Research Contribution

Journal of Foodservice Management & Education, Volume 17, Number 1, Pages 14–18. ©2023
Published jointly by the Foodservice Systems Management Educational Council and the National Association of College & University Food Services

EFFECTIVENESS OF A TRAFFIC LIGHT LABEL INTERVENTION IN A MIDWEST COLLEGE DINING HALL

Amy Martin, BS; Rachel L. Vollmer, PhD*
Family and Consumer Sciences Department, Bradley University, Peoria, IL, USA

ABSTRACT
A repeated measures quasi-experimental design was utilized to examine the effect of traffic light labels on the amount of food served in a university dining hall in comparison to the control nutrition facts panels during the spring 2020 academic semester. There were no significant improvements in the healthfulness of foods served during the intervention compared to the control. Traffic light labels may not be more effective than nutrition facts panels in college dining halls to improve food choices.

Keywords: Traffic Light Labels, College Students, Dining Halls, Nutrition Labeling

Acknowledgement: The authors would like to thank Bradley University's Dining Services for their cooperation in this project. This project was supported by Bradley University's C.C. Wheeler Institute.

INTRODUCTION

Generally, diet quality improves from childhood to adulthood (Thiele et al., 2004), with the exception of the transition between adolescence and adulthood. Diet quality may decrease during this period (Forshee & Storey, 2006) due to the major life changes that occur when a young adult begins college. When young adults move out of their childhood homes, they gain independence as well as a new set of responsibilities, including making healthful eating choices on their own (Nelson, et al., 2008). Unfortunately, without the guidance of their parents, young adults often make poor dietary choices (Nelson et al., 2008).

Making healthy food choices can also be challenging in college dining halls. The wide variety of food choices may lead students to plate themselves large serving sizes and overeat (Rolls, 1986; Rolls et al., 2002), which can contribute to the development of chronic diseases (Nelson et al., 2008; Papadaki et al., 2007; Steffen et al., 2014; Winkleby & Cubbin, 2004). These negative eating and dietary habits are likely to persist throughout one's life and can contribute to the development of chronic diseases (Nelson et al., 2008; Papadaki et al., 2007; Steffen et al., 2014; Winkleby & Cubbin, 2004). Therefore, individuals must learn to make sound nutritional decisions in a college dining environment. Unfortunately, college students may struggle to understand the nutrition information presented on labels (Baltas, 2001; Cowburn & Stockley, 2005; Drichoutis et al., 2006; Mhurchu & Gorton, 2007) or fail to use labels (Graham & Laska, 2012; Ollberding, 2010). Thus, the lack of nutrition label use among college students suggests that changes to the label should be explored in order to increase user-friendliness, and therefore, label use (Ollberding, 2010). One promising alteration is the use of Traffic Light Labels (Seward et al., 2016).

The Traffic Light Label was developed as a user-friendly format because even the most health-conscious consumers found nutrition information difficult to understand and use (Cowburn & Stockley, 2005; Graham et al., 2015; Grunert et al., 2010a; Sharf et al., 2012). The design of the traffic light label uses red (nutrient poor choice), yellow (nutrient neutral choice), and green (nutrient rich choice) labels on packaging to get the attention of consumers and aid them in making better nutritional decisions (Grunert et al., 2010b). Traffic light labels may be especially promising in cafeteria settings. At Harvard University, researchers labeled all of the foods and beverages found in the dining halls with traffic light labels for seven weeks (Seward et al., 2016). A majority of students reported that the traffic light labels were helpful, altered the foods they chose to consume, and should remain in the dining halls (Seward et al., 2016). However, these results were based upon student reports, and studies are needed to evaluate if food decisions change with traffic light labels. Therefore, the purpose of this study was to examine the effect of traffic light labels on the amount of food served in a university dining hall in comparison to the control nutrition facts panels.

METHODS

Study design

This study utilized a repeated measures quasi-experimental design with a control (nutrition facts panel) and an intervention period (nutrition facts panel + traffic light labels) each lasting 28 days at a Midwestern midsize, private university dining hall.

This study was performed in the dining hall of the university during lunch and dinner hours. The dining hall used for this study is one of two on-campus dining halls that students have access to. Normally, about 460 and 439 students eat lunch and dinner in this dining hall, respectively. Only the main buffet line was used for the purposes of this study, as it has the most food options, and is the most frequently used by students. On average, there were between four and ten items present on the main buffet line for lunch and dinner.

This dining hall employs a 28-day cycle menu each semester. Prior to the start of this study, each item served on the main line in the dining hall was assigned either a red, yellow, or green color depending on its nutritional value. The nutritional information for all items was providing by dining services. The quality of the items was assessed using a nutritional criteria evaluation system previously developed and used in a similar study (Seward et al., 2016). This system evaluates food items using five positive criteria and six negative criteria (Table 1). Foods with net positive scores are designated as green labels, those with net negative scores are designated as red labels, and those with neutral scores are designated as yellow labels. During the control, 120 items were labeled as red, 66 items were labeled as yellow, and 140 items were labeled as green. During the intervention, 110 items were labeled as red, 44 items labeled as yellow, and 133 items labeled as green.

*Corresponding Author: Phone: (309) 677-3179; E-mail: rvollmer@fsmail.bradley.edu

Table 1. Traffic Light Label Nutritional Criteria Utilized to Assign Colors to Each Menu Item in a Dining Hall	
Positive Criteria	**Negative Criteria**
Source of fruit or fruit juice (greater than 80% juice)	Saturated fat content greater than 5g
Source of vegetables	Added sugar: has a total sugar content of more than 8g, contains added sugar
Source of whole grains with a carbohydrate-fiber ratio less than 10	High sugar: has a sugar content greater than 20g
Lean protein source: must have less than 5g saturated fat and 12g or more of protein	High sodium: has a sodium content greater than 600mg
Low-fat dairy source: at least 200mg calcium and less than 2g saturated fat	Source of red meat
	Source of refined starch with a carbohydrate-fiber ratio greater than 10

Adapted from: Seward, M. W., Block, J.P., & Chatterjee, A. (2016). A traffic-light label intervention and dietary choices in college cafeterias. *American Journal of Public Health, 106*(10), 1808-1814.

During the spring 2020 semester, the first 28 days of the semester served as a control period in which no changes were made. This dining hall presents nutrition information to students using an index card that displays a nutrition facts panel and a list of ingredients. The nutrition facts panels on these index cards included the serving size, calories, total fat, saturated fat, trans fat, calories from fat, cholesterol, sodium, total carbohydrate, dietary fiber, total sugars, and protein. Then, during the intervention period, traffic light labels were added to this current labeling scheme present in the dining hall. The same index cards and nutrition facts panels remained in the dining hall; however, for this period of time a large, circle color card was added behind the index card to represent one of the three traffic light conditions: red, yellow, or green. Explanatory signage was also added next to the main line to help guide students in using the new labeling system. Some research suggests that signs explaining how to analyze nutrition labels are very helpful to consumers, and consumers are more likely to view and utilize nutrition labels when explanatory signage is present (Graham et al., 2015). Originally, a 28-day follow-up period was included in the design of this study; however, this follow-up period could not be implemented due to the COVID-19 pandemic.

Data collection

This study was approved by the Bradley University Committee on the Use of Human Subjects in Research prior to data collection. The main variable of interest was servings taken, and these data were collected by university dining services. Using the serving size for each item, dining services counts the number of servings taken at the end of the meal period (i.e. lunch). The amount served for each red, yellow, and green item in the main line was collected at both lunch and dinner during both periods of the intervention: control and intervention.

Additionally, dining hall patrons who took food from the main line were asked to fill out a voluntary survey following informed consent. Participants ages 18 and older were recruited to take this survey on randomly chosen (11th and 25th) days of the cycle in each intervention time point. The survey asked questions about participant demographics and other characteristics (i.e. dining hall usage, nutrition label usage, etc.) to compare differences across the intervention time points.

Data Analysis

After testing for outliers among the items, 6 food items from various days were removed from final analysis (3 red foods each from control and intervention). Number of servings taken by color (dependent variable) was combined for both lunch and dinner each day during the control and intervention period. The final sample size was 28 days during the control and 26 days during the intervention. To compare the servings taken per day of the food item for each color during control and intervention, a one-way analysis of variance (ANOVA) was used with significance set at $p < 0.05$. Bonferroni post hoc tests were utilized for multiple comparisons. For the survey data, a Chi-Square or t-tests were performed to examine differences in participant characteristics between the control and intervention.

RESULTS AND DISCUSSION

A majority of the survey participants (n=261) were white (64.4%), male (56.3%) freshmen or sophomores (82.4%) who had never taken a nutrition class (92%). Most of the participants (58.6%) identified as non-dieters, meaning they were not currently watching their diet. In general, a majority of the participants used the dining hall 6 times per week or less (61.5%), never or rarely use nutrition panels in the dining hall (59.1%), and never or rarely use the dining services website to view nutrition information (57.1%). Except for website use, no significant differences were discovered among the survey data between control and intervention (Table 2). However, after adjusting the p-value for multiple comparisons, none of the p-values were low enough to reach significance. While this helps present a generalization of the sample population of the dining hall patrons, surveys were not collected every day of the control and intervention, nor tied to actual food consumption.

The one-way ANOVA for color and time point was significant (F (5, 150) = 4.75, p<0.001). There were no significant differences at control and intervention between red labeled items, yellow labeled items, and green labeled items (Table 3). However, the amount served of food labeled as yellow during the intervention (M = 341.9, SD = 275.9) was significantly lower than the amount of food labeled as red served during control (M = 654.6, SD = 286.4, p<0.0001) and intervention (M = 604.9, SD = 295.9, p=.008).

The results of this study suggest that traffic light labels were not effective for this population as there were no differences in the frequency that red food items were chosen between control and intervention or the frequency that green food items were chosen between control and intervention. There are several reasons why the traffic light labels may not have been effective. The students may have attempted to follow a diet for their New Year's resolutions during the control period (no difference in red and yellow-labeled foods served), but their habits declined by the time the intervention period began (yellow significantly less than red at intervention). Usually, when individuals are looking to make a lifestyle change, they wait for a "temporal milestone" such as the start of a new week, month, year, or school semester, or following a holiday, school break, or birthday. At the beginning of a new year, interest in dieting increases by 82.1% (Dai et al., 2014) but New Year's resolutions do not last. According to the results of one study, 77 percent of

Table 2. Summary & Comparison of Characteristics of Dining Hall Patrons During Control & Intervention

Characteristic	*Control*		Intervention		*p-value*
	M	SD	M	SD	
Age	19.3	1.3	19.3	1.1	0.74
	N(%)[a]				
	Control	Intervention	Total		
Year in School					0.40
Freshman	71(50)	63(53)	134(51)		
Sophomore	40(28)	41(34)	81(31)		
Junior	18(13)	12(10)	30(12)		
Senior	9(6)	3(3)	12(5)		
Graduate Student	3(2)	1(1)	4(2)		
Gender					0.40
Male	83(59)	64(53)	147(56)		
Female	58(41)	55(46)	113(43)		
Other	0(0)	1(1)	1(0.4)		
Race					0.16
Asian or Asian American	7(5)	10(8)	17(7)		
Black or African American	13(9)	16(13)	29(11)		
Hispanic or Latino/a/x	16(11)	10(8)	26(10)		
White or Caucasian	96(68)	72(60)	168(64)		
Multiracial	9(6)	12(10)	21(8)		
Diet Status					0.53
Dieter	59(42)	47(39)	106(41)		
Non-Dieter	81(58)	72(61)	153(59)		
College Nutrition Course					0.16
Yes	8(6)	11(9)	19(7)		
No	133(94)	107(89)	240(92)		
I don't know	0(0)	2(2)	2(1)		
Dining Hall Use per Week					0.30
1-2 times	17(13)	18(16)	35(14)		
3-4 times	29(21)	30(26)	59(23)		
5-6 times	30(22)	31(27)	61(24)		
7-8 times	20(15)	18(16)	38(15)		
9-10 times	18(13)	9(8)	27(11)		
More than 10 times	22(16)	10(9)	32(13)		
Nutrition Panel Use					0.83
Never	46(34)	33(28)	79(31)		
Rarely	34(25)	36(31)	70(28)		
Sometimes	35(26)	30(26)	65(26)		
Often	12(9)	9(8)	21(8)		
Always	9(7)	8(7)	17(7)		
Website Use					0.03
Never	57(42)	42(36)	99(39)		
Rarely	19(14)	31(27)	50(20)		
Sometimes	23(17)	17(15)	40(16)		
Often	26(19)	11(9)	37(15)		
Always	12(9)	15(13)	27(11)		

M, mean; SD, Standard Deviation

[a] Not all frequencies add up to 261 due to skipped questions

participants had maintained their resolutions one week into the new year, but this decreased to 55 percent after one month (Oscarsson et al., 2020). In the present study, when the control period began, several temporal milestones were overlapping. It was the start of a new year and a new school semester, and the holidays and a school break had just ended. This suggests that students may have been dieting for their New Year's resolutions during the control period, but stopped pursuing their resolutions by the time the intervention period started.

Because the intervention period of this study overlapped with the university's midterm exams, students' food choices may also have been driven by stress. Although stress levels are frequently elevated among college students, exams are the most substantial source of their stress and college students experience greater stress during exam periods (Michels et al., 2020). Students also report that they struggle to maintain a healthy diet more during exam periods than at other points in the school year, which leads them to consume more unhealthy food items and fewer healthy items (Michels et al., 2020). The unhealthy items used to cope with stress tend to be those higher in sugar and fat (Michels et al., 2020) and high stress levels among college students are associated with a lower consumption of fruits and vegetables (Ansari et al., 2014). The students in the present study may have experienced these effects of stress as they plated their meals during the intervention period by selecting red-labeled less healthy items instead of healthier yellow-labeled items as a way to cope with their stress.

Previous studies using traffic light labels in cafeteria settings have shown mixed results (Seward et al., 2016; Thorndike et al., 2014). Traffic light labels were successful in changing food choices in a hospital cafeteria setting (Thorndike et al., 2014). However, these labels were unsuccessful in a college dining hall setting. Even though students reported that the traffic light labels were helpful and altered their behavior, no statistically significant behavior changes were observed (Seward et al., 2016). This disparity may have occurred because the study was not long enough to elicit behavior changes from the students. In general, a longer time period may be necessary to observe changes from traffic light labels in a cafeteria setting, especially if students are making gradual, small changes. The present intervention and the study by Seward et al. (2016) were both less than 2 months, while the intervention by Thorndike et al. (2014) observed changes at 12 and 24 months. Because individuals must be exposed to labeling interventions repeatedly in order to make behavior changes (Roy & Alassadi, 2020), a longer intervention may be necessary to observe changes in a college dining hall.

Furthermore, traffic light labels may also be less effective for the college age population. According to the United States Department of Agriculture (2014), 42 percent of working age American adults and 57 percent of older American adults report using nutrition labels when making food decisions. However, in a survey among college students, only 35 percent reported that they frequently examined nutrition labels prior to buying and consuming foods and beverages (Graham & Laska, 2012). Instead, taste has been identified as the main factor that influences young adult food purchases (Hebden et al., 2015; Roy & Alassadi, 2020). In one study, nutritional value was selected as the fourth most important influence on young adult food choices behind taste, convenience, and cost (Hebden et al., 2015). Since taste drives food choices, it is not a surprise that young adults tend to consume foods prepared with high levels of fat, sugar, and sodium instead of more nutritious items (Roy & Alassadi, 2020). If the food selection of young adults is mostly guided by taste instead of nutrition, they may not have noticed or utilized the traffic light labels at all. Furthermore,

Table 3. Mean Differences of Number of Servings between Control and Intervention by Color

	M	SD	1	2	3	4	5	6
1. Control Red	654.6	286.4		49.7	194.6	312.7**	182.5	191.2
2. Intervention Red	604.9	295.8			144.0	263.0*	132.9	141.6
3. Control Yellow	459.0	295.3				118.1	-12.1	-3.4
4. Intervention Yellow	341.9	274.9					-130.2	-121.5
5. Control Green	472.0	195.5						8.7
6. Intervention Green	463.4	192.4						

** $p < 0.01$*
*** $p < 0.0001$*

according to the survey results in the present study, a majority of the participants never or rarely used nutrition panels in the dining hall or used the dining services website to view nutrition information, both of which are always available to students. Therefore, if students were not already using the nutrition information offered to them, providing another method of delivering this information likely was not helpful, even if it was simpler.

The colors used in the traffic light labels could have also discouraged students from using the labels. While many consumers find color coding to be beneficial, others dislike the colors red and green (Grunert & Willis, 2007). Some consumers find red and green to be overly pushy when used on nutrition labels because they feel that they are being coerced to eat certain foods (Grunert & Willis, 2007). Also, young adults gain a significant amount of independence when they attend college, and selecting what they would like to eat in dining halls is one way to exercise independence (Nelson et al., 2008). Therefore, if the students in the present study felt forced to make a particular food choice by the traffic light labels, they may have decided to ignore the labels.

Although this study adds to the literature regarding traffic light labels in a cafeteria setting, it is not without limitations. This study was conducted at one dining hall line during one time point on a particular college campus. Also, there was a lack of racial diversity amongst the survey participants. As a result, the findings may not be generalizable or representative of all campuses. Additionally, individual behavior changes could not be assessed for each student as the total amount served for each food item at each meal was supplied by dining services. For example, even though there were no significant differences in diet status between the two time points, all students did not complete surveys, the impact of diet status on student dining hall choices could not be investigated, and participants may have interpreted the question in different ways.

The lack of a post-intervention period is an additional limitation of this study. Due to the study being cut short by COVID-19, the researchers were unable to administer a post-intervention survey. The planned post-intervention survey would have asked students if they noticed and used the traffic light labels when plating their food. Lastly, the intervention was relatively short, and may not have exposed the students to the labels for long enough to elicit any behavior changes.

CONCLUSIONS AND APPLICATIONS

Traffic light labels may not work in a college dining hall setting, thus other options may be more effective in promoting healthy eating among college students. For example, expanding the number of healthier items that would be labeled as green or yellow offered in dining halls as well as limiting unhealthy, red items might be more effective. During this study, most of the entrées served were labeled with red traffic lights. On the contrary, green labels were often reserved for vegetable side dishes like broccoli, cauliflower, and green beans. The disproportionate amount of red entrées in comparison to green and yellow entrées may make it difficult for students to eat healthfully. University wellness policies may be worthwhile to explore opportunities for dining hall menu nutrition standards. By making a wider variety of nutritious items readily available to students, this may increase the consumption of healthy items among college students, and will overall encourage healthier habits within this population (Hebden et al., 2015; Roy & Alassadi, 2020). Menu reformulation may be necessary as many of the menu items in this study were flagged as having high sodium and high saturated fat. For example, high sodium and saturated fat levels oftentimes pushed items with neutral scores (yellow label) into the negative score (red label) category. This led to fewer foods being labeled as green or yellow. Therefore, sodium and saturated fat contents could be targets to allow for greater variety of healthy items in university dining halls.

Additionally, universities may need to take action to prevent students from stress eating. Students use eating as a coping mechanism to help control their stress (Elshurbjy & Ellulu, 2017), which stems from the aforementioned academic stress, but also related to relationships, finances, and separation from one's family (Lyzwinski, 2018). Thus, to reach more students universities could offer classes that students could earn credit hours, especially first-year students to help students manage their stress and transition to college. Relaxation training, cognitive behavioral therapy, coping skills training, psychoeducation, and social support programs have been found to be effective in reducing perceived stress and/or anxiety among undergraduate students (Yusufov, 2019). Half-semester courses are feasible and affordable for universities as short programs (8 weeks or less) have been successful across campuses (Yusufov, 2019).

In conclusion, traffic light labels were not effective in this study. According to the results of the present study, college students may not utilize nutrition labeling in any format as a majority of survey respondents reported never or rarely using the standard nutrition facts panels. Instead, the food choices of college students may be influenced by factors other than nutritional value. As a result, future studies should focus on how college students can be guided to eat nutritious meals without requiring nutrition labels. Specifically, future studies should examine how to increase the variety of would-be green labeled items beyond vegetable sides, as these made up a large portion of the green labelled items served during this study. Since repeated exposure is necessary for behavior changes to be made, having a longer study period may help to elicit behavior changes among participants more effectively than the length of the present study. Future studies should also ask college students for feedback about traffic light labels and how they use nutrition information, if at all, to make food choices.

REFERENCES

Ansari, W.E., Adetunji, H., & Oskrochi, R. (2014). Food and mental health: Relationship between food and perceived stress and depressive symptoms among university students in the United Kingdom. *Central European Journal of Public Health, 22*(2), 90-97.

Baltas, G. (2001). Nutrition labelling: issues and policies. *European Journal of Marketing*, *35*(5/6), 708–721. https://doi.org/10.1108/03090560110388178

Cowburn, G., & Stockley, L. (2005). Consumer understanding and use of Nutrition Labelling: A systematic review. *Public Health Nutrition*, *8*(1), 21–28. https://doi.org/10.1079/phn2005666

Dai, H., Milkman, K.L., & Riis, J. (2014). The fresh start effect: Temporal landmarks motivate aspirational behavior. *Management Science, 60*(10), 2563-2582.

Drichoutis, A.C., Lazaridis, P., & Rodolfo, M.N., Jr. (2006). Consumers' use of nutritional labels: A review of research studies and issues. *Academy of Marketing Science Review*, *9*, 93–118.

Elshurbjy, A.J., & Ellulu, M.S. (2017). Association between stress and dietary behaviors among university students: Mini-review. *Archives of Medical Science*, *1*(2): 1-3.

Forshee, R. A., & Storey, M. L. (2006). Demographics, not beverage consumption, is associated with Diet Quality. *International Journal of Food Sciences and Nutrition*, *57*(7-8), 494–511. https://doi.org/10.1080/09637480600991240

Graham, D.J., Heidrick, C., & Hodgin, K. (2015). Nutrition label viewing during a food-selection task: Front-of-package labels vs nutrition facts labels. *Journal of the Academy of Nutrition & Dietetics, 115*(10), 1636-1646.

Graham, D.J., & Laska, M.N. (2012). Nutrition label use partially mediates the relationship between attitude toward healthy eating and overall dietary quality among college students. *Journal of the Academy of Nutrition & Dietetics*, *112*(3), 414-418.

Grunert, K.G., Fernández-Celemín, L., Wills, J.M., Storcksdieck genannt Bonsmann, S., & Nureeva, L. (2010). Use and understanding of nutrition information on food labels in six European countries. *Journal of Public Health, 18*(3), 261–77.

Grunert, K.G. & Wills, J.M. (2007). A review of European research on consumer response to nutrition information on food labels. *Journal of Public Health, 15,* 385-399.

Grunert, K.G., Wills, J.M., & Fernández-Celemín, L. (2010). Nutrition knowledge, and use and understanding of nutrition information on food labels among consumers in the UK. *Appetite, 55*(2), 177–189.

Hebden, L., Chan, H. N., Louie, J. C., Rangan, A., & Allman-Farinelli, M. (2015). You are what you choose to eat: Factors influencing young adults' food selection behaviour. *Journal of Human Nutrition and Dietetics*, *28*(4), 401–408. https://doi.org/10.1111/jhn.12312

Lyzwinski, L. N., Caffery, L., Bambling, M., & Edirippulige, S. (2018). The relationship between stress and maladaptive weight-related behaviors in college students: A review of the literature. *American Journal of Health Education*, *49*(3), 166–178. https://doi.org/10.1080/19325037.2018.1449683

Mhurchu, C.N. & Gorton, D. (2007). Nutrition labels and claims in New Zealand and Australia: A review of use and understanding. *Australian & New Zealand Journal of Public Health*, *31*(2), 105–112.

Michels, N., Man, T., Vinck, B., & Verbeyst, L. (2019). Dietary changes and its psychosocial moderators during the University Examination Period. *European Journal of Nutrition*, *59*(1), 273–286. https://doi.org/10.1007/s00394-019-01906-9

Nelson, M. C., Story, M., Larson, N. I., Neumark-Sztainer, D., & Lytle, L. A. (2008). Emerging adulthood and college-aged youth: An overlooked age for weight-related behavior change. *Obesity*, *16*(10), 2205–2211. https://doi.org/10.1038/oby.2008.365

Ollberding, N.J., Wolf, R.L., & Contento, I. (2010). Food label use and its relation to dietary intake among US adults. *Journal of the Academy of Nutrition & Dietetics, 110*(8), 1233-1237.

Oscarsson, M., Carlbring, P., Andersson, G., & Rozental, A. (2020). A large-scale experiment on New Year's resolutions: Approach-oriented goals are more successful than avoidance-oriented goals. *PLOS ONE*, *15*(12). https://doi.org/10.1371/journal.pone.0234097

Papadaki, A., Hondros, G., A. Scott, J., & Kapsokefalou, M. (2007). Eating habits of university students living at, or away from home in Greece. *Appetite*, *49*(1), 169–176. https://doi.org/10.1016/j.appet.2007.01.008

Rolls, B. J. (1986). Sensory-specific satiety. *Nutrition Reviews*, *44*(3), 93–101. https://doi.org/10.1111/j.1753-4887.1986.tb07593.x

Rolls, B. J., Morris, E. L., & Roe, L. S. (2002). Portion size of food affects energy intake in normal-weight and overweight men and women. *The American Journal of Clinical Nutrition*, *76*(6), 1207–1213. https://doi.org/10.1093/ajcn/76.6.1207

Roy, R., & Alassadi, D. (2020). Does labelling of healthy foods on menus using symbols promote better choices at the point-of-purchase? *Public Health Nutrition, 24*(4), 746-754.

Seward, M. W., Block, J.P., & Chatterjee, A. (2016). A traffic-light label intervention and dietary choices in college cafeterias. *American Journal of Public Health, 106*(10), 1808-1814.

Sharf, M., Sela, R., Zentner, G., Shoob, H., Shai, I., & Stein-Zamir, C. (2012). Figuring out food labels. young adults' understanding of nutritional information presented on food labels is inadequate. *Appetite*, *58*(2), 531–534. https://doi.org/10.1016/j.appet.2011.12.010

Steffen, L. M., Van Horn, L., Daviglus, M. L., Zhou, X., Reis, J. P., Loria, C. M., Jacobs, D. R., & Duffey, K. J. (2014). A modified Mediterranean diet score is associated with a lower risk of incident metabolic syndrome over 25 years among young adults: The Cardia (coronary artery risk development in young adults) study. *British Journal of Nutrition*, *112*(10), 1654–1661. https://doi.org/10.1017/s0007114514002633

Thiele, S., Mensink, G. B. M., & Beitz, R. (2004). Determinants of diet quality. *Public Health Nutrition*, *7*(1), 29–37. https://doi.org/10.1079/phn2003516

Thorndike, A. N., Riis, J., Sonnenberg, L. M., & Levy, D. E. (2014). Traffic-light labels and Choice Architecture. *American Journal of Preventive Medicine*, *46*(2), 143–149. https://doi.org/10.1016/j.amepre.2013.10.002

United States Department of Agriculture. (2014). American adults are choosing healthier foods, consuming healthier diets. https://www.usda.gov/media/press-releases/2014/01/16/american-adults-are-choosing-healthier-foods-consuming-healthier (accessed May 2021).

Winkleby, M. A., & Cubbin, C. (2004). Changing patterns in health behaviors and risk factors related to chronic diseases, 1990–2000. *American Journal of Health Promotion*, *19*(1), 19–27. https://doi.org/10.4278/0890-1171-19.1.19

Yusufov, M., Nicoloro-SantaBarbara, J., Grey, N. E., Moyer, A., & Lobel, M. (2019). Meta-analytic evaluation of stress reduction interventions for undergraduate and graduate students. *International Journal of Stress Management*, *26*(2), 132–145. https://doi.org/10.1037/str0000099