



HHS Public Access

Author manuscript

Health Behav Policy Rev. Author manuscript; available in PMC 2021 April 14.

Published in final edited form as:

Health Behav Policy Rev. 2019 March ; 6(2): 152–165. doi:10.14485/hbpr.6.2.4.

Describing Food and Beverage Restaurants: Creating A Reliable Coding Tool

Natalie S. Poulos, PhD, RD, LD [Assistant Professor of Instruction],

Department of Nutritional Sciences, University of Texas at Austin, Austin, TX.

Keryn E. Pasch, PhD, MPH [Associate Professor],

Department of Kinesiology and Health Education, University of Texas at Austin, Austin, TX.

Melissa N. Laska, PhD, RD [Professor]

Department of Epidemiology and Community Health, University of Minnesota, Minneapolis, MN.

Abstract

Objective: To develop an informed, reliable data collection tool to code restaurants found within the youth food environment.

Methods: Registered Dietitians were surveyed and academic literature review was reviewed to determine health centric food environment features. Features were incorporated into an electronic data collection tool. Inter-rater reliability was tested across coders of varying nutrition training on all restaurants located within a half-mile of three high schools.

Results: Sixteen restaurant food environment codes were generated. Data collection had a mean inter-rater reliability of 90.7% agreement (range=81.3–100%), suggesting that regardless of nutrition training, the restaurant food environment can be reliability coded.

Conclusions: Academic and public health professionals can use this tool to collect reliable, informed local restaurant food environment data.

Keywords

Restaurant Food Environment; Electronic Coding Tool

Over the last decade, national prevalence of childhood obesity has remained unchanged at 17%.¹ This high rate of obesity among youth is problematic as childhood obesity is associated with outcomes such as behavioral problems and low self-esteem during adolescence,^{2,3} as well as becoming an obese adult.⁴ Given these problematic outcomes, research aimed at decreasing the prevalence of obesity among youth is warranted.

Correspondence Dr Pasch: kpasch@austin.utexas.edu.

Human Subjects Approval Statement

This study was deemed exempt by The University of Texas at Austin Institutional Review Board.

Conflict of Interest Disclosure Statement

All authors of this manuscript have no conflicts of interest to report.

Recent obesity prevention efforts have begun to focus on environmental factors, such as the community and consumer food environments.^{5–7} Early food environment research explored food availability and its relationship with dietary patterns and weight status among adults.^{8–11} More recently research has shifted to focus on youth populations given the high prevalence of childhood obesity.^{12–16} Specifically, research has focused on the food environment around schools,¹⁷ as youth spend a large part of their day in and around schools; however, results of these studies appear to be conflicting. Some research suggests that having fast food restaurants near a school is associated with increased weight status among students,^{18,19} while others find fast food restaurants to be associated with decreased body mass index (BMI),²⁰ or have no association with diet.²¹ Although it is not unexpected to have conflicting findings given that the food environment field is still developing, it is problematic as it implies discrepancies within the field exist.

When examining the food environment literature, there are key areas in need of improvement. In particular, the food environment field has poor food outlet definitions, and incomparable coding tools. Each missing or poorly reported definition is increasingly concerning because without clear definitions others in the field will rarely produce similar findings (if they exist) or be able to replicate study designs.^{22,23} For example, clear definitions often do not exist for some of the most commonly used terms within the literature, such as fast food outlets. Some research defines fast food outlets by using pre-determined codes from secondary sources such as Dun and Bradstreet data,⁸ while others determine fast food as only top selling, internationally known franchises^{21,24} or outlets where food is ordered at a counter, payment is made prior to receiving food, there is a limited wait staff, or outlets that maintain expedited foodservice times.^{25–28} Superficially, each of these definitions may appear appropriate, yet closer consideration suggests otherwise as each unique food outlet may offer different types of foods. A more specific and thoughtful definitions of restaurants may provide a more detailed picture of youth's complex food environment.

Another limitation is that few studies examining food outlets use similar or comparable tools. Currently, there are food environment coding tools that include as few as 3–10 outlet classifications,^{29–31} while others include 77 classifications.³² Even though each tool may provide unique information, the use of various coding tools across studies likely adds to the variability in food environment findings. Additionally, of the studies describing food environment coding tools, few report how tools were created or reliability of measures.^{31,33–35} Without knowledge of how a tool was developed or if the measures are reliable, it is unclear if it appropriately measures the food environment.

Finally, a large proportion of food environment research to date has relied on secondary data sources, such as government agencies,³⁶ private data collection companies,^{21,37} or open source databases.^{19,32} Using secondary sources can be cost-efficient, as fieldwork is not required, yet it is often incomplete and contains errors due to rapid business turnover.^{38,39} Further, use of industry or governmental data lacks qualitative information on restaurant features that are unique to each outlet, such as types of promotions available⁴⁰ or accessibility of foods and beverages within outlets,⁴¹ both of which have been associated with food choice among youth, suggesting that few studies may accurately represent the

qualities of the food environment important for youth. Finally, recent research suggests that the food environment is changing rapidly, suggesting that reliable, up-to-date information is needed to appropriately understand the food environment.⁴² For example between 2010 and 2015, there was a 22–30% increase in the number of stores with storefront food and beverage availability on restaurants and grocery stores.⁴² This necessitates the development and use of a tool that both considers qualitative aspects of the food environment and is able to document the food environment reliably and efficiently.

Given the current field limitations on measuring the food environment, the purpose of this study was to outline the methods and procedures required to create a reliable restaurant environment coding tool that can be used to appropriately code restaurants over and above what has been used in the food environment literature to date. Restaurants were chosen as the primary focus of this study as the association between distance to and density of restaurants and weight status is one of the most highly debated topics among food environment experts.^{8,16,19,37,43–45} The study was deemed exempt by the Institutional Review Board at The University of Texas at Austin.

METHODS

Informing Tool Codes

Registered Dietitian (RD) survey.—The first step in tool development was to create expert informed codes that would be used to measure the food environment. Registered Dietitians (RDs) were chosen because they are nutrition experts that often have knowledge of the food environment. Thus, to create expert informed codes, a survey that was created and sent to a sample of 14 RDs with known interest in the food environment or in adolescent dietary patterns. Participants were selected based on personal contacts known to be RDs. A survey link was directly emailed to each possible participant. Each participant was also allowed to forward the survey link to other RDs that may have been interested in participating. The survey link was also posted on a Listserv for graduates of a The University of Texas at Austin Coordinated Program in Dietetics. Participation for this survey was voluntary and uncompensated.

The online survey included four questions. It was designed to collect information on what RDs believed to be the most important qualities and factors for determining the healthfulness of a restaurant. Additional items asked participants to describe a healthy diet, where they currently resided, and confirmation of RD status. See Table 1 for all items and response options included. The survey was open for two weeks. Once data collection was complete, open-ended responses for each question were reviewed and grouped together based on similarity. Codes were then developed based on responses within each group and included on the data collection tool.

Overall, 20 RD responses were received during the two weeks the survey was open. Participant RDs were located in Texas (n=7), New York (n=1), Pennsylvania (n=1), Louisiana (n=1), Illinois (n=1), Canada (n=7), and Arizona (n=1). When asked to describe a healthy diet, RDs largely cited themes of being “balanced” (n=11), “emphasis on vegetables” (n=7), and including a “variety of foods” (n=4).

Survey participants identified 113 total factors/qualities they believed to be important in determining the healthfulness of a restaurant. Of the total responses, 27 were unique or not repeated by another participant. The most common responses included the availability of vegetables/vegetarian/vegan dishes (n=19), identification of food source/sustainable food practices (n=13), and freshness/minimal processed (n=10). See Table 2 for detailed list of factors/qualities reported by RDs.

Based on responses and the top factors/qualities suggested by RDs, five RD generated variables were included on the final data collection tool. These included the availability of: (1) unprocessed vegetables, (2) minimally processed foods, (3) vegetarian and vegan entrees, (4) side salads, and (5) locally sourced or sustainable foods. Although RDs mentioned additional factors and qualities, those were not included as they were less frequently reported.

Food environment literature.—The second step in tool development was to review the food environment literature to further support and refine codes informed by the RD survey. The literature was also reviewed to identify gaps in codes from the RD survey may have missed. Specifically, the literature was reviewed for qualities and features of restaurants that previous research suggests may help explain how youth interact with their food environment.

All five RD generated codes were supported within the literature (See Table 3). For example, similar to results from the RD survey, recent research suggests that availability of fruits and vegetables is associated with increased consumption of these foods.⁴⁶ Further, previous research among youth suggests those who participate in farm-to-school programs, are more likely to develop positive attitudes and beliefs towards foods.^{47–49} This emphasis on farm-to-table based food sourcing was also present within the RD student results. See Table 3 for additional references for each RD survey generated item.

In addition to the five RD generated codes, 12 variables based on current findings within the literature were included. Each additional code represented an area within the food environment literature in need of further exploration. These included: (1) accessibility of sugar sweetened beverages (SSBs), (2) availability of meal deals, (3) availability veggies within meal deals, (4) availability of low-cost menus, (5) availability of kids menus, (6) outdoor seating, (7) play area, (8) order location, (9) drive thru, (10) if the restaurant is good for groups, (11) building maintenance (eg, visible building damage), and (12) landscaping maintenance (eg, overgrown vegetation). Each variable was represented within the template as a question or statement such as, “Describe access to free fountain drink refills,” or “Where do you order and receive food?” See Table 3 for full list of variables, description, response options, and variable justifications for the restaurant coding tool.

In sum, 17 total codes were included on the restaurant environment coding tool. Five were based on results from the RD survey. Twelve were based on current findings within the food environment literature. Due to problematic evaluation and interpretation across coders, landscape maintenance was dropped from reliability testing, resulting in 16 variables being testing for inter-rater reliability.

Electronic Restaurant Coding Tool Creation

The third step in the study was to create a custom, electronic tool for data collection that would incorporate all generated codes was created using FileMaker Pro and FileMakerGO.³¹ First, a template was designed to incorporate all variables for this study including study variables as well as pertinent variables from previous work examining the food environment.^{31,50} The first variables to appear were those from the Outdoor MEDIA study such as school ID, photo, and notes/description of the restaurant. This allowed for relevant data to be imported and linked in the new coding database and provide contextual information to the data collector. All additional study variables followed and were organized to allow data collectors to complete data collection forms in an efficient manor. For example, variables that could be documented by reviewing a menu were grouped together as well as those that could be documented from the exterior of the restaurant. Each variable had preset response options to minimize data collector error and increased data collection efficiency.

The template was formatted for direct data collection on an iPhone®/iPod Touch®, as well as a desktop view of the data. This allowed data to be collected in a streamlined fashion while in the field, but was able to be reviewed in a layout more appropriate for a desktop computer after data collection was completed. See Figure 1 for detailed view of both layout types and a detailed view of the completed data collection tool.

In addition to the electronic tool, a data collection and coding protocol was developed for this study. This protocol was based on protocols used in previous work.^{31,50,51} Key features of the protocol included purpose of the study, steps for completing data collection, how to use FileMaker/FileMakerGO, and detailed definitions of each variable included in the template. The study protocol was used to train data collectors prior to testing reliability of the tool. The protocol is available upon request from the first author.

Reliability Testing & Analysis

The fourth step in this study collected primary data on 23 restaurants located within a half-mile of three high schools in Austin, Texas. To be included in the selection pool, a school had to have at least 5 restaurants previously identified by the Outdoor MEDIA study,^{31,50} a study that documented food and beverage advertising and outlets within a half-mile of all middle and high schools within a single district. Selected schools had 9, 8, and 7 restaurants located within a half mile of the school. Restaurants were previously identified and documented by the Outdoor MEDIA study.^{31,50}

Upon review of the restaurant coding tool and discussion with each coder, it was determined that the code “landscape maintenance” was challenging to define. It is also possible that the perception of “well maintained landscaping” may differ according to socioeconomic status or cultural group. Further, landscape maintenance and building maintenance may measure similar components of the food environment, such as quality or maintenance of the overall also property. Therefore, landscape maintenance was not included in reliability analysis testing, resulting in 16 total variables being including in inter-rater reliability testing.

To test the inter-rater reliability of the restaurant coding tool, a series of tests was completed to confirm the tool was reliable across multiple types of data collectors. Specifically,

reliability of this tool was tested using an RD with master's degree in health education as the "gold standard" against three additional coders: an undergraduate research assistant with no nutrition training, an undergraduate research assistant with nutrition training, and a nutrition graduate student. By testing reliability across each type of coder, this study helped ensure that the tool created would be reliable regardless of the background knowledge and training of the coder.

Before reliability testing, each coder was trained on using the template and protocol. Once trained, each coder received an iPhone®/iPod Touch® with a school specific data collection file to be used for reliability testing. During reliability testing, each coder completed data collection independently in each restaurant around a single high school. Simultaneous data collection guaranteed that food environments experienced by both coders were exactly the same (eg, promotions or menu did not change).

For reliability analysis, responses for each pair of the coders were compared through a mean percent agreement to represent a reliability measure for the specific school coded. An overall reliability measure was calculated to represent reliability across all three schools included in reliability testing. Percent agreement was chosen over other measures of reliability such as Kappa because it allowed reliability to be determined for the overall record/restaurant. Thus, the agreement between each 16 variables included in reliability testing were compared simultaneously for a single restaurant. This method of inter-rater reliability testing has been successfully used by previous research to examine reliability of a data collection tool.³¹

After reliability testing was completed, a master file of all restaurant data collected for reliability testing was created to serve as the primary data analysis file. Data was then exported to Microsoft Excel for analysis.

RESULTS

Inter-Rater Reliability

School 1 had a total sample of 9 restaurants. A nutrition undergraduate student and a RD with master's degree completed data collection. One restaurant had closed, leaving a final sample of 8 restaurants. Inter-rater reliability ranged from 87.5 to 100 percent agreement, with a mean 92.2 percent agreement. Restaurants within the sample for school 1 included Denny's, Luby's, New Mandarin Chinese, Tarbouch Lebanese Grill, Subway, Curra's Grill, Taco Bell, and McDonald's.

School 2 had a total sample of 8 restaurants. A nutrition graduate student and a RD with master's degree completed data collection. All restaurants were open and available for data collection. Inter-rater reliability ranged from 81.3 to 100 percent agreement and had a mean of 89.3 percent agreement. Restaurants included within this sample for school 2 included Elaine's Pork and Pie, El Chilito, Sam's BBQ, Bayseas Seafood, Joe's Place, Mi Madres, and Hoover's Cooking.

School 3 had a total sample of 7 restaurants. An undergraduate student with no formal nutrition training and a RD with master's degree completed data collection. All restaurants

were open and available for data collection. Inter-rater reliability ranged from 75.0 to 100 percent agreement and had a mean of 90.6 percent agreement. Restaurants included within this sample for school 3 included Juiceland, Thundercloud Subs, Subway, Sushi Zushi, Magnolia Café, Fabi and Rosi, El Arroyo, and Tacos N Tequila.

Overall, results show a high mean inter-rate reliability of 90.7 percent agreement across all coders. Reliability measures across each type of coder were similar. For example, the highest reliability was between the undergraduate nutrition student and the RD with master's degree (92.2% agreement), while the lowest was with the nutrition graduate student (89.3% agreement). No specific item had consistently lower reliability than other items.

DISCUSSION

This study created a tool that includes reliable codes informed by experts and literature, assessed the inter-rater reliability of the coding tool, and is among the first to develop and describe the methods used to create an electronic tool used to identify restaurant features within the food environment around high schools. Although each restaurant food environment may have unique qualities, this study demonstrates that the restaurant food environment can be coded with high reliability using a simple, easy to use tool. When compared to other studies, this study maintained a high reliability, yet only required one short training session as opposed to multiple day trainings that include both classroom and field work.^{52,53} This study included 16 reliable measures, each of which was evidence-based and included to address specific limitations present within the food environment literature.

When considering the three coders, reliability was reasonably high among all coders. This suggests that individuals using this tool, such as local practitioners, health educators, and community members, do not need extensive nutrition training to maintain reliable data collection within their local food environment. Thus, utility of this tool extends food environment research by providing a practical and useable tool to both academia and the lay community.

This tool also minimizes time spent training data collectors, time in the field, and time required for data entry. While many other food environment coding tools are labor intensive and require extensive training,^{52,54} this tool was reliable with a single 1-hour training and took only 3–5 minutes to complete within each restaurant. Further, this tool is non-intrusive as it uses common technology (the iPod touch) and requires little interaction with restaurant staff. This allows data collectors to collect the data efficiently with a minimal amount of time spent within each restaurant. Minimizing the time in the field is essential, as a common barrier to collecting primary data is the cost of fieldwork. Another benefit of minimizing time within the restaurant is that attention is not drawn to the data collector, further increasing the efficiency of the data collection. Finally, by using an electronic data collection form, data entry after data collection was minimized and reduced manual data entry error.

Data gathered through use of this tool adds a novel data to food environment research. Although it may be possible that secondary sources or online visualizations of the food environment (eg, Google Earth) could provide some food environment codes and data,

collecting data directly from the food environment experienced by youth will deliver up-to-date qualitative data that will provide a richer context and view of the environment. For example, data collected through secondary sources would be unable to determine codes such as the accessibility of free fountain drinks and promotion of unprocessed vegetables within the physical restaurant. Yet, it may be possible for future research to use a combination of secondary sources and this new tool. A future study may want to use secondary sources to identify outlets of interest, and then use this tool to gain a more detailed understanding of those outlets. This would minimize the time spent ground truthing restaurant outlet data, while providing primary, qualitative data on specific outlets.

While this study has many strengths, such as the creation of a reliable, informed, and adaptable tool, it does have limitations that should be considered. First, this study did not include all outlets to which youth may be exposed. It only focused on outlets within one-half mile around schools, yet these are restaurants to which students have easy access. Second, it focused only on restaurants, excluding outlets such as grocery stores, convenience stores, mobile food vendors, and general merchants (eg, General Dollar). Although each of these outlet types are commonly experienced by youth, focusing on restaurants provided a detailed look at one of the most common types of food outlets youth encounter around their schools. Additionally, this study only documented restaurants around a small sample of high schools. The food environment around other types of schools may be different than what was documented by this study, yet this study documented all high schools within a single district and included national chain restaurants that would be found in many cities throughout the US. Another possible limitation is that all restaurants coded may not be youth-oriented restaurants, even though youth have access to all restaurants. Future research should consider factors or qualities of restaurants in order to better determine if youth would be likely to visit a particular restaurant. Nevertheless, each of the restaurants documented by this study are possible restaurant options for youth. This study was unable to determine if the tool was able to predict associations important for understanding youth's behavior within the food environment. Finally, this tool was not examined for test-retest reliability nor face or content validity was assessed for this tool. Future research should consider including these psychometric tests to further strengthen this restaurant environment coding tool. Nevertheless, the novelty and strengths of this study should not be discounted, as it provides up-to-date information about the food environment and provides support for future research examining the food environment of youth. After consideration of strengths and limitations, best practices have been identified when using this restaurant-coding tool. See Table 4 for a list of best practices.

There are four changes to the tool and protocol that resulted after data collection and reliability analyses and are important to note. First, the landscape maintenance variable was dropped, as it was viewed differently by coders and it is likely that building maintenance measures similar qualitative factors. Second, the item documenting availability and options of meal deals was improved. Specifically, coders did not see the practical difference between response options of "Not available" and "No" to the question, "Are meal deals with varying sizes available?" To clarify this question, response options of "Not available" and "No" were collapsed into a single response. Future research may consider asking only if meal deals are available (yes or no), and then if customers are able to select different sizes. Third, reliability

may be further improved with multiple practice sessions on select restaurants to ensure coders know what to look for, are familiar with the tool, and comfortable in the field. Fourth, incorporation of a feedback mechanism to provide information back to restaurants or the researcher may benefit this tool. For example, variables within the tool may be scored to provide a healthfulness index to indicate how many features are supportive of health. This could then be used to classify the degree to which outlets are or are not healthful or could be used as a feedback mechanism to restaurants to show certain health-related areas in need of improvement.

IMPLICATIONS FOR HEALTH BEHAVIOR OR POLICY

This study created an informed, reliable data collection tool used to collect primary data within the restaurant food environment of high schools that cannot be collected through secondary sources. Use of the food environment tool created can benefit both future and existing food environment research to ensure that data are informed, reliable, and accurately represent the restaurant food environment of youth.

The tool developed in this study aligns with Healthy People 2020⁷³ objectives focused on creating healthier food access. Specifically, this study documented the availability and advertisement of foods recommended by the Dietary Guidelines for Americans Advisory Committee⁷⁴ including fruits, vegetables, grains, and minimally processed meats. Given that Americans are eating away from home more than ever before, identifying the healthful features or lack of healthful features of the restaurant food environment will provide needed data to inform policy that will support and incentivize restaurants to more closely align their food offerings with the Dietary Guidelines for Americans. Ultimately, state and local health professionals and policy makers can use this tool to directly assess the healthfulness of restaurants in their communities, a key feature of national nutrition objectives.

Food environment researchers should consider:

- Identifying additional healthful features of the food environment important to youth.
- Testing the reliability and validity of the tool in additional food outlet settings such as convenience and grocery stores.
- Using the tool to determine how the restaurant environment may be better reflect the recommendations from the Dietary Guidelines for Americans Advisory Committee.

Health practitioners and policy makers should use this tool to:

- Assess and describe the healthfulness of restaurants in their communities, particularly those surrounding schools.
- Leverage results from assessments to inform and influence food environment policies and legislation.
- Identify strategies for improvement of the food environment of youth.

Acknowledgements

This research was funded through a grant to Dr. Keryn E. Pasch from the National Cancer Institute, grant # R03CA158962. The content of this manuscript is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute or the National Institutes of Health.

References

1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA*. 2014;311(8):806–814. [PubMed: 24570244]
2. Reilly JJ, Armstrong J, Dorosty AR, et al. Early life risk factors for obesity in childhood: cohort study. *BMJ*. 2005;330(7504):1357. [PubMed: 15908441]
3. Pulgaron ER. Childhood obesity: a review of increased risk for physical and psychological comorbidities. *Clin Ther*. 2013;35(1):A18–32. [PubMed: 23328273]
4. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change. *Obesity (Silver Spring)*. 2008;16(10):2205–2211. [PubMed: 18719665]
5. Story M, Neumark-Sztainer D, French S. Individual and environmental influences on adolescent eating behaviors. *J Am Diet Assoc*. 2002;102(3 Suppl):S40–51. [PubMed: 11902388]
6. Rose D, Bodor JN, Hutchinson PL, Swalm CM. The importance of a multi-dimensional approach for studying the links between food access and consumption. *J Nutr*. 2010;140(6):1170–1174. [PubMed: 20410084]
7. Gordon-Larsen P. Food availability/convenience and obesity. *Adv Nutr*. 2014;5(6):809–817. [PubMed: 25398746]
8. Rundle A, Neckerman KM, Freeman L, et al. Neighborhood food environment and walkability predict obesity in New York City. *Environ Health Perspec*. 2009;117(3):442–447.
9. Smoyer-Tomic KE, Spence JC, Raine KD, et al. The association between neighborhood socioeconomic status and exposure to supermarkets and fast food outlets. *Health Place*. 2008;14(4):740–754. [PubMed: 18234537]
10. Wang MC, Cubbin C, Ahn D, Winkleby MA. Changes in neighbourhood food store environment, food behaviour and body mass index, 1981–1990. *Public Health Nutr*. 2008;11(9):963–970. [PubMed: 17894915]
11. Yancey AK, Cole BL, Brown R, et al. A cross-sectional prevalence study of ethnically targeted and general audience outdoor obesity-related advertising. *Milbank Q*. 2009;87(1):155–184. [PubMed: 19298419]
12. Babey SH, Wolstein J, Diamant AL. Food environments near home and school related to consumption of soda and fast food. *Pol Brief UCLA Cent Health Policy Res*. 2011(PB2011–6):1–8.
13. Chiang PH, Wahlqvist ML, Lee MS, Huang LY, Chen HH, Huang ST. Fast-food outlets and walkability in school neighbourhoods predict fatness in boys and height in girls: a Taiwanese population study. *Public Health Nutr*. 2011;14(9):1601–1609. [PubMed: 21729476]
14. Nixon H, Doud L. Do fast food restaurants cluster around high schools? A geospatial analysis of proximity of fast food restaurants to high schools and the connection to childhood obesity rates. *J Agri Food Sys Comm Dev*. 2011;2(1):181–194.
15. Forsyth A, Wall M, Larson N, Story M, Neumark-Sztainer D. Do adolescents who live or go to school near fast-food restaurants eat more frequently from fast-food restaurants? *Health Place*. 2012;18(6):1261–1269. [PubMed: 23064515]
16. Buck C, Bornhorst C, Pohlmann H, et al. Clustering of unhealthy food around German schools and its influence on dietary behavior in school children: a pilot study. *Inter J Behav Nutr Phys Act*. 2013;10:65. doi: 10.1186/1479-5868-10-65
17. Williams J, Scarborough P, Matthews A, et al. A systematic review of the influence of the retail food environment around schools on obesity-related outcomes. *Obes Rev*. 2014;15(5):359–374. [PubMed: 24417984]

18. Sanchez BN, Sanchez-Vaznaugh EV, Uscilka A, Baek J, Zhang L. Differential associations between the food environment near schools and childhood overweight across race/ethnicity, gender, and grade. *Am J Epidemiol.* 2012;175(12):1284–1293. [PubMed: 22510276]
19. Grier S, Davis B. Are All Proximity Effects Created Equal? Fast Food Near Schools and Body Weight Among Diverse Adolescents. *Am Market Assoc.* 2013;32(1):116–128.
20. Laska MN, Hearst MO, Forsyth A, Pasch KE, Lytle L. Neighbourhood food environments: are they associated with adolescent dietary intake, food purchases and weight status? *Public Health Nutr.* 2010;13(11):1757–1763. [PubMed: 20529405]
21. An R, Sturm R. School and residential neighborhood food environment and diet among California youth. *Am J Prev Med.* 2012;42(2):129–135. [PubMed: 22261208]
22. Larson NI, Story MT, Nelson MC. Neighborhood environments: disparities in access to healthy foods in the U.S. *Am J Prev Med.* 2009;36(1):74–81. [PubMed: 18977112]
23. Valentine JC, Cooper H, Patall EA, Tyson D, Robinson JC. A method for evaluation research syntheses: The quality, conclusions, and consensus of 12 syntheses of the effects of after-school programs. *Res Synth Meth.* 2010;1(1):20–38.
24. Lamichhane AP, Warren J, Puett R, et al. Spatial patterning of supermarkets and fast food outlets with respect to neighborhood characteristics. *Health Place.* 2013;23:157–164. [PubMed: 23933445]
25. Powell LM, Rimkus LM, Isgor Z, Barker D, Chaloupka FJ. Exterior Marketing Practices of Fast-Food Restaurants. 2012. <https://www.rwjf.org/en/library/research/2012/03/exterior-marketing-practices-of-fast-food-restaurants.html>. Accessed November 28, 2018.
26. Block JP, Scribner RA, DeSalvo KB. Fast food, race/ethnicity, and income: a geographic analysis. *Am J Prev Med.* 2004;27(3):211–217. [PubMed: 15450633]
27. Burdette HL, Whitaker RC. Neighborhood playgrounds, fast food restaurants, and crime: relationships to overweight in low-income preschool children. *Prev Med.* 2004;38(1):57–63. [PubMed: 14672642]
28. Hurvitz PM, Moudon AV, Rehm CD, Streichert LC, Drewnowski A. Arterial roads and area socioeconomic status are predictors of fast food restaurant density in King County, WA. *Inter J Behav Nutri Phys Act.* 2009;6:46. doi: 10.1186/1479-5868-6-46
29. Burgoine T, Lake AA, Stamp E, Alvanides S, Mathers JC, Adamson AJ. Changing foodscapes 1980–2000, using the ASH30 Study. *Appetite.* 2009;53(2):157–165. [PubMed: 19467279]
30. Morland KB, Evenson KR. Obesity prevalence and the local food environment. *Health Place.* 2009;15(2):491–495. [PubMed: 19022700]
31. Poulos NS, Pasch KE. The Outdoor MEDIA DOT: The development and inter-rater reliability of a tool designed to measure food and beverage outlets and outdoor advertising. *Health Place.* 2015;34:135–142. [PubMed: 26022774]
32. Lake AA, Burgoine T, Greenhalgh F, Stamp E, Tyrrell R. The foodscape: classification and field validation of secondary data sources. *Health Place.* 2010;16(4):666–673. [PubMed: 20207577]
33. Kelly B, Cretikos M, Rogers K, King L. The commercial food landscape: outdoor food advertising around primary schools in Australia. *Aust N Z J Public Health.* 2008;32(6):522–528. [PubMed: 19076742]
34. Glanz K Measuring food environments: a historical perspective. *Am J Prev Med.* 2009;36(4 Suppl):S93–98. [PubMed: 19285215]
35. Hosler AS, Dharssi A. Reliability of a survey tool for measuring consumer nutrition environment in urban food stores. *J Public Health Manag Pract.* 2011;17(5):E1–8.
36. Powell LM, Slater S, Mirtcheva D, Bao Y, Chaloupka FJ. Food store availability and neighborhood characteristics in the United States. *Prev Med.* 2007;44(3):189–195. [PubMed: 16997358]
37. Bader MD, Schwartz-Soicher O, Jack D, et al. More neighborhood retail associated with lower obesity among New York City public high school students. *Health Place.* 2013;23:104–110. [PubMed: 23827943]
38. Cummins S, Macintyre S. Are secondary data sources on the neighbourhood food environment accurate? Case-study in Glasgow, UK. *Prev Med.* 2009;49(6):527–528. [PubMed: 19850072]
39. Kelly B, Flood VM, Yeatman H. Measuring local food environments: an overview of available methods and measures. *Health Place.* 2011;17(6):1284–1293. [PubMed: 21908229]

40. Institute of Medicine. Food marketing to children and youth: threat or opportunity? Washington, DC: National Academies Press; 2006.
41. Terry-McElrath YM, O'Malley PM, Johnston LD. Accessibility over availability: associations between the school food environment and student fruit and green vegetable consumption. *Child Obes.* 2014;10(3):241–250. [PubMed: 24872011]
42. Lucan SC, Maroko AR, Patel AN, et al. Change in an urban food environment: Storefront sources of food/drink increasing over time and not limited to food stores and restaurants. *J Acad Nutri Diet.* 2018;118(11):2128–2134.
43. Hollands S, Campbell MK, Gilliland J, Sarma S. A spatial analysis of the association between restaurant density and body mass index in Canadian adults. *Prev Med.* 2013;57(4):256–264.
44. Davis B, Carpenter C. Proximity of fast-food restaurants to schools and adolescent obesity. *Am J Public Health.* 2009;99(3):505–510. [PubMed: 19106421]
45. Harris DE, Blum JW, Bampton M, et al. Location of food stores near schools does not predict the weight status of main high school students. *J Nutri Edu Behav.* 2010;43(4):274–278.
46. Krolner R, Rasmussen M, Brug J, Klepp KI, Wind M, Due P. Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part II: qualitative studies. *Inter J Behav Nutri and Phys Act.* 2011;8:112. doi: 10.1186/1479-5868-8-112
47. Chambers S, Lobb A, Butler L, Harvey K, Traill WB. Local, national and imported foods: a qualitative study. *Appetite.* 2007;49(1):208–213. [PubMed: 17368868]
48. Joshi A, Ratcliffe MM. Causal pathways linking farm to school to childhood obesity prevention. *Child Obes.* 2012;8(4):305–314. [PubMed: 22867068]
49. Joshi A, Azuma AM. Do farm-to-school programs make a difference? Findings and future research needs. *J Hunger Enviro Nutr.* 2008;3(2–3):229–246.
50. Pasch KE, Poulos NS. Outdoor food and beverage advertising: A saturated environment. In: Williams JD, Pasch KE, Collins CA, eds. *Adv Comm Res Reduce Child Obesity 2013*:303–316.
51. Pasch KE, Komro KA, Perry CL, Hearst MO, Farbaksh K. Outdoor alcohol advertising near schools: what does it advertise and how is it related to intentions and use of alcohol among young adolescents? *J Stud Alcohol Drugs.* 2007;68(4):587–596. [PubMed: 17568965]
52. Glanz K, Sallis JF, Saelens BE, Frank LD. Nutrition Environment Measures Survey in stores (NEMS-S): development and evaluation. *Am J Prev Med.* 2007;32(4):282–289. [PubMed: 17383559]
53. Rimkus L, Powell LM, Zenk SN, et al. Development and reliability testing of a food store observation form. *J Nutr Educ Behav.* 2013;45(6):540–548. [PubMed: 23726894]
54. Ghirardelli A, Quinn V, Sugerman S. Reliability of a retail food store survey and development of an accompanying retail scoring system to communicate survey findings and identify vendors for healthful food and marketing initiatives. *J Nutr Educ Behav.* 2011;43(4 Suppl 2):S104–112. [PubMed: 21683279]
55. Dunham L, Kollar LM. Vegetarian eating for children and adolescents. *J Pediatr Health Care.* 2006;20(1):27–34. [PubMed: 16399477]
56. Jensen T Food issues polarizing America. 2013; <http://www.publicpolicypolling.com/main/2013/02/food-issues-polarizing-america.html>. Accessed May 15, 2015.
57. Neumark-Sztainer D, Story M, Perry C, Casey MA. Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *J Am Diet Associ.* 1999;99(8):929–937.
58. Pribis P, Pencak RC, Grajales T. Beliefs and attitudes toward vegetarian lifestyle across generations. *Nutrients.* 2010;2(5):523–531. [PubMed: 22254039]
59. Deliens T, Clarys P, De Bourdeaudhuij I, Deforche B. Determinants of eating behaviour in university students: a qualitative study using focus group discussions. *BMC Public Health.* 2014;14:53. [PubMed: 24438555]
60. Neumark-Sztainer D, Wall M, Perry C, Story M. Correlates of fruit and vegetable intake among adolescents. Findings from Project EAT. *Prev Med.* 2003;37(3):198–208. [PubMed: 12914825]
61. Hillier A, Cole BL, Smith TE, et al. Clustering of unhealthy outdoor advertisements around child-serving institutions: a comparison of three cities. *Health Place.* 2009;15(4):935–945. [PubMed: 19369111]

62. Couch SC, Glanz K, Zhou C, Sallis JF, Saelens BE. Home food environment in relation to children's diet quality and weight status. *J Acad Nutri Diet.* 2014;114(10):1569–1579.
63. Boutelle KN, Fulkerson JA, Neumark-Sztainer D, Story M, French SA. Fast food for family meals: relationships with parent and adolescent food intake, home food availability and weight status. *Public Health Nutr.* 2007;10(1):16–23. [PubMed: 17212838]
64. Hebden L, Hector D, Hardy LL, King L. A fizzy environment: availability and consumption of sugar-sweetened beverages among school students. *Prev Med.* 2013;56(6):416–418. [PubMed: 23480973]
65. McKinley MC, Lowis C, Robson PJ, et al. It's good to talk: children's views on food and nutrition. *Eur J Clin Nutr.* 2005;59(4):542–551. [PubMed: 15714214]
66. Reedy J, Krebs-Smith SM, Bosire C. Evaluating the food environment: application of the Healthy Eating Index-2005. *Am J Prev Med.* 2010;38(5):465–471. [PubMed: 20171823]
67. Powell LM, Auld MC, Chaloupka FJ, O'Malley PM, Johnston LD. Access to fast food and food prices: relationship with fruit and vegetable consumption and overweight among adolescents. *Adv Health Eco Health Serv Res.* 2007;17:23–48.
68. Kalavana TV, Maes S, De Gucht V. Interpersonal and self-regulation determinants of healthy and unhealthy eating behavior in adolescents. *J Health Psychol.* 2010;15(1):44–52. [PubMed: 20064883]
69. Baker CW, Little TD, Brownell KD. Predicting adolescent eating and activity behaviors: the role of social norms and personal agency. *Health Psychol.* 2003;22(2):189–198. [PubMed: 12683739]
70. Kirkpatrick SI, Reedy J, Kahle LL, Harris JL, Ohri-Vachaspati P, Krebs-Smith SM. Fast-food menu offerings vary in dietary quality, but are consistently poor. *Public Health Nutri.* 2013;17(4):924–931.
71. Saelens BE, Sallis JF, Black JB, Chen D. Neighborhood-based differences in physical activity: an environment scale evaluation. *Am J Public Health.* 2003;93(9):1552–1558. [PubMed: 12948979]
72. Leslie E, Cerin E, Kremer P. Perceived neighborhood environment and park use as mediators of the effect of area socio-economic status on walking behaviors. *J Phys Act Health.* 2010;7:802–210. [PubMed: 21088312]
73. Office of Disease Prevention and Health Promotion, United States Department of Health and Human Services. Healthy People 2020 Topics and Objectives: Nutrition and Weight Status. <https://www.healthypeople.gov/2020/topics-objectives/topic/nutrition-and-weight-status/objectives>. Accessed November 30, 2018.
74. Millen BE, Abrams S, Adams-Campbell L, et al. The 2015 Dietary Guidelines Advisory Committee Scientific Report: Development and Major Conclusions. *Adv Nutrition.* 2016;7(3):438–444.

Desktop Layout

Restaurant SchoolID XXXXXXXX PhotoID 31 Send by Email

Dennys

Address, City, State, Zip

Restaurant: Dennys

Description: establishment

Notes: Dennys

1. Are salads able to be included as a side?
2. Are whole, unprocessed vegetables available?
3. Does this restaurant serve vegetarian or vegan entrees?
 No Yes
4. Is advertising or promotion of unprocessed, whole foods available?
5. Is advertising or promotion of locally sourced, sustainable or farm-to-table foods visible?
 No Yes
6. Which best describes access to **free** fountain drink refills?
7. Does this restaurant have a menu of single, low-cost items?
 No Yes
8. Does this restaurant have meal deals with varying sizes?
- 8A. If yes, are whole, unprocessed vegetables available?
 No Yes
9. Does this restaurant have a drive thru?
 No Yes
10. Does this restaurant have a kids menu?
 No Yes
11. Where do you order and receive food?

12. Describe the environment of the restaurant.

A. Is the restaurant good for groups? No Yes

B. Does this restaurant have outdoor seating? No Yes

C. Does this restaurant have a play area? No Yes


D. Is the building well maintained? No Yes


E. Is the landscaping well maintained? No Yes N/A

Updated by Admin Jun 1, 2015 9:42 AM

UserID: 1 StartTime: 12:34 PM DateCompleted: 6/1/2015
EndTime: 12:37 PM

Photo.jpg





Drag a file here

Drag a file here

Drag a file here

Health Behav Policy Rev. Author manuscript; available in PMC 2021 April 14.

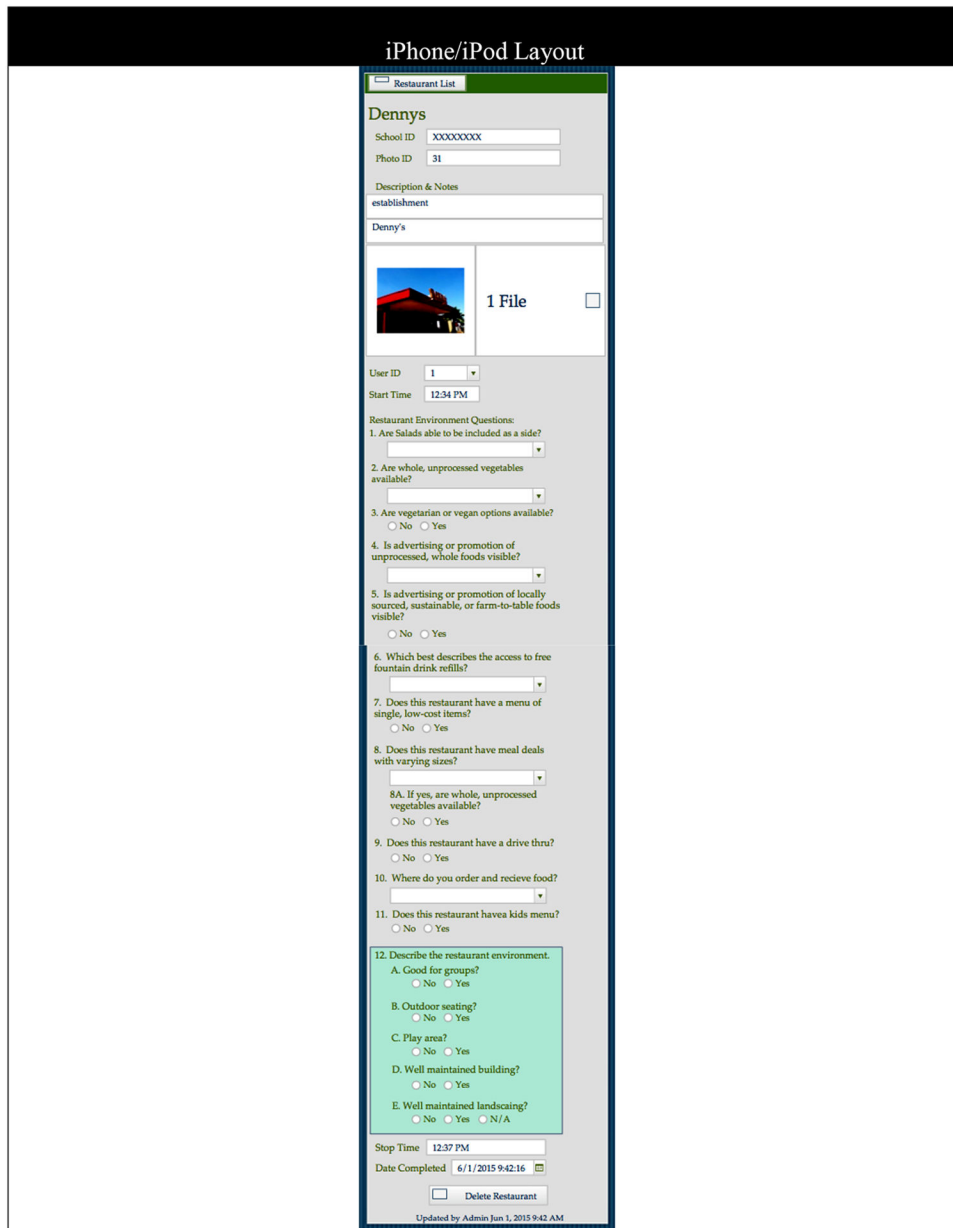


Figure 1. Desktop and iPhone®/iPod Touch® layout view of restaurant data collection tool.

Table 1.

Items included on RD survey.

Item	Response Option	Reason for Use
“What do you believe are important qualities/factors to consider when determining the healthfulness of a restaurant? Please list at least 5.”	Participants were given 10 free-response boxes.	<ul style="list-style-type: none"> • Provided a foundation for future code development
“How would you describe a healthy diet?”	A single free response box was provided for participant response.	<ul style="list-style-type: none"> • Ensure that each RD had a similar perception of what constitutes a healthy diet
“What city do you current live in?”	A single free response box was provided for participant response.	<ul style="list-style-type: none"> • Ensure that participants were not clustered in a single geographic area
“Are you a Registered Dietitian?”	“Yes” or “No”	<ul style="list-style-type: none"> • Confirm that all participants completing the survey were currently a RD

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2.

Qualities and factors used for determining restaurant healthfulness.

Quality/Factor	n
Vegetable/Vegetarian/Vegan/Leafy Greens	19
Vegetable/Leafy greens (13) *	
Vegetarian/Vegan (6) *	
Locally sourced/Sustainability *	13
Freshness/Minimally processed *	10
Overall food choices	6
Portion size	6
Substitutions possible	6
Sodium	6
Fried alternative/Unbreaded entrees	6
Whole grains	5
Fresh fruit	5
Nutrition information available	5
Beverage choices	5
Balanced meals	3
Cooking technique	3
Calorie content	3
Fats	3
Variety	2
Taste	2
Sugar	2
Advertising	1
Cleanliness	1
Safety	1

* Included on restaurant coding tool

Table 3.

Restaurant coding tool variables, definitions, response options, and justification.

Variable	Question Description	Responses	Justification	Reference
Are salads able to be included as a side? *	A side salad is a small portion of leafy greens served alongside an entrée.	Not Available Up charge Free substitution	Increased availability of fruits and vegetables or salad bars in associated with healthful consumption of these foods.	(37; 45)
Are whole, unprocessed vegetables available? *	Whole, unprocessed vegetables are vegetables that have been fresh cut and prepared. This will also include minimally cooked fresh vegetables such as steamed or roasted vegetables, but does not include vegetables purchased as ready-to-cook foods such as commercially made French fries.	Not Available Sides Entrées Entrées and sides	Key factor reported by RDs included the availability of minimally processed vegetables such as side salads.	RD Survey
Are vegetarian or vegan entrées available? *	Vegetarian entrées are main dishes that do not include meat. Vegan entrées are main dishes that do not include any animal product (e.g., meat, cheese, egg). Some restaurants may specifically mark these items, while other restaurants may not.	No Yes	Key factor reported by RDs included the availability of vegetarian and vegan options. A recent poll suggests that 13% of Americans identify as either vegetarian or vegan. Vegetarian youth appear to follow vegetarian diets for environmental and moral reasons.	(46; 47; 48; 49)
Is advertising or promotion of unprocessed, whole foods visible? *	Whole, unprocessed foods are foods including meats, grains, vegetables, and fruit that are available to purchase in their original form (e.g., whole chicken breast or fresh apple), or unprocessed (e.g., 100% ground beef hamburger). This excludes foods that are purchased as ready-to-eat or cook foods such as commercially prepared and packaged French fries or chicken tenders. Advertising is signage designed to increase the purchasing of particular items (e.g., poster on restaurant window). Promotion is any act deliberately taken by the restaurant to support consumption of particular foods (e.g., food display of specials at counter).	No Sides Entrées Entrées and sides	Key factor reported by RDs included the availability of minimally processed foods. Research suggests that availability is a common driver of consumption among youth. The majority of advertising research focuses on promotion of unhealthy products, while little research has documented healthful advertising.	(8; 21; 45; 50; 51; 52)
Is advertising or promotion of locally sourced, sustainable, or farm-to-table foods visible? *	Locally sourced foods are those that are grown, cooked, or made near the location of the restaurant. Sustainable foods are those that have been grown or made using sustainable practices. Farm-to-table foods are foods that have been grown or produced near the restaurant location. Advertising is signage designed to increase the purchasing of particular items (e.g., poster on restaurant window). Promotion is any act deliberately taken by the restaurant to support consumption of particular foods (e.g., food display of specials at counter).	No Yes	Key factor reported by RDs included the availability of local or sustainably sourced foods. Research suggests youth who attend schools with a farm-to-school program develop positive beliefs and attitudes toward consumption of fruits and vegetables.	(53; 54; 55)
Which best describes access to free fountain drink refills?	Fountain drinks are the beverages that are dispensed through a machine, which includes a variety of faucets of sodas, drinks, or water. Fountain drinks do not have to be carbonated, but must be dispensed through a fountain machine. Free refills are when a restaurant customer only purchases one beverage, but has the ability to replenish their beverage for free.	Fountain drinks not available Free fountain drink refills not available Free, behind counter Free, ready access	Few have documented accessibility within restaurants. If customers have ready access to SSBs they may be more likely to consume more.	(56; 57; 58)

Variable	Question Description	Responses	Justification	Reference
Does this restaurant have a menu of single, low-cost items?	A single, low-cost item menu is a menu of single food or beverage items that are typically less than \$3, often as low as \$1 (e.g., McDonald's Dollar Menu, Taco Bell's Dollar Cravings Menu, Wendy's Right Size Right Price Menu).	No Yes	Cost of food also appeared within the literature as a key factor for youth's consumption patterns. Youth often choose foods they believe will give them the highest satiety value for the lowest cost, such as items on a low-cost menu (e.g., dollar menu) or purchased as a meal deal. Low-cost menus have also been found to cluster around schools.	(45: 48; 52; 59; 60)
Does this restaurant have meal deals with varying sizes?	Meal deals are a common way restaurants promote a single entrée, side, and beverage for a single price that is often less expensive than purchasing each item separately. Meal deals often give the customer the option to change the size of the beverage or a food item served within the meal for minimal cost.	Not Available No Drinks only Food and drinks		
If yes, are whole, unprocessed vegetables available?	If meal deals are available at this restaurant, are vegetables included on the menu that are minimally processed.	No Yes	Key factor reported by RDs included the availability of minimally processed foods. Given that availability associated with consumption, the availability of healthful choices on meal menus was documented.	(45: 50; 51)
Does this restaurant have a drive thru?	A drive thru is any window or ordering station that food is ordered and delivered to the customer without the customer needing to leave their vehicle.	No Yes	Food outlets are often classified based on where customers order food, neglecting to identify those with drive thru windows. Drive thru windows may appeal to youth, as they are often newly licensed drivers. Without considering where food is received, neglecting to identify "fast casual" restaurants. These order locations may be particularly significant for youth as fast casual restaurants offer a different atmosphere.	(61)
Where do you order and receive food?	Ordering food is when a customer verbally requests particular food items. Receiving food is when the consumer obtains the foods purchased.	Table (order/receive) (TT) Counter order, counter pick-up (CC) Counter order, table receive (CT)		
Is this restaurant good for groups?	"Good for groups" is a term often used to describe restaurants that can easily accommodate groups of people. Group dining is often facilitated by large spaces, tables that accommodate many chairs, picnic-style tables, and restaurants that are willing to split food bills.	No Yes	The importance of social interaction during adolescence is well documented within the literature. Identifying features of restaurants that facilitate interaction among youth (e.g., good for groups) may be important.	(62; 63)
Does this restaurant have outdoor seating?	Outdoor seating is the availability of chairs, benches, and tables outside on restaurant property.	No Yes	Outdoor seating may also facilitate social interaction among youth.	
Is there a play area?	A play area is any type of play scope or area of available toys and activities at a restaurant.	No Yes	Recent work suggests offerings on fast food menus, including kid's menus, are of minimal nutrition quality when measured by the Healthy Eating Index.	(64)
Does this restaurant have a kid's menu?	A kid's menu is a special menu designed for youth. Typically this menu is separate from the large menu and specifically described as a youth menu.	No Yes		
Is the building well maintained?	A well maintained building is any restaurant that has a physical building that is free of visible damage or wear. Damage or wear may include, but not limited to things such as cracks in walls or broken/non-functioning lights.	No Yes	Maintenance of resources is associated with use.	(65; 66)
Is landscaping well maintained?	Well maintained landscaping is plants, grass, or other vegetation that has been visibly taken care of, watered, and trimmed. Poorly maintained landscaping includes un-mowed, overgrown weeds, or dying plants.	No Yes N/A		

* Items created based on results from the RD survey.

Table 4.

Best Practices when Using the Restaurant Coding Tool.

Best Practice
<p>1. Be familiar with the data collection template on the mobile device. If data collectors are familiar with the tool prior to data collection, data is collected faster and without drawing attention to the data collector while in the restaurant. This allows the data collector to work quickly and efficiently without disturbing other patrons or restaurant staff.</p>
<p>2. Review and complete possible data collection from exterior of restaurant. Prior to entering the restaurant, data collectors should consider reviewing the template and completing questions or items that were visible from the exterior of the outlet to decrease overall data collection time.</p>
<p>3. Directly approach restaurant staff. Once in the restaurant, data collectors should directly approach the restaurant hostess and ask for a menu. This allows the data collector to review available options and gives them time to look around the restaurant to identify and answer any remaining environmental questions on the tool.</p>
<p>4. Perform data collection during off peak hours. This allows data collectors to not be in the way or too obvious during data collection. Data collection completed between 11am and 3pm on weekdays was the quickest, least distracting to restaurant staff, and minimized attention of the data collectors.</p>
<p>5. Be polite and respectful of restaurant staff. Answer any questions the restaurant staff has about what you are doing eases any tension they may have about data collectors being present.</p>