

Short Version Smarter Lunchrooms Annotated Bibliography of Non-Cornell Research

The Smarter Lunchrooms Movement has grown over the past few years and numerous researchers have become interested in studying the efficacy of our strategies. Below is a current and concise list of research conducted by researchers outside of Cornell University on the effectiveness of the Smarter Lunchrooms Movement in schools.

Asada, Y., Chriqui, J., Chavez, N., Odoms-Young, A., & Handler, A. (2016). USDA Snack Policy Implementation: Best Practices From the Front Lines, United States, 2013–2014. Preventing Chronic Disease, 13, E79. https://www.cdc.gov/pcd/issues/2016/16_0023.htm

This study examined “Smart Snack” policy implementation in exemplary high schools to learn more about the best practices for implementation. It was found that the best approach to snacking policy implementation came from schools that had the HealthierUS Schools Challenge: Smarter Lunchrooms award. The Smarter Lunchrooms program was reported to be a strong catalyst in the implementation of Smart Snacks because of its comprehensive wellness approach. Due to the success of this program’s snack implementation policy, organizations providing technical assistance to schools should encourage schools to strive for this award.

Bark, K., Byker-Shanks, C., & Stenberg, M. (2015). Innovative Strategies for Creating Smarter Lunchrooms in Montana High Schools. *Journal of Nutrition Education and Behavior*, 47(4), S113. DOI: 10.1016/j.jneb.2015.04.316

This study describes Smarter Lunchrooms innovative approach to increase consumption of fruits and vegetables while decreasing waste. These recommendations are based on a pilot project conducted with five high schools in Montana during the 2014-2015 school year. The results of the pilot study indicate that the success of the implementation of Smarter Lunchroom strategies can be enhanced through a team approach allowing for staff and students to share perspectives and create actionable solutions.

Blanchette, L. & Brug, J. (2005). Determinants of fruit and vegetable consumption among 6–12-year-old children and effective interventions to increase consumption. *Journal of Human Nutrition and Dietetics*, 18(6): 431–443. DOI: 10.1111/j.1365-277X.2005.00648.x

This was a review of the existing literature on effective intervention strategies to promote fruit and vegetable consumption among 6-12 year old children. It was found that accessibility, availability, and taste preferences were the most important factors in fruit and vegetable consumption. Multi-factorial school-based interventions that combined classroom curriculum, parent, and food service components also showed the greatest success in fruit and vegetable promotion.



Bridge, E., Granquist, L., Hoffer, E., & Schwartz, A. (2010). Child Obesity Research Project: Testing Signage at Two Middle Schools in Everett Prepared for and Funded by the Office of the Attorney General of Massachusetts. Northeastern University, School of Public Policy and Urban Affairs. Retrieved from Researchgate: DOI: 10.13140/2.1.5126.7529

This was an examination of whether displaying signs in middle school cafeterias would influence food choices made by students. Researchers found there was not a significant difference in the food choices of students due to the introduction of signage. Further research on factors such as the effect of a cafeteria's layout on food choice is needed to obtain more conclusive results.

Centers for Disease Control (2013). Make a difference at your school! *Chronic Disease, Paper 31.* Retrieved from <http://digitalcommons.hsc.unt.edu/cgi/viewcontent.cgi?article=1030&context=disease>

With childhood obesity rates on the rise, ten strategies were proposed to prevent this problem in schools. They are as follows: Address physical activity and nutrition through a Coordinated School Health Program (CSHP), maintain an active school health council and designate a school health coordinator, assess the school's health policies and programs and develop a plan for improvement, strengthen the school's nutrition and physical activity policies, implement a high-quality health promotion program for school staff, implement a high-quality course of study in health education, implement a high-quality course of study in physical education, increase opportunities for students to engage in physical activity, implement a quality school meals program, and ensure that students have appealing, healthy choices in foods and beverages offered outside of the school meals program.

Delger, P., Scheidel, C., & Askelson, N. (2016). Satisfy Students' Taste Preferences Through Smarter Lunchroom Changes. *Journal of Nutrition Education and Behavior, 48(7), S136.* DOI: 10.1016/j.jneb.2016.04.300

This was an evaluation of the implementation of Smarter Lunchroom changes by the University of Iowa in 5 high schools. Using the Smarter Lunchrooms assessment, meal participation data, and pre/post surveys, strengths and need for change were assessed in each school. A significant difference was found between what students perceive is happening in the cafeteria and what adults see. Thus, engaging students in this program is needed to make changes in order to satisfy their taste preferences.

Dill, A., & Williams, K. (2016). Creating Wisconsin Smarter Lunchrooms to Increase Student Selection of Healthful Foods. *Journal of Nutrition Education and Behavior, 48(7), S136-S137.* DOI: 10.1016/j.jneb.2016.04.301



This was an observation of Smarter Lunchrooms implementation in Wisconsin schools under the direction of Wisconsin Team Nutrition. During this period, the number of schools participating in Smarter Lunchrooms increased. It was found that schools receiving funding for this project showed increased student satisfaction, fruit and vegetable consumption, and meal participation. It was concluded that Smarter Lunchrooms implementation was a cost-effective way for schools to increase selection and student satisfaction with healthy foods.

Ensaff, H., Homer, M., Sahota, P., Braybrook, D., Conan, S., McLeod, H. (2015). Food choice architecture: An intervention in a secondary school and its impact on students' plant-based food choices. *Nutrients* 7(6), 4426-4437; DOI: 10.3390/nu7064426

This study's purpose was to examine the potential of shifting adolescents' food choices towards plant-based foods. Using a real world setting of a school canteen, a set of small changes to the choice architecture was designed and deployed in a secondary school in Yorkshire, England over a 6 week period. Selection of designated food items significantly increased during the intervention and post-intervention periods, compared to baseline. Students were 2.5 times as likely to select the designated food items during the intervention period, compared to baseline. The study's results point to the influence of choice architecture within secondary school settings, and its potential role in improving adolescents' daily food choices.

Glanz, K. & Mullis, R. (1988). Environment interventions to promote healthy eating: A review of models, programs, and evidence. *Journal of Health Education & Behavior*, 15(4): 395-415. DOI: 10.1177/109019818801500403

This is a review article on the success of environmental interventions to promote healthy eating. Five types of environmental interventions were analyzed: (1) changes in the food supply, (2) point of choice nutrition information, (3) collaboration with private sector food vendors, (4) worksite nutrition policies and incentives, and (5) changes in the structure of health and medical care related to nutrition. It was found that these environmental interventions on dietary behavior reached large segments of the population through various means. Models such as these using multidimensional environmental and educational technologies have been successful in reaching large segments of the population and may also be successful in other health promotion initiatives.

Godfrey, J. R. (2012). Making Lunchrooms Smarter in the Ithaca City School District. *Childhood Obesity*, 8(6), 588-590. DOI: 10.1089/chi.2012.0086.lunch

This was a case study on the implementation of Smarter Lunchroom principles in the Ithaca City School District. After implementation, it was found that fruit consumption increased by 50%, more of the healthier entrees are being sold, and students were more receptive to the introduction of new and different menu items. Overall, students were making healthier choices



without any direct prompting or information, just based on the layout of the menu items, presentation of foods, and different entrée options.

Golub, H., Gunther, C., & Kennel, J. (2014). Evaluation of the effectiveness of a cafeteria-based behavioral economics intervention designed to improve student intake of reimbursable meal components (1019.18). *The FASEB Journal*, 28(1 Supplement), 1019-18.

This was a study on the implementation of Smarter Lunchrooms Movement Protocol in four elementary schools. Plate waste data was recorded as a measure of evaluation. Researchers found that of the 637 students in the 4 schools, 21.8% and 44.5% of students ate all or none of the entrée, 68.7% ate less than 1/4 of the vegetable, and 60.3% ate 3/4 or all of the fruit. Only 13.7% of students chose unflavored milk over flavored varieties. These findings will help determine the success of behavioral economics interventions on the intake of reimbursable school meal components/nutrients.

Goto, K., Waite, A., Wolff, C., Chan, K., & Giovanni, M. (2013). Do environmental interventions impact elementary school students' lunchtime milk selection? *Journal of Applied Economic Perspectives and Policy*, 35(2): 360-76. DOI: 10.1093/aep/ppt004

This was a study on the impact of a lunchroom intervention geared at increasing students' consumption of white milk. The first intervention required students to ask for chocolate milk while white milk was readily available. Researchers found this led to an 18% increase in the selection of white milk with no change in the ratio of white milk selected to white milk consumed. In the second intervention, chocolate milk was presented in visible site, but with three times as much white milk with it. This intervention had no significant effect on selection patterns.

Herman, C. P., Roth, D. A., & Polivy, J. (2003). Effect of the presence of others on food intake: A normative interpretation. *Psychological Bulletin*, 129(6): 873-86. DOI: 10.1037/0033-2909.129.6.873

In this review, the authors discuss the effect that the presence of others has on food intake. It was found in social facilitation studies that people eat more in groups than alone, but impression management studies showed that people eat less in the presence of others. Modeling studies revealed that the presence of others may facilitate or inhibit eating, depending on the eating behaviors of the other person. Despite the conflicting research, authors were able to conclude that in the presence of palatable food and absence of clear signals of satiety, people look outward to cues from the environment to determine termination of intake. Socially derived inhibitory norms are what drive intake in the presence of others.

Lopes, M., Brown, K., & Dzimiera, J. (2015). Innovative Strategies for Creating Smarter Lunchrooms in Montana High Schools. *Journal of Nutrition Education and Behavior*, 47(4S), Page S113. DOI: 10.1016/j.jneb.2015.04.316

This project followed 5 Montana high schools in their implementation of Smarter Lunchrooms strategies from the Smarter Lunchrooms Self-Assessment Scorecard. Scores from this scorecard, plate waste data, and meal participation rates were used to evaluate success. Researchers found that salad bar and milk waste decreased while student participation increased. The average scorecard values also increased by 33%. These simple low-cost strategies enhance food selection and decrease plate waste in high school lunchrooms.

McDowell, K. M., Gunther C.W., & Kennel J.A. (2013). Determining the Effectiveness of a Behavioral Economics Cafeteria Intervention at Big Walnut High School Designed to Improve Healthfulness of Student Purchases (thesis). Retrieved from The Knowledge Bank (OSU) <http://kb.osu.edu/dspace/handle/1811/54678>

This study followed the implementation of Smarter Lunchroom strategies in an Ohio high school. Researchers assessed the program's success through production records, sales, direct observation, and student surveys. After the intervention, the high school's Smarter Lunchroom score increased from 5.5 (baseline) to 18. The number of students choosing fruits as a side and vegetables as a side increased (22.6 to 40.7% and 48.65 to 63.31%, respectively), but the sale of reimbursable meals decreased. These results imply that the intervention is sustainable and will be used to design the lunch menu in following years.

Narayan, R. J. (2014). Smarter Lunchrooms - Ohio: Using Production and Sales Records to Measure Change in Food Selection (Master's publication). Retrieved from Core Scholar (WSU). <http://corescholar.libraries.wright.edu/mph/120/>

This study develops an indicator, using production records, to track food selection in school cafeterias. Methods: Participating Ohio school districts applied interventions from The Smarter Lunchrooms Movement to cafeterias. Using MyPlate as a model and production records from two school districts, a coding system was developed to categorize foods, which were used to create the indicator, My Tray. Results: My Tray provides a visual snapshot of entrées, grains, vegetables, fruits, and milk selection. Students attending study schools selected fruits and vegetables to make 24% and 31% of the tray respectively. High school students selected the most fruit (22%) and elementary students selected 18%. Vegetable selection was highest in the elementary schools (37%), middle school was 29%, and high school selection was at 19%. Conclusion: My Tray displays food groups selection. My Tray is designed to track changes in lunchroom food selection. The tool can also be used to aggregate data across months, which can help to make comparisons across categories. Food service staff can use My Tray to track the impact of cafeteria interventions. The goal of establishing an indicator, using production, was challenging because of different recording methods, chasing missing information, and combination food items.



Nicklas, T. A., Johnson, C. C., Myers, L., Farris, R. P., & Cunningham, A. (1998). Outcomes of a high school program to increase fruit and vegetable consumption: Gimme 5 -- a fresh nutrition concept for students. *Journal of School Health, 68(6): 248-53. DOI: 10.1111/j.1746-1561.1998.tb06348.x*

This was a cohort study on efforts to increase high-school student's consumption of fruits and vegetables. The intervention used involved a media campaign, classroom workshops, school meal modification, and parental support. After 3 years, the fruit and vegetable consumption of the intervention group increased by 14%. Their knowledge scores and awareness indicators were also significantly higher than those of the control group. This intervention was the first to show that student behavior can be influenced by positive media messages, increased exposure to a variety of tasty products, and minimal classroom activity.

Rhodes, J. E. (2004). The critical ingredient: Caring youth-staff relationships in after-school settings. *New Directions of Student Leadership, Special Issue: After-School Worlds: Creating a New Social Space for Development and Learning, 101: 145-61. DOI:10.1002/yl.75*

This article explored the importance of afterschool programs on youth development. It is known that successful afterschool programs can lead to improvements in academic performance, social skills, and internalizing and externalizing behavior. After reviewing literature, the author found that the quality of the youth-staff relationships forged can directly influence the youths' attendance decisions and the developmental benefits they derive. It was concluded that increased attention to the processes that govern staff-youth relationships and the settings, activities, and training that give rise to them are necessary to improve the after-school experiences of the nation's youth.

Rose, P. J., Golub, H. M., & Kennel, J. A. (2015). *Methods and Fidelity of Smarter Lunchrooms Program to Decrease Plate Waste in Children's School Lunch Meal* (thesis). Retrieved from The Knowledge Bank (OSU). <http://kb.osu.edu/dspace/handle/1811/6869>

The purpose of this study was to develop and implement Smarter Lunchrooms (SL) programming in 12 Ohio schools to promote healthier food selection and lessen plate waste among children participating in the NSLP. Smarter Lunchroom scores increased in schools from 7.4+3.3 pre-intervention to 13.8+2.3 post-intervention with the largest improvements seen in the fruit and vegetable categories. Compliance with the program was 69% overall with the lowest fidelity in increasing the number of locations fruit was offered (55%), labeling fruit (44%) or targeted entrée (17%) with creative, age-appropriate names, and offering equal amounts of white and chocolate milk (38%).



Schwartz M.B. (2007). The Influence of a Verbal Prompt on School Lunch Fruit Consumption: A Pilot study. *Int J Behav Nutr Phys Act*, 4:6, DOI:10.1186/1479-5868-4-6

This study evaluated the effectiveness of the verbal prompt, "Would you like fruit or juice with your lunch?", on the consumption of fruit in NSLP elementary schools. The results of the intervention were compared to data from a control school with the same amount of fruit and 100% fruit juice, but no verbal prompt. Approximately 90% of students in the verbal intervention school took a fruit serving while only 60% of students in the control school did. In both schools, 80% of students that took a fruit serving consumed said serving. This resulted in fruit consumption in 70% of the intervention school students, compared to less than 40% of the control school students. It was concluded that interventions as simple as a verbal prompt have a significant effect on whether students will take, and subsequently consume, more fruit with their purchased school lunch.

Soule, K., Klisch, S., Linnell, J. D., Scherr, R. E., Bergman, J. J., Ginsburg, D. C., & Zidenberg-Cherr, S. (2016). Schools as Hubs of Health: A Case Study on Comprehensive Nutrition Education Program Delivery. *Journal of Nutrition Education and Behavior*, 48(7), S31.

This was a pilot study testing a comprehensive nutrition education program delivery model at Bruce Elementary School in Santa Maria, California. One of the interventions involved training lunchroom staff and youth leaders in Smarter Lunchrooms principles and changing lunchroom environments to meet these principles. Pre and post-intervention evaluations will be conducted, as the results are still pending.

Steenhuis, I., van Assema, P., van Breukelen, G., Glanz, K., Kok, G., de Vries, H. (2004). The impact of educational and environmental interventions in Dutch worksite cafeterias. *Health Promotion International*, 19(3), 335-343. DOI: 10.1093/heapro/dah307

This was an environmental intervention study on seventeen worksite cafeterias. Each cafeteria was assigned to one of the following interventions; labeling of low-fat products, increase in the availability of fruits, vegetables, and low-fat products, an educational program focusing on healthy nutrition. No significant changes in consumption data were observed for any of the interventions. A significant treatment effect was seen in the total fat consumption of the labeling intervention, but only in participants that believed they ate a high-fat diet. The labeling intervention also had a significant effect on the sales of desserts, but not for any other products.

Stroebele, N. & De Castro, J. M. (2004). Effect of ambience on food intake and food choice. *Nutrition*, 20(9): 821-36. DOI: 10.1016/j.nut.2004.05.012

This was a review article on the current research regarding the effect of "ambience" on food



choice and intake. The authors found that changes in intake were affected by the following environmental factors; the number of people present during eating, food accessibility, eating location, color, smell, and temperature of the food, time of consumption, ambient sounds, temperature, and lighting. It was suggested that manipulation of these factors, individually or in combination, may be used to control food intake.

Thapa, J.H., Lyford, C. (2014). Fun in the Lunch-Room: A Nudge to Develop Healthy Taste Buds. American Society of Health Economics Conference, Oral Session.
<https://ashecon.confex.com/ashecon/2014/webprogram/Paper1801.html>

This project, the modification of choice architecture in a low-income elementary school lunchroom, was implemented with the intent of changing fruit and vegetable consumption habits of the students. Through analysis of tray waste data, it was found that the frequency of lunchroom trays with consumed servings of fruit increased over 5% for students in grades 1-3. Additionally, the number of trays with a fruit serving increased by 17% for grade one, 7% for grade two, and 10% for grade three. This tray waste data suggests that the low-cost modification of lunchrooms may be a successful approach to increasing fruit and vegetable consumption in school children.

Thorndike, A. N., Sonnenberg, L., Riis, J., Barraclough, S., & Levy, D. E. (2012). A 2-Phase labeling and choice architecture intervention to improve healthy food and beverage choices. *American Journal of Public Health*: 102(3): 527-33. DOI: 10.2105/AJPH.2011.300391

This was a study on the effect of a 2-phase labeling and choice architecture intervention designed to increase the visibility and convenience of healthy foods in a large hospital cafeteria. It was found that the sales of unhealthy items decreased in both phases while the sales of healthy items increased in the labeling phase. The largest changes were seen in the sales of beverages, with a 16.5% decrease in unhealthy beverage sales in the labeling phase and an 11.4% decrease in the choice architecture phase. Bottled water sales also increased by 25.8% in the choice architecture phase.

Walsh, E., & Kiviniemi, M. (2014). Changing how I feel about the food: experimentally manipulated affective associations with fruits change fruit choice behaviors. *Journal of Behavioral Medicine*, 37(2), 322-331. DOI:10.1007/s10865-012-9490-5

The purpose of this study was to examine the causal effect of affective associations about fruit on the consumption of fruit. This was done through the manipulation of participant's affective associations through the pairing of fruit images with either positive, negative, or neutral affective stimuli. Participants that were positively primed were three times more likely than negatively primed participants to choose fruit over a granola bar in a snack selection test. They were also



twice as likely to choose fruit than neutrally primed participants. All of this occurred despite no change in self-reporting associations or cognitive beliefs.

Zhuzhina, P. (2016). The impact of a Smarter Lunchrooms Makeover on children's food choice and consumption (Master's thesis). Retrieved from Digital Commons @ Cal Poly. DOI: 10.15368/theses.2016.114

This study implemented Smarter Lunchrooms interventions at two primarily Hispanic elementary schools in Paso Robles, CA. The interventions focused on increasing the appeal of the salad bars, including installation of age-appropriate signage highlighting fruits and vegetables, as well as branding of fruits and vegetables with fun age-appropriate characters. Fruits were also placed into decorative bowls to increase their attractiveness. Following the intervention, the proportion