment, specifically decreasing RED foods and electronic equipment, and having a greater number of public recreation spaces close to the home (trend-level), positively influence weight and/or weight-related outcomes for children. For clinicians providing FBT to families, these home environment changes may be particularly worthwhile treatment targets. Notably, the null findings between some of the home environment changes and various weight and behavioral outcomes (e.g., GREEN foods, etc.) should not be taken as an indication that these home environment changes are not helpful with weight management. While they were not independent predictors of outcomes, it may be that their effects are better shown in combination with other variables. Moreover, in regard to the second aim, it was found that relatively few neighborhood environment characteristics were associated with home environment at baseline or post-FBT, which has clinical relevance in the sense that participants in FBT are able to make home modifications regardless of the convenience of neighborhood resources. Future studies may consider taking objective measurements of the home environment and evaluating the role of both the home and the food and recreation environments for weight loss maintenance.

Acknowledgements

Funding Source: This work was supported by several National Institutes of Health (NIH) Grants: 5R01HD036904 and 3R01HD036904-07S1 (National Institute of Child Health and Human Development), 5K24MH070446 (National Institute of Mental Health), KL2RR024994 (National Center for Research Resources), 1F31DK113700 (National Institute of Diabetes and Digestive and Kidney Diseases) and 5T32HL007456 (National Heart, Lung, and Blood Institute). This work was also made possible by NIH Grant UL1 RR024992 (National Center for Research Resources).

Abbreviations:

FBT	Family-Based Treatment
GIS	Geographic Information System

MVPA	Moderate-to-Vigorous Physical Activity
BMI	Body Mass Index

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Table 1.

Means, Standard Deviations, and T-Test Results from Baseline to Post-FBT (n=181)

	Baseline (M±SD)	Post-FBT (M±SD)	T	p
Child zBMI	2.17 ± 0.39	1.89 ± 0.55	15.65	<0.001
Kilocalories (average/day)	1717.51 ± 460.90	1357.72 ± 302.75	9.78	<0.001
Fruit and Vegetable Intake (average servings/day)	3.06 ± 1.52	4.36 ± 2.13	-7.86	<0.001
Percentage Intake from Fat (average/day)	31.50 ± 6.25	24.60 ± 6.25	12.74	<0.001
Daily Average MVPA	47.55 ± 22.38	45.00 ± 20.90	1.82	0.071
Child Weekly Screen time (hours/week)	24.48 ± 14.06	18.19 ± 12.25	7.77	<0.001
GREEN Food Environment Score (possible range: 0-20)	12.49 ± 4.20	13.74 ± 3.34	-3.90	<0.001
RED Food Environment Score (possible range: 0-55)	17.88 ± 8.20	7.58 ± 6.74	18.69	<0.001
Electronic Equipment (items in house; unlimited range)	26.25 ± 12.84	23.21 ± 11.62	3.70	<0.001
PA Equipment (items in house; possible range: 0-26)	6.81 ± 2.68	7.01 ± 2.51	-1.35	0.179
Neighborhood Healthy Store Count	1.46 ± 1.88			
Neighborhood Unhealthy Store Count	4.09 ± 4.20			
Neighborhood Restaurant Count	8.08 ± 9.12			
Neighborhood Park Count	4.95 ± 3.68			
Distance to Closest Neighborhood Park (miles)	0.46 ± 0.66			
Neighborhood Public Recreation Facilities Count	0.57 ± 1.22			

FBT = Family-Based Treatment for Childhood Obesity; MVPA = moderate and vigorous physical activity; PA=physical activity

Table 2.

Linear Regressions of Diet-related Home and Neighborhood Environment Variables on Child zBMI and Diet Outcomes

	Change in zBMI			Change in Kcal Consumption			Change in Fruits and Vegetable Consumption			Change in Percentage Intake from Fat		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
<i>Baseline Home Environment (n=181)</i>												
Baseline GREEN Food Availability	−0.001	0.004	0.763	7.711	5.837	0.188	0.099	0.040	0.015*	−0.177	0.131	0.179
Baseline RED Food Availability	−0.002	0.002	0.224	3.741	2.812	0.185	0.021	0.020	0.291	−0.004	0.059	0.945
<i>Changes in Home Environment (n=181)</i>												
Change in GREEN Food Availability	−0.001	0.004	0.694	−5.149	6.436	0.425	−0.019	0.045	0.682	−0.232	0.135	0.087
Change in RED Food Availability	0.005	0.002	0.014*	2.593	3.258	0.427	−0.039	0.023	0.095	0.190	0.067	0.005**
<i>Neighborhood Food Environment (n=115)</i>												
Number of Healthy Stores	0.007	0.010	0.504	5.869	14.83	0.694	−0.020	0.111	0.858	0.330	0.335	0.327
Number of Unhealthy Stores	0.004	0.005	0.416	5.869	6.221	0.348	−0.021	0.046	0.802	0.188	0.139	0.179
Number of Restaurants	0.001	0.002	0.670	1.376	2.862	0.632	−0.010	0.021	0.641	−0.005	0.065	0.941

Covariates in all models include child age, child sex, and family socioeconomic status

* $p < 0.05$;

** $p < 0.01$

Table 3.

Linear Regressions of Activity-related Home and Neighborhood Environment Variables on Child zBMI and Activity Outcomes

	Change in zBMI			Change in Daily Minutes of MVPA			Change in Weekly Screen Time		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
<i>Baseline Home Environment (n=181)</i>									
Electronic Equipment	−0.003	0.001	0.014 [*]	0.078	0.094	0.408	−0.093	0.053	0.082
PA Equipment	0.001	0.006	0.893	−0.423	0.488	0.389	0.101	0.252	0.688
<i>Changes in Home Environment (n=181)</i>									
Change in Electronic Equipment	0.003	0.001	0.031 [*]	−0.017	0.108	0.875	0.021	0.064	0.746
Change in PA Equipment	−0.005	0.009	0.591	0.578	0.646	0.373	−0.360	0.355	0.312
<i>Neighborhood Recreation Environment (n=115)</i>									
Number of Parks	0.001	0.005	0.917	0.160	0.395	0.687	−0.068	0.245	0.781
Distance to Closest Park (mi)	0.023	0.030	0.457	−3.513	4.080	0.392	0.812	1.380	0.558
Number of Public Recreation Facilities	0.020	0.016	0.223	2.107	1.081	0.055	0.033	0.731	0.656

Covariates in all models include child age, child sex, and family socioeconomic status

^{*}
p<0.05;

^{**}
p<0.01