Literature Review: How taste tests can increase the nutritional quality of the diets of food insecure populations

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Introduction

A majority of Americans consume less than the recommended amount of fruits and vegetables to support adequate health, according to Ciliska et al. (2000).[1] In addition, many of these people lack the resources to obtain and make use of these health-promoting foods, be it due to lack of accessibility, affordability, or knowledge regarding preparation techniques. This reduced access to healthy foods is linked to higher rates of chronic diseases in low-income populations (Gittelsohn et all., 2010).[2] Increasing availability of fruits and vegetables at community food shelves has the potential to increase health of the populations utilizing these facilities.. However, many people lack previous exposure to these foods, or the foods (especially vegetables) have been previously disliked.

Exposureto new foods, especially via tasting, helps people acquire a preference for them, and this has been documented in the literature since the early 1980's, such as in Pliner (1982): "Attempts to explain why vegetable consumption is so low, in adults, as well as children, have often highlighted taste preferences as a significant barrier."[3] Wardle et al. (2003) agree, stating that "experimental studies with infants, children and adults have provided strong support for the efficacy of exposure, demonstrating that tasting a food or drink more often increases liking for it."[4] Eertmans et al. (2001) also bolster this opinion: "Environmental interventions such as changes of food supply and variety may enable repeated positive experience with (novel) healthy products and an increase in the liking for and choice of these foods through the mechanism of mere exposure. Experience with the food should include experience with its taste and not merely with its visual aspects."[5] In light of this research, it seems apt to assume that offering taste tests of available produce at community food shelves may enhance preference for fruits and vegetables, thus increasing the nutritional quality of the diets of the populations served.

Review of Literature

Several studies have looked at the effect of mere exposure (including the opportunity for taste testing) on increasing the liking for previously disliked or unknown foods. Neophobia, the fear of the new, has been strongly associated with avoidance of unknown foods, especially fruits and vegetables. Therefore, behavioral researchers, public health workers, and nutritionists have sought to determine ways to increase the preference for these health-promoting foods in populations who may be unfamiliar with them. The *mere-exposure effect,* a psychological phenomenon by which people tend to develop a preference for things merely because they are familiar with them, was first extensively researched by Robery Zajonc in the 1960s to 1990s. (Zajonc, 2001)[6] His and Pliner's (1982)[3] early experiments in this area determined that multiple events of mere exposure with unfamiliar foods, primarily gustatory/olfactory, increased liking for them. Pliner concluded that using this theory of mere

exposure in a food/nutrition context could ultimately increase the nutritional quality of a person's diet and improve the health of the population.[3]

This research has led to several other studies concluding that taste is a main driver of food preference. Cox et al. (2012) found that exposure to sensory characteristics, rather than health benefit information alone, was more effective in increasing the popularity of Brassica vegetables among adults.[7] In a randomized controlled trial comparing exposure and reward to exposure alone on children's acceptance of an unfamiliar vegetable, Wardle et al. (2003) determined that daily exposure to the taste of a target vegetable increased children's liking and consumption of the vegetable compared with no exposure.[4] In addition, a school-based wellness initiative (Lakkakula et al., 2003) found that taste testing of certain vegetables identified as being disliked by the participating children was an effective way to increase the same children's liking of these foods.[8]

Because behavioral scientists, public health workers, and nutritionists have come to recognize the value of taste-testing in altering food preference, several community interventions have utilized this technique to enhance the nutritional quality of certain population's diets. Ciliska et al.'s systematic review of community-based interventions to increase fruit and vegetable consumption in people four years of age and older found that the most successful interventions had a multidimensional approach that went beyond merely giving nutritional information but included exposure to the hedonic characteristics of a food and that were based on established psychological/behavioral theories.[1] An example of this type of intervention is *Eat Right-Live Well!,* a supermarket-based intervention in a low-income Baltimore community focused on improving the local food environment and reducing obesity and chronic disease. This intervention utilized shelf labels and in-store displays promoting healthy foods, sales and promotions on healthy foods, increasing healthy food product availability, community outreach events, employee training, and in-store taste tests with recipe card distribution. Participant reactions to the taste tests were measured using a Likert-type scale. Although in this case it was difficult to measure if future food preference and purchasing behavior was affected by the taste test, analyzers of the intervention reported that the taste tests gave time to engage customers in conversations about healthy eating behaviors and diet-related diseases.[9] This opportunity is important to consider when discussing the usefulness of taste tests because social modeling and social interactions involving food are also major contributing factors affecting preference.[5]

A similar intervention is the *Baltimore Healthy Stores* (BHS) pilot project implemented in supermarkets and small corner stores of low-income neighborhoods of Baltimore. BHS "uses a store's existing facilities to improve access to healthy food and to increase consumers' knowledge, self-efficacy and behavioral intentions about healthy food choices and food preparation through health education and point-of-purchase marketing strategies," and is based on documented social and behavioral theory.[10] These interventions include the use of taste tests implemented with high reach and dose in small food stores in low-income neighborhoods in Baltimore. According to process analysts, these taste tests appeared to lead to increased sales of these foods.[2] BHS has been highly successful in positively impacting healthy food preparation behavior and food-related psychosocial factors including knowledge, self-efficacy, and intentions.[10]

The Expanded Food and Nutrition Education Program (EFNEP) is a program that teaches

low-income families with young children how to prepare nutritious and economical meals through food demonstrations. It's effectiveness on improving the nutritional quality of its participants' diets has been well documented. Authors of a review of an EFNEP program in Hawaii found that tasting the dishes at group meetings had a significant effect on the participants' use of the recipes at home, concluding that food demonstrations are a worthwhile teaching method.[11] Again, this demonstrates that exposure and interactive food experiences positively influence food preference.

Conclusion

This literature review highlights the well-documented association between taste exposure and food preference. The success of the noted community interventions utilizing taste tests to influence food preference iterate the positive impact taste-testing can have on the nutritional quality of the diet. Therefore, we conclude that offering taste tests of available produce at community food shelves has great potential to positively impact the diets of food insecure populations.

Annotated bibliography

1. Ciliska, D., Miles, E., & O'Brien, M.A., et al. (2000). Effectiveness of Community-Based Interventions to Increase Fruit and Vegetable Consumption. *J Nutr Educ*., 32(6), 341-352.

   Systematic review of of community-based interventions to increase fruit and vegetable consumption in people four years of age and older. "The most effective interventions gave clear messages about increasing fruit and vegetable consumption; incorporated multiple strategies that reinforced the messages; involved the family; were more intensive; were provided over a longer period of time, rather than one or two contacts; and were based on a theoretical framework. People in public health positions or making decisions about nutrition interventions need to give priority to those interventions that are multipronged, flexible, open to input from target groups, and theoretically based."

2. Gittelsohn, J., Suratkar, S., Song, H., et al. (2010). Process Evaluation of Baltimore Healthy Stores: A Pilot Health Intervention Program With Supermarkets and Corner Stores in Baltimore City. *Health Promot. Prac.* 11(5), 723-732. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3042858/ Accessed 7/29/16.

   Process evaluation of supermarket-/small food store- based intervention located in low-income neighborhoods in Baltimore, MD. This intervention utilizes colorful in-store displays promoting healthy foods, promotion of healthy foods, and in-store taste tests, and is based on social/behavioral theory. Authors conclude that "food store-based interventions in both small and large stores are a viable means of increasing the availability of health foods choices and for conducting point-of-purchase promotions targeting low-income minority populations."

3. Pliner, P. (1982). The Effects of Mere Exposure on Liking for Edible Substances. *Appetite,*

3(3), 283-290.

Original research looking at the effects of mere exposure on food preference using previously untasted tropical fruit juices. “The results showed a strong exposure effect such that the more frequently a juice had been tasted, the better it was liked.”

4. Wardle, J., Herrera, M.L., Cooke, L., & Gibson, E.L. (2003). Modifying children’s food preferences: the effects of exposure and reward on acceptance of an unfamiliar vegetable. *Eur J Clin Nutr*., 57(2), 341-348.

Randomized controlled design study comparing exposure and reward to exposure alone on children’s acceptance of an unfamiliar vegetable. “Experimental studies with infants, children and adults have provided strong support for the efficacy of exposure demonstrating that tasting a food or drink more often increases liking for it.” The current study found exposure greatly increased liking compared to a control group. The reward intervention did not differ siginificantly from exposure or control group.

5. Eertmans, A., Baeyens, F., & Van den Bergh, O. (2001). Food likes and their relative importance in human eating behavior: review and preliminary suggestions for health promotion. *Health Educ Res*., 16(4), 443-456.

Article reviewing research on the psychological determinants of human eating behavior. “The affective response to food is the most predictive of food choice… mere repeated exposure… enhances affective response towards it, and can even overcome an initially negative response.” In regards to health promotion, experience with food should involve experience with its taste, and should emphasize the association between healthy products and good taste, since food choice is largely determined by taste preference.

6. Zajonc, R.B. (2001). Mere Exposure: A Gateway to the Subliminal. *Current Directions in Psychological Science,* **10** (6), 224. doi:10.1111/1467-8721.00154.

7. Cox, D.N., Melo, L., Zabaras, D., & Delahunty, C.M. (2012). Acceptance of health-promoting Brassica vegetables: the influence of taste perception, information and attitudes. *Public Health Nutr*., 15(08), 1474-1482.

Original research comparing acceptance of *Brassica* vegetables in two groups: Group A received health information before taste-testing vegetables, Group B did not receive health information before tasting the vegetables. “Specific health information, including protecting against cancer, did not override taste aversion to Brassica vegetables and increase acceptance,” reinforcing the theory that taste is a main driver of food preference. “The present study found that sensory characteristics, rather than health benefit information, need to be addressed in order to increase the popularity

of Brassica vegetables."

8. Lakkakula, A., Geaghan, J., Zanovec, M., Pierce, S., & Tuuri, G. (2010). Repeated taste exposure increases liking for vegetables by low-income elementary school children. *Appetite,* 55(2), 226-231.

School-based pilot project, ''Wellness Partnership for Kids,'' combining cafeteria-based vegetable tasting program with a school wellness curriculum. "The number of children who reported liking or liking a lot for previously disliked vegetables was greater after eight or nine taste exposures." Taste-testing is a way to increase liking for previously unliked or unfamiliar foods.

9. Lee, R., Rothstein, J.D., & Gergen, J.N., et al. (2014) Process Evaluation of a Comprehensive Supermarket Intervention in a Low-Income Urban Community in Baltimore. *J Nutr Educ Behav*., 46(4), S98.

Process evaluation on a grocery store intervention, "Eat Right-Live Well!," involving shelf labels and in-store displays promoting healthy foods, sales and promotions on healthy foods, in-store taste tests, increasing healthy food products, community outreach events to promote the intervention, and employee training. Taste tests gave time to engage customers in conversations about healthy eating behaviors and diet-related diseases. "Taste tests had moderate reach and low dose but were effective in engaging customers."

10. Gittelsohn, J. & Rowan, M. (2010, updated 2013). Intervention: Baltimore Healthy Stores. *Center for Human Nutrition, Bloomberg School for Public Health, Johns Hopkins University*, Program description, 1-11. http://centertrt.org/content/docs/Intervention_Documents/Intervention_Templates/Baltimore_Healthy_Stores_template.pdf Accessed 7/15/16.

This document is a template for the *Baltimore Healthy Stores* (BHS) project and includes an overview of the project, resources needed for implementation, and keys for successful implementation and intervention. BHS has been shown to positively influence food behaviors and food-related psychosocial factors.

11. Boushey, C., & Rouch, M. (1989). Demonstration increases recipe use among Hawaii graduates of the Expanded Food and Nutrition Education Program. *J Am Diet Assoc*., 89(11), 1656-1658.

Study of EFNEP participants' use of recipes after demonstration and tasting of same recipes. "The authors found that tasting the dishes at group meetings had a significant effect on the participants' use of the recipes at home. Food demonstrations are a

worthwhile teaching method."