Brief Report

Feasibility of using mobile point-of-sale technology in Baltimore City corner stores for tracking sales: A brief report

Emma C. Lewis, Kaitlyn M. Harper, Lisa K. Poirier, Joel Gittelsohn

Human Nutrition, Department of International Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD, USA

Abstract

Small food retail stores in many underserved urban settings keep no electronic records, making documentation of program impact on sales difficult to obtain. We examined the feasibility of introducing a point-of-sale tablet (POST) application to track sales of foods and beverages in Baltimore City corner stores. A sample of four geographically and ethnically diverse corner store owners were trained to use POST to track sales of 14 items for eleven days. Feasibility was documented via a structured survey and open-ended interviews. POST had high economic and cultural acceptability, operability, and perceived sustainability, regardless of language differences or familiarity with mobile technology. All store owners reported willingness to use POST again. It is feasible to train corner store owners to use a point-of-sale application for sales monitoring. An upcoming trial will help to ensure that POST provides sufficient value added for corner store owners.

Introduction

Many underserved urban communities lack supermarkets, leaving residents to rely heavily on small independently owned food retail stores (referred to as 'corner stores') for food purchases.[1,2] Baltimore City is notable for a relative absence of supermarkets, and low access to personal transportation.[3] In fact, one-quarter of Baltimore City residents live in areas identified as Healthy Food Priority Areas.[4] In 2016, it was estimated that Baltimore City was home to 525 independently owned and operated corner stores, with density varying by neighborhood, although current estimates suggest that this number may be closer to the six-hundreds.[5] Numerous studies to date have used the Healthy Food Availability Index (HFAI) score, a numerical value ranging from 0 to 27 that evaluates the availability and cost of healthy foods in individual food stores in Baltimore City corner stores, and found an overall low average score of 9.1.[6-8] Thus, it is well documented that corner stores in Baltimore City are particularly lacking in healthy food options.[3]

Gaps in the literature

Many public health interventions have sought to improve healthy food access in small food retail settings.[3,9-13] However, a challenge has been their lack of record-keeping with which to track sales. Our previous work in Baltimore City indicates that most corner store owners do not have electronic point-of-sale (POS) systems and keep no formal records of stocking and sales.[14] Importantly, a survey in Baltimore City found that corner store owners would be interested in having access to a mobile application which would allow them to have a better understanding of what is stocked and sold.[14]

Objective

The purpose of this pilot study was to examine the feasibility of employing a simplified mobile tablet application POS system for use by corner store owners in Baltimore City.

Design and methods

The Point-Of-Sale Tablet (POST) application is an interactive Android tablet mobile application developed for use by small corner store owners. POST serves as a scaled-back POS software to track unit sales of targeted foods and beverages selected by the research team. POST is designed to be intuitive for all ages, regardless of language or familiarity with mobile technology.

POST has two main screens: i) the home page; and ii) the administrator page. The home page is the only screen visible to corner store owners while using the application (Figure 1). During the pilot test, the home screen consisted of 16 boxes (4x4), 14 of which display a picture of a food item and example brands, selected to be common based on former work in Baltimore City corner stores, of the food item in small text below. Foods/beverages included: 100% fruit juice, diet soda, regular soda, apple, banana, baked potato chips, regular potato chips, healthy cold cereal, sugary cold cereal, frozen vegetables, whole milk, skim milk, 100% whole wheat bread, and white bread. These items were chosen to

Significance for public health

In recent decades, research on healthy food purchasing behaviors in small food retail stores has increased. Urban retail food environments lacking in healthy foods and abundant in unhealthy foods are often located in areas with high proportions of underserved African-American residents. Retail food environments such as these are particularly concerning, as they are associated with alarming rates of obesity and chronic disease in ethnic minority populations. Children are also being increasingly affected by what is available for purchase in small food retail stores, leading to lifetime risk for obesity and related diseases. In order for store owners to be better equipped to handle stocking and sales of healthy food items, they require efficient and effective technology to better control business operations. Mobile point-of-sale technology has the potential to improve small food retail environments and can inform future research on the stocking, purchasing, and consumption of healthy foods in similar settings and beyond.

represent a balance of healthy and unhealthy options. When an item is tapped on the screen, a green check mark appears along with a positive chime, and a record is made in a database including the store name, item name, date time displayed as UNIX time (i.e., the number of seconds since January 1, 1970). The bottom of the page includes an "Undo" button in case the wrong food or beverage is chosen. The administrator page is password-protected and can only be used by the research team. This screen is used to set up the store for data collection, as well as to access and export data stored. Exported data are stored in Excel (.csv) format which can then be input into statistical analysis software such as STATA or SPSS for research purposes.

Following the design and development of POST, four Baltimore City corner store owners were recruited from July-September 2019 to pilot the application. Once a brief overview of the study was given, store owners were asked if they would be willing to participate, and if so, to provide oral consent.

Training of corner store owners

Participating corner store owners were trained to use POST for any transactions in which they sold any of the selected 14 items. Store owners were provided with an Android tablet with POST
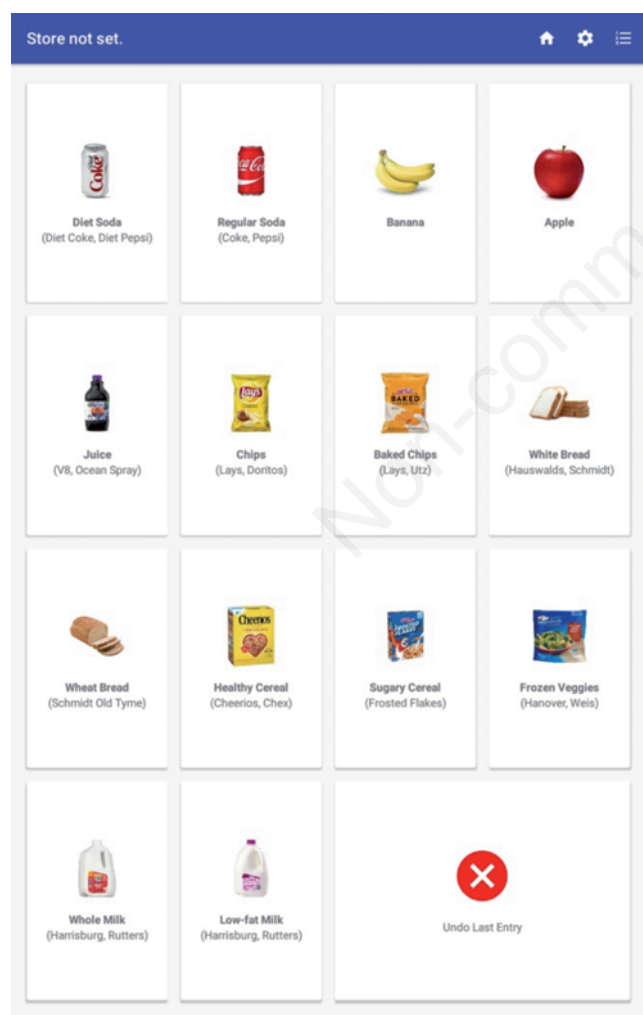

Figure 1. POST home screen visible to store owners.

software installed on the device, as well as a tablet case, stand, charger, and extension cord. Corner store owners were instructed to use POST for 1-, 3-, and 7-day time periods for a total of eleven days. Store owners were told that the research team would visit the store every 1-, 3-, and 7- day period in order to collect data from the tablet and ensure POST was being used correctly. Once all eleven days of data collection were completed, store owners received a $50 gift card for their participation.

Data collection and feasibility assessment

Data were collected using a structured survey instrument and open-ended interviews conducted by a research team member. The brief structured survey instrument included questions regarding the corner store owner's ethnicity, how long they have owned their store, and how they typically complete transactions in their store. Corner store owners were also asked informal questions regarding their experiences using POST at the 1-, 3-, and 7- day points over the eleven-day period. The open-ended interview included questions regarding store owners' experience using POST and probed at various dimensions of their perceived feasibility of use of POST in the future, as well as feedback on how POST could be improved to provide sufficient value added for the store owner.

Feasibility criteria included i) acceptability; ii) operability; and iii) perceived sustainability, and was assessed based on open-ended responses to questions during the open-ended interviews. For the purpose of this pilot, acceptability referred to how well POST was received by corner store owners and the extent to which corner store owners were willing to continue to use it for the eleven-day test period. Operability referred to the ease of using POST as well as the ease of being trained on the use of POST, as reported by corner store owners and as experienced by the research team. Perceived sustainability referred to corner store owners' perceptions of whether POST would be appropriate for continued use over time.[15]

Results

The four corner store owners were ethnically diverse, with individuals of Chinese, Indian, Middle Eastern, and Pakistani origins. Two stores were female-owned and one store owner had maintained their store for over a decade. Each store had an average of 8 aisles stocked with food and drink and each store only had one cash register.

Acceptability

POST was found to be moderately acceptable for use by the sampled corner store owners. Three out of four store owners completed all eleven days of sales recording. The fourth store owner only completed the first time-point before electing to drop out of the study, reporting that this was due to their store being busy and not having enough help with customers and stocking.

Operability

POST had high operability in each of the four corner stores sampled. All corner store owners reported that POST was easy to use, and that they would be willing to use it again. Training on the use of POST took approximately five minutes, regardless of store owners' language differences or familiarity with mobile technolo-

gy. Corner store owners were excited at the opportunity to use a tablet device and appreciated being provided with all necessary materials. Corner store owners also reported the ease of being able to train their coworkers or family members to use POST in the case that they were absent from the store during hours of business.

Perceived sustainability

POST had moderately high perceived sustainability. Three out of four corner store owners expressed that they would willingly continue to use POST in their stores on a daily basis and that it would provide a time- and cost-efficient method for tracking sales in the future. The corner store owner who elected to drop out of the study perceived POST to be time consuming, citing that their store was high-traffic and not enough staff were available to cover daily operations, thus leaving little flexibility to utilize a POS system for every transaction.

Discussion

To our knowledge, this is the first study to develop and pilot a simplified POS mobile tablet application for small corner store owners. POST was found to be feasible for use by a diverse group of Baltimore City corner store owners with moderate acceptability, high operability and moderately high perceived sustainability. Importantly, we found that it was feasible to train corner store owners in underserved areas to use a simplified point-of-sale mobile application. Based on feedback from this pilot, POST could be improved to enhance acceptability, operability, and perceived sustainability before being applied in future work.

Limitations

It is important to note the limitations of this pilot study. First, the sample size (n=4) was small. A planned clinical trial will continue to examine the feasibility and acceptability of POST among a larger sample of corner store owners in Baltimore City beginning in Spring 2022. Second, this pilot test used a convenience sample; thus, this sample of store owners may be more likely to report high feasibility compared to those that did not choose to participate. Third, POST is not optimized to represent the full range of foods in a corner store, which can often reach over 500 items. However, it is possible to choose foods which represent more or less commonly sold items, as well as those which are representative of a particular dietary pattern (i.e., healthy foods, ethnic foods). Finally, this study may not be generalizable in other neighborhoods or cities where corner stores are prevalent. It may be beneficial to test POST among corner store owners in underserved settings elsewhere.

Future implications and next steps

This pilot study has important implications for research on healthy food purchasing behaviors in corner stores in Baltimore City and other underserved urban areas across the country. POST has the potential to provide various benefits to corner store owners, including: i) better control over business operations; ii) better analytical thinking and planning; iii) increased business efficiency; and iv) improved personal client communication.[16] Overall, technology like POST can help to increase profits and help store owners to make informed business decisions. Next steps include continuing to pilot test POST in a larger sample size of diverse

Baltimore City corner stores and conducting a comparative analysis between data collected by corner store owners using POST and store owners' verbal recall in order to validate POST as a tool for assessing the tracking of sales in small corner stores. Given the recent increase in interest regarding food access and healthy food availability in corner stores, particularly in Baltimore City, this pilot is well-positioned to inform future work in this area.

Correspondence: Emma C. Lewis; 615 N. Wolfe St. W2041, Baltimore, MD 21205, USA.
E-mail: elewis40@jhu.edu

References

1. United States Department of Agriculture [USDA]. Access to Affordable, Nutritious Food Is Limited in "Food Deserts". 2010. Retrieved from https://www.ers.usda.gov/amber-waves/2010/march/access-to-affordable-nutritious-food-is-limited-in-food-deserts/
2. Borradaile KE, Sherman S,Veur SSV, et al. Snacking in children: the role of urban corner stores. Pediatrics 2009;124:1293-8.
3. Gittelsohn J, Suratkar S, Song HJ, et al. Process evaluation of Baltimore Healthy Stores: a pilot health intervention program

with supermarkets and corner stores in Baltimore City. Health Promot Pract 2010;11:723–32.

4. Buczynski AB, Freishtat H, Buzogany S. Mapping Baltimore city's food environment: 2015 report. 2015. Available from https://mdfoodsystemmap.org/wp-content/uploads/2015/06 /Baltimore-Food-Environment-Report-2015-11.pdf

5. Baltimore Food Policy Initiative. 2016. State of the corner store: A city perspective. Available from https://planning.baltimorecity.gov/sites/default/files/RFEA%20Mtg2_BFPI.pdf

6. Franco M, Diez Roux AV, Glass TA, et al. Neighborhood characteristics and availability of healthy foods in Baltimore. Am J Prev Med 2008;35:561-7.

7. Freishtat H. Baltimore city 2018 food environment brief. 2018. Available from https://planning.baltimorecity.gov/sites/default/files/City%20Map%20Brief%20011218.pdf

8. Przygocki L. Corner stores and health equity in Baltimore, MD: An analysis using the Healthy Food Availability Index. 2013. Available from: https://mdfoodsystemmap.org/wp-content/uploads/2014/07/LP_HFAI_GISproject_Revised_May24 _2014.pdf

9. Albert SL, Langellier BA, Sharif MZ, et al. A corner store intervention to improve access to fruits and vegetables in two Latino communities. Public Health Nutr 2017;20:2249-59.

10. Gittelsohn J, Rowan M, Gadhoke P. Interventions in small food stores to change the food environment, improve diet, and reduce risk of chronic disease. Prev Chronic Dis 2012;9:E59.

11. Bodor JN, Ulmer VM, Dunaway LF, et al. The rationale behind small food store interventions in underserved urban neighborhoods: insights from New Orleans. J Nutr 2010;140:1185-8.

12. Flournoy R. Healthy food, healthy communities: Promising strategies to improve access to fresh, healthy food and transform communities. Oakland: PolicyLink; 2010. Available from: https://www.policylink.org/sites/default/files/HFHC_FULL_FINAL_20120110.PDF

13. Ayala GX, Baquero B, Laraia BA, et al. Efficacy of a store-based environmental change intervention compared with a delayed treatment control condition on store customers' intake of fruits and vegetables. Public Health Nutr 2013;16:1953–960.

14. Ross A, Krishnan N, Panchal J, et al. Another barrier to increasing access to healthier foods is the cost of delivery to corner stores and wholesaler minimum purchase requirements that are not feasible for small stores due to lack of storage space. Ecol Food Nutr 2019;58:3-22.

15. Moore JE, Mascarenhas A, Bain J, Straus SE. Developing a comprehensive definition of sustainability. Implement Sci 2017;12:110.

16. Erply Business Software [Internet]. Point of sale. 2019. Available from https://erply.com/pos-system/