FED-UP WITH CHILDHOOD OBESITY

the things kids eat on their way to and from school

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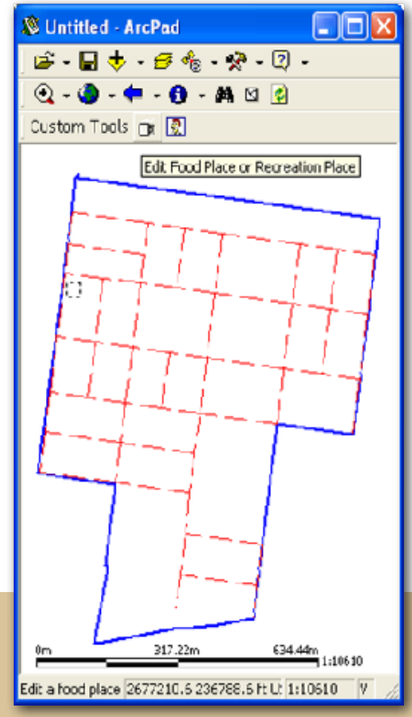
CHAPTER THREE

Stopping on the way to buy a snack has become a ritual for many children who walk to school in cities like Philadelphia. Adults may lament the practice, but it bears great resemblance to their own morning coffee run. For the school children, the ritual might cost 50 cents for some chips, a Tastykake®, or a can of bright blue soda. The adult ritual costs more: $2 for a donut and coffee at Dunkin' Donuts® or $6 for a Mocha Frappuccino® and maple scone at Starbucks®. And at the end of the day, there is more of this snacking for both groups. Children travel in packs to the nearest corner store to stock up on junk food before heading home or to after-school programs, while the adults enjoy "happy hours" combining crowded spaces with high-fat food and alcohol. In neither case is there any stigma, since peers and the media have given all this their blessing.

So, are these junk food stops just a harmless part of being a child, or are they to blame for the dramatic increase in obesity among children? The answer likely lies somewhere in between. Junk food is part of a larger equation between food intake and physical activity that is clearly out of balance. In fact, however, we really don't know how important it is or for whom it is important. Researchers and policy-makers have been so focused on what is happening inside the schools that they have given little attention to what happens just outside. Arguably, this journey to and from school is part of the school day, a time when many children are outside the supervision of their parents or other adults and free to make their own decisions. School districts and the beverage industry have both taken steps to limit the junk food sold to children in school, but they have done little regarding available food options in the neighborhoods nearby. That's understandable if the goal is to keep schools from being implicated in childhood obesity; school officials can hold up their hands and declare that it's someone else's fault that more and more of their children are overweight. But if the goal is to help children slim down by making good food choices everywhere, we still have a long way to go. Some schools and teachers do have policies restricting outside food, but these are difficult to enforce and are meaningless for children who gobble down their junk food just outside the school doors.

What do we actually know about the food children purchase on the way to and from school, other than anecdotal information what we might infer from the abundant evidence littering a sidewalk? We know that nearly 70% of the Philadelphia children surveyed in one study of 5th to 7th graders said they stopped to buy food either on the way to or from school. In this School Nutrition and Kids (SNAKs) study, almost 30% reported stopping in both directions. On average, they spent just over $2 a day, with a median expenditure of $1.50. This includes a number of children who report spending $10 or more, probably purchasing prepared lunch or dinner foods rather than just snacks. But who is to say what constitutes a regular meal these days? The children surveyed were from schools where most are eligible for free lunches. To the extent that this indicates low family income, it suggests that those surveyed were typical of public schools in Philadelphia.

Using ArcPad, a geographical software package designed for handheld computers, the SNAKs study also determined that children have many opportunities to purchase food on the way to and from school (Figures 2 and 3). Most of these are either franchised convenience stores or locally-owned "Mom and Pop" corner stores, but there are also multiple take-out restaurants and street vendors (Figure 4). We surveyed the elementary feeder area around each of five schools. These areas encompassed approximately one square mile from which elementary and middle schools draw most of their students. The number of food opportunities within each area ranged from 10 to 35, with an average of 21. In a follow-up pilot study, we identified 40 corner stores alone within one mile of a summer camp housed in a North Philadelphia



LEFT FIGUE 1 Examples of "junk food" commonly purchased by children on their way to and

ABOVE TOP FIGURE 2 Example of PDA used in the field for collecting data

ABOVE BOTTOM FIGURE 3 Screenshot of Arcpad mapping application used on PDA to collect data

church. Those 40 corner stores offered several hundred different types of snacks; we lost count at 500. Two dollars can buy a lot in these stores, where a 1-ounce bag of chips (120 calories, 5 grams of saturated fat) costs 25 cents, and sodas (100 calories, 30 grams of sugar) cost no more than 50 cents. In short, every dollar a child spends here is likely to translate into 200 or more extra calories.

We know from the work of The Food Trust, a nonprofit organization in Philadelphia, that corner store owners are not necessarily the enemy. Their Corner Store Campaign has enlisted the assistance of owners whose stores are near public schools in which The Food Trust staff provide nutrition lessons and teach children how to read food labels. The Food Trust brought in a marketing company to work with the children to design a logo for a line of health snacks that the participating corner stores prominently displayed. Children who bought these and other healthy snacks were rewarded with pencils and other small gifts. However, even though such store owners are often frequently members of the community who care about the children, they are also business people who must be responsive to demand. If the $2 daily average found by the SNAKs survey holds for all 200,000 public school children in Philadelphia, that's $400,000 in junk food a day or $2 million a week. Though the 100,000 children attending private schools in Philadelphia may be somewhat less inclined to buy junk food because they are less likely to be walking to school, even the conservative estimate of $1 a day would yield a weekly total of $2.5 million. All those quarters really do add up, and this doesn't even take account of the junk food that parents send to school with their children.

We know that weight status reflects physical activity levels as well as food intake, so what kind of physical activity are children getting during the school day? Recent research has focused on physical education classes in school where equipment, supervision, and gender-specific programming seem to make the greatest difference.

Because Philadelphia's public school system is designed around elementary school feeder areas, most elementary and middle school students get to school by walking. In the SNAKs study, 75% of children reported that they walk to school. However, the physical activ-

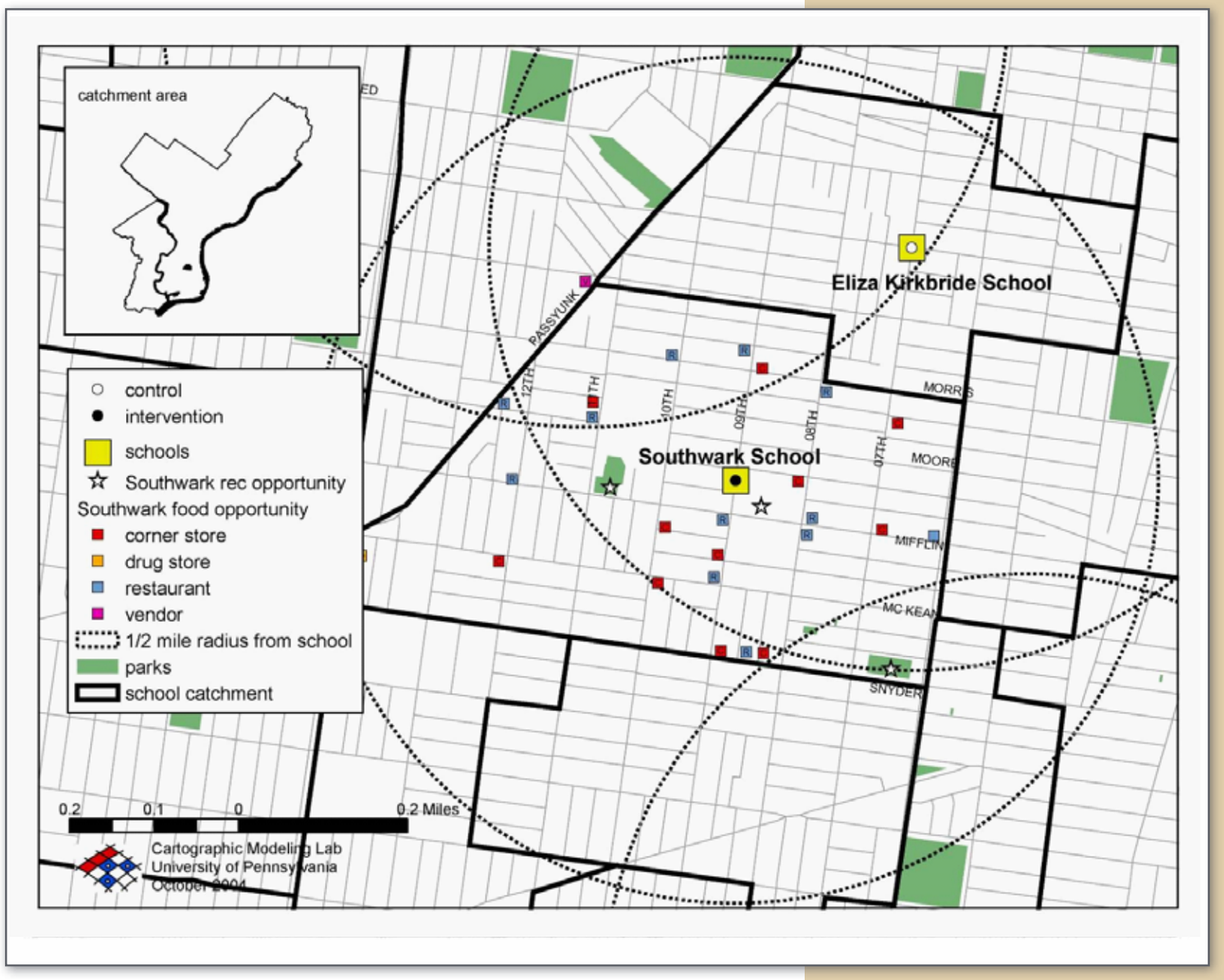


FIGURE 4 Results from "food opportunity" survey around one school

ity of walking to school is certainly not enough. Of those children who walk, 19% were still at risk for becoming overweight and 23% were already overweight. Note that the Centers for Disease Control [CDC] uses the terms "at-risk for overweight" and "overweight" to parallel "overweight" and "obese" in adults. This is because they do not want to stigmatize children who are still growing. Like many other researchers, however, we have used the term "obesity" for ease of interpretation. To be precise, "obese" refers to a body mass index (weight in kilograms divided by height in square meters) or BMI above the 95th percentile, while "at risk" refers to a BMI between the 85th and 95th percentiles.

Common sense (and some research) indicates that crime levels and perceptions of neighborhood safety influence the willingness of parents to let children play outside. Residential proximity to schools and parks has also been shown to influence amounts of physical activity among children. Our survey for the SNAKs study found an average of four recreation opportunities - parks, playgrounds, and/or recreation centers - per school feeder area. But we also know from living and working in the city that children create their own recreation opportunities wherever they can, be they in the form of improvised basketball hoops on utility poles, sidewalks used for jumping rope, or football games in empty lots. Global positioning systems (GPS) and Accelerometers (devices placed on the wrist, hip, or ankle to record movement and calculate energy expenditure) have been used to track where and how much physical activity children obtain.

By using ArcPad to map the routes that children in the SNAKs study took to and from school, we learned that they do not necessarily choose the most direct path. Many of them make multiple stops, in part to accommodate the preferences of siblings and friends with whom they walk. One person might like the candy selection at one corner store, while someone else likes the hoagies prepared at another. We know from this pilot survey that middle school students understand basic urban geography and can either name the streets they walk or show the path they take. These recorded routes indicate that there are certain well-traveled corridors, but that there are almost as many ways to walk to school as there are potato chip varieties to try.

There is so much more we want to know about the impact of daily food and activity decisions on children's weight status in particular and their well-being in general. Understanding where children buy what kinds of foods is largely a spatial issue, so some type of mapping is necessary. But the typical representations of urban geography using GIS desktop and survey software bear little resemblance to the real world through which children move.

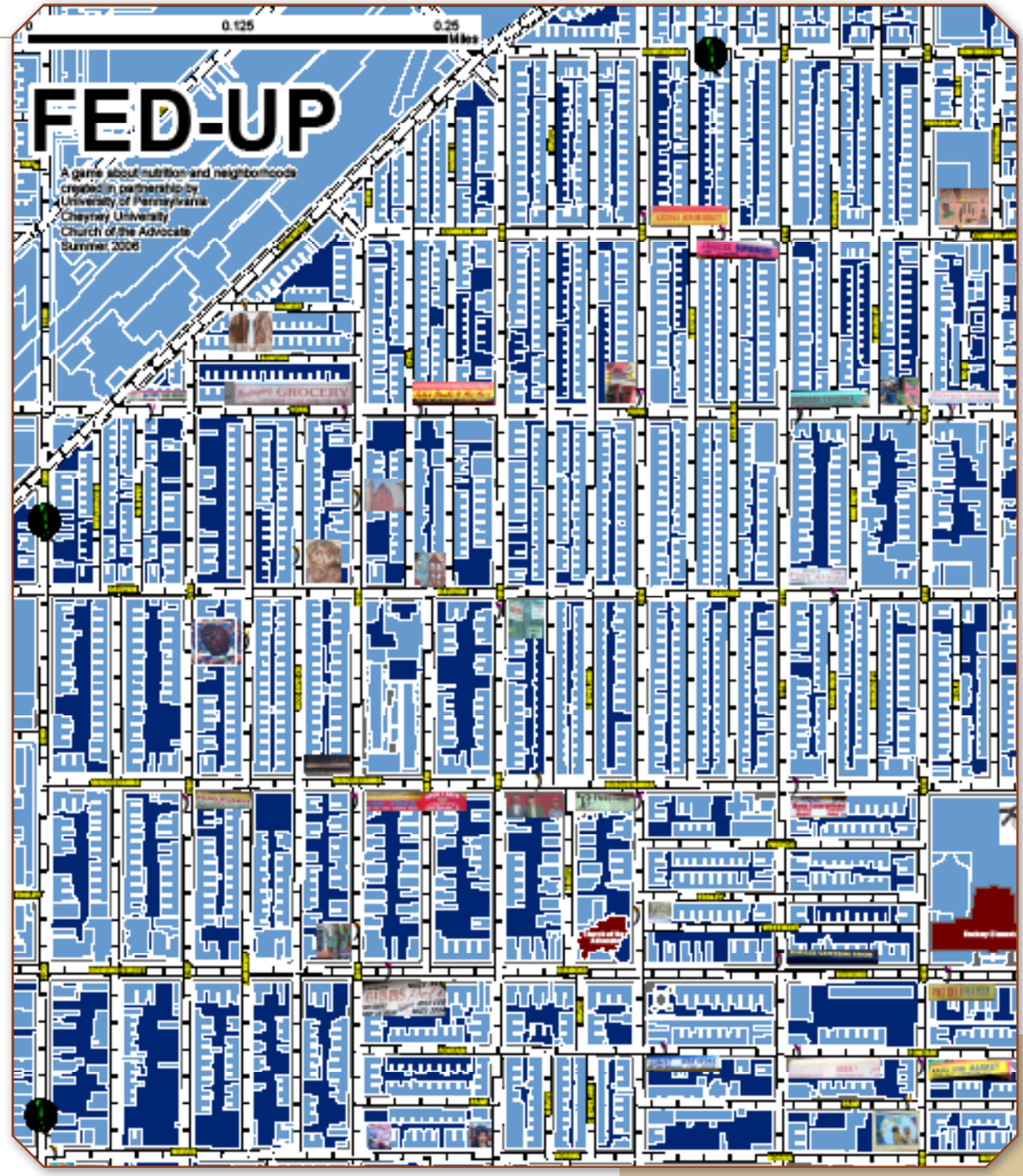


FIGURE 5 FED-UP game board used to teach kids about healthy eating

Even if they are able to show their path along a street centerline file and identify the parcel or point meant to represent their favorite corner store, this representation does little to engage them. In the age of Google Earth® and Madden Football®, we can do so much better.

We envision a tool for modeling this journey to and from school, incorporating all the choices that children face, by blending GIS and video game technology. We call our vision FED-UP: Food and Exercise Diaries for Urban Places. We imagine a computer interface designed to look like the neighborhood around a specific school, reflecting all the things that children would recognize - stores, murals, institutions like fire and police stations, libraries, schools, playgrounds, recreation centers, and so on. Children will move through 2D or 3D representations of their neighborhood using game controls, simulating their walk, drive, bus trip, or subway ride to school. "Playing" FED-UP will involve inputting the information about their journey to and from school - what they eat, with whom who they walk, where they stop, and what they purchase.

Photographs of buildings and store signs will allow them to recognize the stores where they stop. As they "enter" these stores, they will move to a new computer screen that looks like the inside of a typical corner store (see Figure 6). Based on their personal profile (created before starting their diary), their favorite foods will be displayed most prominently. They can search the database of foods using either keywords (e.g., "soda," "chips," "milk") or images to identify specific items. Children will pay for their food out of the money they inserted - virtually - into a pocket or wallet before leaving home. Similarly, children will be able to identify stops at a playground or recreation center in order to select from among images of people jumping rope, playing basketball, or just relaxing with their friends. Catching the school bus or taking the subway will involve a similar selection.

FIGURE 6 A mock-up convenience. Graphic by Caitlin Bowler MCP'07

Of course this sounds like fun, but what kinds of scientific data will it produce that are not already available using more conventional and less expensive methods? We will only know by comparing results from FED-UP to results from conventional food recalls and diaries. How can we be sure that children report honestly about their food and physical activity choices? Again, we will need to compare results across methods to ensure reliability and validity. For example, we might compare the self-reported route with the one indicated by a GPS device attached to a willing subject. If students "play" FED-UP on a single handheld or desktop computer where we extract the data about their route and stops regularly, we can minimize concerns about confidentiality. But if we want children to play this at home, possibly sending their "diary" report over the Internet, then we have much more serious considerations. Because the interface needs to be customized for each neighborhood, replication will potentially be expensive and tedious. Can we develop clear data-collection and data integration strategies to make this more efficient? Perhaps using GoogleMap's StreetView®, which integrates panoramic photographs of streets for a growing number of places including Philadelphia, into the GoogleMaps® interface. Creating FED-UP for a single neighborhood would hardly seem worthwhile.

The obstacles to creating FED-UP are significant, but so are the potential rewards. If FED-UP is successful, we will know where children are acquiring their food. We will know whether most of their calories are coming from home, stores, or school. We will be able to identify junk food hotspots as well as more healthy alternatives - the hottest location for buying Mountain Dew or bottled water. In other words, we will be able to

model a local geography of nutrition. We will know how children acquire food. Are they purchasing it with their own money, borrowing money from friends, or trading? Who are they with when they buy and eat food? Most importantly, we will be able to answer questions about just how important it is that children stop to buy snacks on the way to and from school, whether it's a harmless ritual for most or a significant factor in why so many of them are overweight or obese.

While FED-UP is primarily intended as a food and exercise diary, we imagine a number of extensions. For example, we could use it for nutrition education, confronting children with various food and physical activity choices and letting them see the long-term consequences. We might want children to know the answers to the following types of questions, and how they need to change their behaviors to be healthier: What difference do those two bottles of sweetened iced tea make if you drink them in addition to your regular food every day for a year? How much weight can you expect to gain? How many hours of basketball or jump rope are needed to compensate? What difference does it make to your body if you choose reduced-fat versus whole milk or whole wheat rather than white bread?

We could also model the food choices that parents face when grocery shopping and invite them to "play" so we have a broader picture of what children are eating. Or we might design FED-UP so that children can redesign their own physical worlds. If they had their way, what would the parks and playgrounds look like? What would be advertised on the billboards? Might they redesign the streets for scooters and skateboards? Could we simulate choices children make other than those involving food and recreation? Could we allow them to role-play around conflicts and peer pressure? Could we let them see the consequences of their behavior, from studying to littering to selling drugs, on their families and neighborhood? Could we pepper their virtual neighborhood with positive messages about self-worth? The possibilities in Second Life®, the virtual 3D world created by users, suggest that this is all possible.

REFERENCES

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