# Nutrition Education and Behavioral Sciences

## How Gain-Framed and Loss-Framed Messages Influence Nutrition and Physical Activity Knowledge (E12-01)

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**Objective:** The objective of this 9-mo quasiexperimental study was to examine the impact of gain- and loss-framed messages on nutrition and physical activity (PA) knowledge in 4th-grade students participating in the Shaping Healthy Choices Program (SHCP), a multicomponent nutrition program.

**Methods:** Eight 4th-grade classrooms participating in the University of California CalFresh Nutrition Education Program were recruited and divided into 1 of 3 groups: *1*) no messages (2 classrooms, $n = 50$); *2*) loss-framed messages (3 classrooms, $n = 76$); and 3) gain-framed messages (3 classrooms, $n = 67$). Students participated in the SHCP and received accelerometers to sync on a tablet in the classroom to view their activity. The gain- and loss-framed groups also viewed a health message on the tablet. Analyses were conducted on data from students who completed both pre- and post-tests. For all outcomes, means and SDs for each group were calculated, and distributions were examined for normality. Change in outcomes was calculated by subtracting pre- from post-scores. Analyses were conducted with STATA 14.0. Paired t tests, ANOVA, and Bonferroni for multiple comparisons were used.

**Results:** Students who participated in the SHCP improved nutrition knowledge in the no message group (+1.3 points, $P = 0.04$), the loss-framed group (+1.9 points, $P = 0.01$), and the gain-framed group (+2.6 points, $P = 0.01$). Improvements in PA knowledge were also demonstrated in the no message group (+1.6 points, $P < 0.01$), the loss-framed group (+1.3 points, $P < 0.01$), and the gain-framed group (+2.5 points, $P = 0.01$). Students who received gain-framed messages significantly improved PA knowledge as compared with students who received loss-framed messages (+1.2 point difference, $P = 0.04$). Students in the loss-framed group reported a decrease in self-efficacy from pre- to post-test (–1.2, $P = 0.05$), although this was not observed in the other groups.

**Conclusions:** These results show that the SHCP improves nutrition and PA knowledge, and the positive reinforcement further strengthens some of these improvements, whereas loss-framed messaging can contribute to undesirable outcomes, such as reduced self-efficacy. Incorporating positive reinforcement through gain-framed messages can be a relatively low-cost avenue for supporting beneficial outcomes.

**Funding Sources**

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## Colorful Senses at Play—The MassFarmFresh Way: A Novel Intervention Engaging Preschool Children's Exploration of Vegetables During Circle-Time in Massachusetts Head Start (E12-02)

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**Objectives:** Massachusetts Farm Fresh (MAF*F*) is a Head Start classroom circle-time–based novel multisensory nutrition education intervention that exposes multiethnic preschool children to a diverse selection of vegetables grown in the New England region. Specifically, MAFF sought to explore if there were pre-post sensory intervention-responsive increases in children's intake of overall vegetables, and across 4 color categories: red (beets and radishes); orange (carrots); green (beans, peas, and broccoli); and white (cauliflower and parsnips). Based on previous findings from the Feeding Infants and Toddlers Study, a higher baseline intake of green color compared with other color vegetables was hypothesized, with a predicted pre-post increase in all the introduced color categories.

**Methods:** An established phytochemical classification was used to determined the color categories. Eight selected vegetables were matched by appearance and growth process to create pairs: green bean-sugar snap pea, broccoli-cauliflower, beet-radish, and carrot-parsnip. Aligned with the early learning domains of Head Start and guided by social cognitive theory, a circle-time sensory exploration curriculum (week1: baseline; weeks 2–5: sensory education; and week 6: follow-up), was designed to meet developmentally appropriate "play" guidelines. Each week, 2 farm animal puppets introduced the children ($n = 60$) to the vegetable pairs by highlighting each vegetable's color, shape, flavor, texture, and growth process. Data were analyzed through the use of descriptive and nonparametric statistics (SAS version 20.0. p

**Results:** Total mean intake (g) increased pre-post (pre: 14.75 $\pm$ 1.38 g compared with post: 17.83 $\pm$ 2.05 g; $P = 0.06$). Red and white color vegetables trended towards an increase (red, pre: 2.66 $\pm$ 0.41g compared with red, post: 3.68 $\pm$ 0.54 g; $P = 0.07$; and white, pre: 2.81 $\pm$ 0.46 g compared with white, post: 3.93 $\pm$ 0.62 g; $P = 0.08$), thus positively affecting intake from the flavonoid classes anthocyanin (red vegetables) and anthoxanthin (white vegetables), respectively.

**Conclusions:** These findings highlight the efficacy of multisensory interventions which successfully portray a colorful array of vegetables denoting a diverse micro- and phytonutrient pattern, to positively affect young children from medically underserved communities.

**Funding Sources**

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**Engaging High School Students in a 6-Week Metabolic Disease Curriculum Increases Self-Efficacy and Perceived Ability to Seek and Understand Accurate Health Information (E12-03)**

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**Objective:** Does engaging high school students in a novel health focused science course lead to improved self-efficacy and perceived ability to seek and understand accurate health information?

**Methods:** The Metabolic Disease curriculum is part of a year-long high school biology course developed by biomedical researchers and high school teachers. The 6-wk curriculum includes many topics within nutrition, including food production, metabolism of nutrients, and hunger and satiety hormones. An important element of the curriculum is identifying and evaluating credible sources of nutrition and health information. This novel curriculum emphasizes scientific practices such as data analysis, study design, and critically evaluating research results, as well as real-life scenarios to teach biological principles. Two high school classrooms participated in this study: a high-performing exam school (n = 77), and an urban school serving a diverse population of students ($n = 15$). Student engagement was measured by a 6-item retrospective pre-post survey that asked students how often and with whom they discussed health information. Students' self-efficacy to seek and understand accurate healthrelated information was measured via a 9-item retrospective pre-post survey. In the urban school, students' perceived ability to seek and understand online health information (eHealth Literacy) was measured before and after the course by the eHEALS survey. Data was analyzed with a paired $t$ test, or if nonparametric, with the use of a Wilcoxon Signed Rank test.

**Results:** Students in both schools demonstrated improved self-efficacy (urban school: $P = 0.0019$; exam school: $P < 0.0001$), and increased how often they talked about health information (urban school: $P = 0.0078$; exam school: $P < 0.0001$). The urban school students also demonstrated an improvement in their overall eHealth literacy scores ($P = 0.0078$).

**Conclusions:** After completing a life-relevant course in nutrition and metabolic disease, high school students from two different school types reported improvement in their ability to learn about nutrition content, were more engaged with the topic in their community, and demonstrated an increase in electronic health literacy. These findings demonstrate that material in the classroom can impact the way students interact with health information.

**Funding Sources**

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**Effect of User Profile Characteristics on Engagement in an Online Women, Infants, and Children Nutrition Education Program (E12-04)**

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**Objective:** The objective of this study was to determine the relationship between user profile characteristics and engagement in wichealth.org, an online nutrition education program. wichealth.org is a theoretically driven intervention consisting of >50 parent-child feeding and other related nutrition behavior change–focused lessons implemented as part of the Women, Infants, and Children (WIC) program in 30 states.

**Methods:** All 70,612 wichealth.org users who both completed lesson and profile items during the 2017 fiscal year were included for analysis. A retrospective cohort design stratified users by race, ethnicity, education level, age group, and device used to access the

site. Nonparametric chi-square tests assessed the significance of the difference in engagement level for each stratum with the greatest deviation from the overall group compared with the remaining strata. Engagement was measured as whether users shared, favorited, or liked an educational resource during the lesson.

**Results:** A significant variation in engagement level was identified for profile items. Users less likely to engage included race reported as white ($\chi^2 = 210.2$; $P < 0.00001$) and younger age groups, especially 18–24 y ($\chi^2 = 117.5$; $P < 0.00001$). Those found more likely to engage included Latino ethnicity ($\chi^2 = 832.0$; $P < 0.00001$); lower education levels, especially those not finishing high school ($\chi^2 = 11{,}017.1$; $P < 0.00001$); and use of a mobile device for lesson completion ($\chi^2 = 477.2$; $P < 0.00001$). Engagement was not associated with user belief in the ability to make changes through the use of what was learned ($R^2 = 0.02$), nor was it associated with whether those beginning in an earlier stage of change (i.e., preparation, contemplation, precontemplation) progressed following lesson completion ($R^2 = 0.03$).

**Conclusions:** Results from this study provide online nutrition education developers, especially those working with lower-income parent-child feeding behaviors, with insight as to the potential level of engagement based on user characteristics. In particular, higher engagement among lower-educated, Latino, and mobile device users could serve as an indication of commitment with which these users attempted to assess the value of, and were willing to share with others, the resources found to be relevant to learning.

**Funding Sources**

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### "It's Not Just a phone": Facilitators and Barriers to Integrating an Information and Communications Technology Application in India's Flagship Nutrition Program (E12-05)

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**Objectives**: A mobile phone–based information and communications technology (ICT) application, intended to digitize beneficiary enrollment, enable beneficiary tracking, and support delivery of integrated child development services (ICDS), is being integrated into the ICDS program in India. In the context of an ongoing impact evaluation of the ICT tool, we examined frontline worker (FLW) perceptions of the tool and stakeholder insights on factors that affected roll-out and scale up.

**Methods:** We used a telephonic survey with FLW ($n = 204$) in intervention areas to assess ICT tool usage, challenges, and FLW satisfaction. Data were tabulated. We conducted in-depth interviews with core stakeholders involved in early support to implementation of the ICT tool ($n = 13$). We analyzed interviews through the use of a theoretic framework of program scale-up to identify salient facilitators and barriers to roll-out and implementation of the ICT tool.

**Results:** Early integration of the ICT tool appeared successful. The majority of FLWs used the ICT tool daily (82%), 81% found it "easy" to use, and 74% preferred it over their paper-based records. When asked about challenges, most FLWs reported network (90%) and phone hardware problems (60%). Stakeholders identified several factors that facilitated rapid integration of the ICT tool into the ICDS: the leadership of a senior government official, multiple external partners working together to support roll-out, the availability of external funding, and links to a broader political vision of technology integration in India. Major roll-out challenges identified included delays in hardware procurement and dashboard development, limited server capabilities, and network shutdowns. Stakeholder perceptions about challenges to further scale-up included limited mechanisms for transfer of software and implementation support from external partners to the government, lack of plans for hardware replacement and training support, differential uptake by state governments, and the presence of other health ICT tools.

**Conclusions:** Early findings suggest positive FLW experiences with uptake and use of an ICT tool in the ICDS in India. Further scale-up requires investment in strengthening network infrastructure and institutional mechanisms to support implementation needs, and alignment with other ICT tools.

**Funding Sources**

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### Development of Short Mobile Messages for an Intervention to Prevent Excessive Gestational Weight Gain in Low-Income Women in Hawai'i Women, Infants, and Children (E12-06)

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**Objectives:** Excess weight gain during pregnancy is associated with adverse outcomes during and after pregnancy, such as increased incidence of gestational diabetes mellitus and labor and delivery complications. Approximately 60% of overweight women gain excessive weight during pregnancy. The purpose of this study was to develop short mobile messages for an intervention to prevent excessive gestational weight gain in low-income women in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Hawai'i.

**Methods:** A series of 18 messages of $\leq$160 characters focused on reinforcing the WIC Program's recommendations for pregnant women were developed. To refine message wording, cognitive testing was conducted in 5 pregnant WIC participants age $\geq$18 y between weeks 15 and 20 of gestation. Cognitive interviews conducted individually at WIC and other locations lasted $\sim$1 h and evaluated whether text messages were understandable and appropriate for the target population. Participants were asked to state the meaning of messages in their own words, as well as ways to make them clearer. After messages were revised, the Flesch-Kincaid formula was used to determine reading level. To further ensure cultural relevance, messages were also reviewed by an obstetrician/gynecologist with experience in low-income groups.

**Results:** Participants in cognitive interviews made suggestions that resulted in modification of text. These included shortening words and sentences when possible, and providing specific examples of foods containing nutrients such as iron and folic acid, as well as examples of foods falling into the categories of "dark green," "orange," and "red" vegetables. Participants also suggested providing more specific

guidance regarding the increase in calorie needs during pregnancy. The resulting messages had a Flesch-Kincaid grade level of 5.7. The obstetrician/gynecologist approved the revised messages.

**Conclusions:** Cognitive testing procedures demonstrated relevance of messages to the target population. Evaluation of reading level indicated low reading difficulty. Messages are appropriate for use in a text-message intervention for health promotion in low-income women in Hawai'i WIC.

**Funding Sources**

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### Examining Weight-Related Eating Behaviors within an 8-Week Weight-Loss Intervention (OR01-01)

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**Objectives:** Obesity is a serious public health concern, and therefore understanding how eating behaviors impact weight status is essential. The objectives of this study included the assessment of eating behaviors within an 8-wk weight-loss intervention focused on reducing bites, reducing eating rate, and increasing steps.

**Methods:** Seventy-two overweight or obese adults (age: 37.7 ± 15.3 y; BMI: 31.3 ± 3.2 kg/m$^2$) participated in an 8-wk weight-loss study. Participants were weighed and completed the Weight Related Eating Questionnaire (WREQ) under standardized laboratory conditions at weeks 0 and 8. The WREQ is a validated tool assessing eating behaviors on 4 subscales: routine restraint (RR), compensatory restraint (CR), susceptibility to external cues (EC), and emotional eating (EE). At week 8, participants were dichotomized into a weight-loss group (WL) or a weight-stable/gainers group (WSG). Wilcoxon Mann-Whitney tests examined between-group differences in week 0 WREQ scores. Repeated-measures ANOVA examined between-group differences in WREQ score changes from week 0 to week 8. Correlations examined associations between week 0 WREQ scores and body weight change from week 0 to week 8, and between WREQ score change and body weight change.

**Results:** No significant differences were found between WL ($n = 41$) and WSG ($n = 31$) groups in week 0 RR, CR, or EE scores, and there were no between-group differences in change in these scores. WL participants had significantly higher week 0 EC scores (WL = 3.29 ± 1 compared with WSG = 2.66 ± 0.9; $P = 0.01$) and significant reductions in these scores compared with the WSG ($P < 0.01$). No associations were found between RR, CR, or EE scores and body weight change. There were associations between EC scores and body weight change; participants with higher week 0 EC scores lost more weight ($r = -0.32$, $P < 0.01$), and participants with greater reductions in EC scores lost more weight ($r = 0.40$, $P < 0.01$).

**Conclusions:** These findings suggest that participants who are more susceptible to external eating cues may be more responsive to a bite, eating rate, and step-focused weight-loss intervention. Future weight-loss studies may consider this type of intervention for participants who are more prone to eating in response to external cues that are independent of internal hunger and satiety indicators.

**Funding Sources**

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### Body Image and Behaviors for Eating Disorders in Nonprofessional Classical Ballet Dancers (OR01-02)

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**Objective:** The aim of this study was to evaluate body image (BI) and the presence of suggestive behaviors for eating disorders in nonprofessional classical ballet dancers, and compare these with sports and sedentary women.

**Methods:** Female ballet dancers ($n = 13$) were evaluated and compared to gym sportswomen ($n = 20$) and sedentary women (n = 15), matched by age. The female Silhouettes Figure Scale (SFS) and the Body Shape Questionnaire (BSQ) were applied to evaluate the presence of distortion and dissatisfaction with BI. The Bulimic Investigatory Test, Edinburgh (BITE) was used to identify bulimic behaviors; and the Eating Attitudes Test (EAT-26) to identify anorexic symptomatology. Body mass index (BMI) was calculated and percentage of body fat (BF%) was determined by dual-energy X-ray absorptiometry. Energy intake was evaluated by three 24-h recalls. The Spearman's test ($r^2$) was used to assess the correlation of BI, EAT, and BITE with BMI, BF%, and energy intake.

**Results:** Median BMI of ballet dancers (19.68 kg/m$^2$) was similar to that of the sportswomen (21.23 kg/m$^2$) and significantly lower than that of sedentary women (24.26 kg/m$^2$). A lower BF% (24.90%) was observed in ballet dancers when compared with the other groups ($P < 0.001$). There was also a negative energy balance of −979.53 (1119.94) kcal in ballet dancers. Considering the SFS, the presence of BI distortion (81.0%) and dissatisfaction (85.7%) was high and similar in the studied groups ($P > 0.05$). BSQ and BITE scores in ballet dancers were similar to those presented by the sportswomen and significantly lower compared with the sedentary women ($P < 0.05$). There were positive correlations between BMI and BSQ scores ($r^2 = 0.653$, $P < 0.001$), EAT-26 ($r^2 = 0.389$, $P = 0.015$), and BITE ($r^2 = 0.505$, $P = 0.001$), as well as between BF% and BSQ ($r^2 = 0.611$, p 2 = 0.358, $P = 0.001$).

**Conclusions:** The nonprofessional practice of classical ballet was associated with a better BI and a lower presence of behaviors suggestive for bulimia compared with sedentary women. These positive results were similar to those found in sportswomen, suggesting that the nonprofessional practice of classical ballet may offer the same beneficial effects as nonathletic sports practice on BI perception and the presence of behaviors suggestive of eating disorders.

### Parental Food Attitude Questionnaire: A New Tool to Understand Potential Levers to Changing Parental Provision of Unhealthy Foods (OR01-03)

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**Objective:** Children's excessive intake of unhealthy foods is a global issue. Intervening early in childhood can change the trajectory of poor eating habits tracking through to later in life. Parents' attitudes and beliefs provide promising new avenues to reducing parental provision of unhealthy foods and beverages to children. This study aimed to validate the newly developed Parental Food Attitude Questionnaire, which measures parents' attitudes and beliefs towards limiting provision of unhealthy foods, based on the Health Action Process Approach model.

**Methods:** Parents of 3- to 7-y-old children ($n = 495$) completed the questionnaire through a cross-sectional online survey. Exploratory and confirmatory factor analyses were performed to determine the construct validity of the new questionnaire, and to examine the ability of the questionnaire to measure the constructs within the motivational and volitional phases of the Health Action Process Approach model.

**Results:** Confirmatory factor analyses resulted in 6 factors in the motivational phase (18 items; $\chi^2$ 229.83, df 120, $P = \chi^2$ 409.045, df 168, $P \leq 0.01$; TLI 0.96; CFI 0.97; RMSEA 0.04) measuring parents risk perception (4 factors) and outcome expectancies (2 factors), and 7 factors in the volitional phase (21 items; $\chi^2$ 409.045, df 168, $P = < 0.01$; TLI 0.96; CFI 0.97; RMSEA 0.05) measuring maintenance self-efficacy (3 factors), action planning (1 factor), coping planning (2 factors), and recovery self-efficacy (1 factor). The final 13 factors, and single items for action self-efficacy and intention, strongly aligned with the Health Action Process Approach theoretical framework.

**Conclusions:** These results confirm that the Parental Food Attitude Questionnaire is a valid questionnaire to assess parents' attitudes and beliefs towards unhealthy food provision. The questionnaire can be used to prioritize potential levers to motivate parents to change their provision-related behavior. Greater understanding of this area will help tailor behavior change interventions to reduce parents' provision and children's subsequent intake of unhealthy foods.

**Funding Sources**

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### Changes in Diet and Physical Activity in the Strong Hearts, Healthy Communities Randomized, Cardiovascular Disease Risk Reduction Multilevel Intervention Trial (OR01-04)

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**Objectives:** The aim of this study was to evaluate the effects of a 6-mo multilevel diet and physical activity program on behavioral outcomes in midlife and older women.

**Methods:** Sixteen medically underserved rural towns in Montana and New York were randomized to one of two 6-mo programs: a twice-weekly multilevel, experiential-learning intervention focused on diet and physical activity, Strong Hearts, Healthy Communities (SHHC) ($n = 101$); individual-level components included aerobic exercise, strength training, and healthy eating practices, whereas social and community levels included civic engagement focused on social and built environment change to support healthy lifestyles. The control program met monthly and included healthy lifestyle education-only classes ($n = 93$). Sedentary overweight or obese females aged ≥40 y were recruited; baseline measures were completed prior to randomization. Dietary data were collected via the ASA-24. Physical activity data were collected through the use of accelerometers (Actigraph wGT3X-BT), the International Physical Activity Questionnaire, and the Sedentary Behavior Questionnaire. Adjusted multilevel linear regression models were utilized with town as a random effect.

**Results:** With respect to diet, compared with controls, SHHC participants' Healthy Eating Index score improved; SHHC participants also increased fiber and fruit and vegetable intake, yet this difference was largely driven by reduced intake among controls. In pre-post comparisons, both groups decreased intake of calories, fat (total, saturated, monounsaturated, and solid), sodium, and refined grains. With respect to physical activity, compared with controls, SHHC participants' accelerometer-determined moderate to vigorous physical activity increased as did step counts; improvements were observed for self-reported walking and vigorous metabolic equivalent (MET) minutes, and sedentary (sitting desk) time. In pre-post comparisons, the controls had increased self-reported walking MET minutes and sedentary behavior, whereas the SHHC group improved across most active and sedentary behaviors.

**Conclusions:** Strong Hearts, Healthy Communities was associated with improvements in diet and physical activity compared with the control program, though the latter did show improvements in pre-post analysis. Physical activity behaviors were more notably improved compared with diet behaviors.

**Funding Sources**

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### The Effects of Distraction on Amount Consumed, Food Preference, and Satiety (OR01-05)

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**Objective:** The aim of this stud was to determine the effects of cognitive distraction on amount of food consumed, food preference, and perceptions of satiety in a healthy, adult population.

**Methods:** A randomized controlled crossover study of 120 healthy adults (age: 20.2 ± 1.4 y; 57% female; 48% white) randomly assigned participants to begin in either the distracted (DIS, $n = 55$) or nondistracted (NON, $n = 65$) condition. In DIS, participants consumed a meal comprised of quiche while completing a rapid visual information processing task (RVIP) for 15 min. In NON, participants ate without any task assignment. After a 30-min rest period with limited stimulation, participants were offered a snack of grapes and cookies and given 5 min to eat ad libitum. Participants completed an exit survey assessing satiety and enjoyment of the meal based on 100-mm visual analogue scales. After 1 wk, participants completed the opposite condition.

**Results:** A repeated-measures ANOVA determined that those in DIS consumed significantly less [$F(1, 117) = 11.78$, $P = 0.001$]; this held

true even when controlling for initial condition [$F(1, 117) = 28.786$, $P < 0.001$] and gender [$F(1, 116) = 30.441$, $P < 0.001$]. A significant interaction of initial condition was found [$F(1, 117) = 19.689$, $P < 0.001$]. A repeated-measures ANCOVA, controlling for initial condition and previous intake, determined that there were no significant differences in grape or cookie consumption between groups or in the proportion of grapes or cookies consumed. An ANCOVA controlling for initial condition revealed a significant difference between groups for memory of quiche received [$F(1, 116) = 30.737$, $P < 0.001$] and memory of quiche consumed [$F(1, 118) = 7.616$, $P = 0.007$]. No statistically significant differences were observed between groups in perceptions of fullness, hunger, or enjoyment of the meal.

**Conclusions:** Participants consumed significantly less food, and memory of the meal decreased, when they were distracted. No differences were observed in amount consumed or food preference at a future eating occasion, perceptions of satiety, or enjoyment of the meal. The findings run counter to previous work and may be due to testing during a breakfast meal, the novelty of the RVIP to participants, or the inclusion of male participants. Future research should aim to determine more conclusive results.

**Funding Sources**

None.

### Vidas Activas y Familias Saludables (VALÉ): Pilot Study of a Multidisciplinary Pediatric Obesity Treatment Program (OR01-06)

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**Objective:** The objective of this study was to assess the feasibility and preliminary effectiveness of a multidisciplinary, family-centered, and culturally adapted education program to change lifestyle behaviors among overweight and obese Latino children aged 4–9 y.

**Methods:** Latino families with an overweight/obese child [≥85th percentile body mass index (BMI) for age] aged 4–9 y, participated in a 10-wk (∼90 min/wk) group-based program that addressed diet, exercise, and behavior modification. Families were recruited through local health care clinics and schools. Children engaged in supervised exercise programming, and caregivers participated in culturally adapted nutrition and behavioral health sessions (i.e., reading labels, portion control, behavioral reinforcement, problem solving, lapse/relapse). Although dinner was provided, families set weekly SMART (specific, measurable, achievable, relevant, time-limited) goals. Children were measured at baseline and at 3-mo follow-up for anthropometrics (BMI, body fat), blood biochemistry (lipids, glycemia, etc.), blood pressure, physical fitness, and behavioral health changes (dietary intake, physical activity, parental stress, and depression).

**Results:** Families ($n = 36$ children, 64% males) participated in the program with a retention of 64%. Of the 36 families that participated, 97% were from Central America, with 64% of those reporting El Salvador as their country of origin. Mean child BMI percentile for age at baseline was 98.16 ± 2.662. There was a significant decrease in mean BMI percentile over the study period (–0.07, $P < 0.05$) as well as in body fat percentage (–1.16, $P < 0.05$) and waist circumference (–2.05, $P < 0.05$). Mean values for total cholesterol and LDL cholesterol decreased and mean values for HDL cholesterol increased, though the lipid changes did not reach statistical significance.

**Conclusions:** Preliminary findings indicated that a 10-wk multidisciplinary and culturally sensitive group intervention for Latino families was well accepted and led to positive changes in children's BMI percentile, body fat percentage, and waist circumference. The program is currently being replicated to test effectiveness on a larger scale.

**Funding Sources**

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### Diabetes Selfmanagement Support Program in Predominately Hispanic Faith Community Settings: A Pilot Study (OR01-07)

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**Objectives:** The aims of this study were: *1*) to assess the feasibility, facilitators, barriers, and effectiveness of adopting the Stanford Diabetes Self-Management Program (Stanford DSMP) in faith community settings for Hispanics; and *2*) to assess if the Stanford DSMP, when delivered in faith community settings, reduces participants' glycohemoglobin (HbA1c), Self-Efficacy for Diabetes, and health-related quality of life (HRQOL).

**Methods:** The Stanford DSMP, a 6-wk evidence-based program, was implemented in 5 churches in San Antonio, TX. A single-group pre-post test design measured program effect on improving type 2 diabetes outcomes. Program feasibility, facilitators, and barriers were assessed through documentation and face-to-face interviews.

**Results:** Out of 96 participants, 87 attended throughout the 6-wk program (91%). HbA1c level was significantly improved by a mean reduction of 0.73%. HRQOL score increased by 2.6 d/mo; stretching/strengthening activity increased by 36 min/wk; and Self-Efficacy for Diabetes significantly increased. The program was viewed as useful by the community due to it taking place in a familiar environment with church acquaintances and being easy to access. Key barriers were lack of facilitators' competency in the Spanish language, short program length, and no ongoing support group/reunions.

**Conclusion:** Stanford DSMP program implementation, adoption feasibility, and effectiveness has shown promising results in faith community settings for Hispanics.

**Funding Sources**

Baptist Health Foundation of San AntonioAmerican Diabetes Association.

### Preventing Weight Gain in Kidney Transplant Recipients: Feasibility of a Televideo Physical Activity and Nutrition Intervention (OR01-08)

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**Objective:** Weight gain in the early post-transplant period is common in kidney transplant recipients (KTRs), adversely affecting

survival, diminishing quality of life, and increasing risk for diabetes and cardiovascular disease. The purpose of this study was to assess the feasibility of a televideo nutrition and physical activity (PA) health-coaching intervention to prevent weight gain in KTRs.

**Methods:** This was a randomized controlled study for stable KTRs between 6 and 12 mo post-transplantation. Ten participants were recruited from a kidney transplant clinic and were randomly allocated to 2 groups: intervention and enhanced usual care (eUC). Both groups tracked their healthy lifestyle behaviors of fruits and vegetables, whole grains, water, and PA, and reported on a weekly basis. The intervention group participated in weekly 1-h televideo health coaching sessions for 12 wk. Sessions involved 30 min of exercise led by an adaptive PA expert that was completed in the participants' homes without the need for special equipment, and 30 min of nutrition education with a registered dietitian. The eUC group had access to written educational materials but did not attend health-coaching sessions. Fitness trackers were given for PA tracking, and tablet computers were supplied to facilitate videoconferencing, data reporting, and sharing of educational materials.

**Results:** KTRs were informed of the study opportunity at a clinic visit. The first 10 KTRs screened were eligible and enrolled into the study. There were no significant group differences at baseline. The health-coaching session attendance rate was 78% for the 12 sessions. Absences were due to illness or school/work conflicts. Adherence to reporting healthy behaviors was 86%. Technological issues were the main barriers to full data reporting. All 10 KTRs returned for week 12 study assessments. Clinically meaningful improvements were found for quality of life, fruit and vegetable intake, and PA.

**Conclusions:** The results suggest that a televideo nutrition and PA intervention for KTRs is feasible. A larger and longer trial is needed to determine the effectiveness of the intervention at changing healthy lifestyle behaviors, preventing weight gain, reducing risk, and improving quality of life.

**Supporting Images/Graphs**

| Baseline Demographics | | | | |
|---|---|---|---|---|
| | Total (n=10) | Control (n=5) | Intervention (n=5) | p-value |
| **Gender** | | | | 1.00 |
| **Male** | 5 | 3 | 2 | |
| **Female** | 5 | 2 | 3 | |
| **Race** | | | | 1.00 |
| **Hispanic or Latino** | 1 | 1 | 0 | |
| **Non-Hispanic White** | 5 | 2 | 3 | |
| **Black or African American** | 2 | 1 | 1 | |
| **Multi-racial** | 2 | 1 | 1 | |
| **Age in years** | 44.60 ± 10.02 | 44.00 ± 11.02 | 45.2 ± 10.18 | 0.86 |
| **Education** | | | | 1.00 |
| **High School Graduate** | 4 | 2 | 2 | |
| **Some College** | 5 | 3 | 2 | |
| **College Graduate** | 1 | 0 | 1 | |
| **BMI** | 32.67 ± 5.64 | 31.51 ± 7.93 | 33.83 ± 2.31 | 0.559 |

**Funding Sources**
None.

**Fourth-Graders without Cooking Experience Make Greatest Gains in Key Outcomes of School-Based Culinary Intervention (OR04-01)**

Leslie Cunningham-Sabo,[1] Barbara Lohse,[2] and Stephanie Smith[3]

[1]Colorado State University; [2]Rochester Institute of Technology, NY; and [3]University of Northern Colorado

**Objectives:** Fuel for Fun (FFF) is a theory-based culinary and physical activity program. This study examined the impact of FFF on cooking self-efficacy (SE), attitudes toward cooking (AT), and preferences for specific vegetables (VP).

**Methods:** Four cohorts of 4th graders from 8 schools in 2 adjacent school districts participated in a cluster-randomized controlled trial of FFF. Cohorts 1 and 4 were controls; cohorts 2 and 3 were FFF participants. Students ($n$ = 1409; 50% boys; 70% with some prior cooking experience; 49% FFF) completed a validated in-class survey including cooking AT (6 items, score range 6–30), SE (8 items, range 8–40), VP (11 items, range 11–55), and cooking status (Do you cook? yes/no). Surveys were administered by trained personnel at baseline (BL; fall), postintervention follow-up 1 (FU1; spring), and subsequent fall (FU2). Data were affirmed normal or transformed, then analyzed with repeated-measures generalized linear modeling controlled for gender, treatment, and BL cooking status.

**Results:** All students improved in SE, AT, and VP from BL to FU1 and FU2 (all $P < 0.002$). No gender differences by treatment were observed over time for SE and VP. Gains in SE were greater for FFF students ($n$ = 529, BL 34.5 to FU2 36.6) compared with controls ($n$ = 538, BL 35.2 to FU2 36.5; $P < 0.001$); especially for noncookers ($n$ = 155, 31.8, 35.9, 35.6) compared with controls ($n$ = 162, 32.2, 34.0, 34.8; $P = 0.008$). Gains in AT over time were also greater for FFF students ($P = 0.009$); again especially for noncookers ($n$ = 156, 24.2,

26.0, 26.0) compared with controls ($n = 160, 24.7, 25.1, 25.4$; $P = 0.005$). VP was significantly improved at FU2 when controlling for treatment, gender, and BL cooking status ($P = 0.012$). The greatest improvement was from BL to FU1 for FFF noncookers. FFF noncooker improvement was maintained at FU2 (BL 34.0, FU1 36.6, FU2 36.3).

**Conclusions:** Cooking status at BL influenced gains in SE, AT, and VP up to 1 y later for both boys and girls. Immediate FFF intervention impact remained significant 5 mo later, with greatest gains for FFF without BL cooking experience. School-based culinary programs improve attitudes toward cooking and preferences for vegetables, especially among youth without prior cooking experience, contributing to childhood obesity prevention efforts.

**Funding Sources**

US Department of Agriculture, National Institute of Food and Agriculture.

**Cooking Experience and Family Involvement Key to Body Mass Index Change in a 4th-Grade School-Based Intervention (OR04-02)**

Barbara Lohse[1] and Leslie Cunningham-Sabo[2]

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**Objectives:** Fuel for Fun (FFF) is a theory-based, culinary-driven, experiential program that includes cafeteria, physical, and family-based activities. This study explored the impact of FFF on the body mass index (BMI) of 4$^{th}$-grade youth.

**Methods:** Four cohorts of 4th graders from 8 schools in 2 adjacent school districts participated in a cluster-randomized controlled trial of FFF. Cohorts 1 and 4 were controls; cohorts 2 and 3 were FFF participants, with 4 of these schools adding a family component with in-school and at-home reinforcing activities. Height and weight were measured by trained personnel through the use of standard procedures prior to intervention (fall), immediately after the intervention (spring), and in fall of 5th grade. Perceived cooking status (yes/no) was included on an in-class survey completed with height/weight measures. BMI was converted to age- and sex-specific BMI percentiles (BMI%tile). After affirming normality, data were analyzed with generalized linear modeling repeated measures and univariate analyses to assess the percentage changes in BMI.

**Results:** Mean baseline BMI%tile was $56.6 \pm 30.1$ (71% normal, 13% overweight, 13% obese, 3% underweight; $n = 1379$) and higher in FFF ($P = 0.03$). Change in BMI%tile was not significant over the 12-mo period or by treatment. However, when self-identified cooking status at 12 mo was included, the pattern of BMI%tile change tended to differ ($P = 0.08$) with a decrease for FFF and no change for control. BMI%tile decreased for those in FFF schools that included a family component ($n = 304$) compared with those without ($n = 232$) ($P = 0.002$). This decrease in BMI%tile was significant even when controlling for baseline BMI%tile (mean $\pm$ SE $-1.91 \pm 0.61$ compared with $1.27 \pm 0.70$; $P = .001$). In FFF family-based schools, migration from a normal BMI%tile to overweight was lower (4% compared with 8%) and fewer moved from overweight to obese BMI%tile (3% compared with 32%; all $P < .001$) than in FFF schools without a family-based component.

**Conclusions:** BMI%tile tended to decrease from 4th grade to 5th grade in those who identified with cooking in 5th grade and when FFF included a family-based component. Inclusion of family-based activities mitigated movement from normal to overweight and overweight to obese BMI%tile. To facilitate childhood obesity prevention, school-based interventions are encouraged to include culinary experiences at school and extend them to the home.

**Funding Sources**

National Institute of Food and Agriculture, US Department of Agriculture, under award number 2012-68001-19603.

**Katalyst Pilot Study: The Use of Interactive Activities in Anatomy and Physiology to Teach Children the Scientific Foundation of Healthy Lifestyles (OR04-03)**

Rebecca Hagedorn, Kathryn Baker, Tyler Hendricks, Melissa McGowan, Lauren M Joseph, Shalin Ghandi, Timothy Waanders, and Melissa D Olfert

West Virginia University

**Objective:** The aim of this study was to evaluate the effectiveness of the Katalyst pilot study, a 5th-grade experiential learning program designed to promote healthy lifestyle behaviors in elementary-age children.

**Methods:** The study took place in November 2017 at an Appalachian elementary school. Fifth-grade students participated in an interactive curriculum comprised of four 60-min learning modules based on the following organ systems: digestive, nervous, circulatory, and respiratory. Modules combined classroom discussion with hands-on activities to teach basic physiology principles with an emphasis on preventing chronic disease through diet, nutrition, increased physical activity, and abstinence from drug and tobacco use. Prior to delivery and after the program, students completed a 37-item survey to assess their knowledge and perceptions of healthy lifestyle behaviors. Teachers completed a postintervention survey to provide feedback on the program. Frequency analysis and paired $t$ tests were conducted on student responses. Content analysis was performed on teacher feedback.

**Results:** Students had a correct answer response rate of 66.58% at baseline ($n = 74$) and a correct response rate of 71.67% at post-test ($n = 65$), representing an overall improvement of 5.09% ($P = 0.0019$). Greatest improvement (27.15% increase) was "What does eating too much salt do?" and the largest reversal (17.96% decrease) was in response to "How much should fifth-graders exercise each day?" There was an increase in students strongly agreeing that they are "interested in careers that deal with the human body and diseases" from 27.40% at baseline to 45.31% at post-test. Teacher feedback ($n = 5$) showed that all teachers believed that Katalyst was effective in meeting state educational standards and students benefited from the program more than "reading about the body systems in a textbook or health magazine."

**Conclusion:** The Katalyst intervention improved children's knowledge of how their lifestyle decisions affect their body, health, and disease. Moreover, Katalyst heightened interest in health-related careers. Katalyst aligned with state educational standards and was beneficial to students.

**Funding Sources**

West Virginia University Experimental Station Hatch WVA00641 and Try This West Virginia Pilot Grant.

**After-School Nutrition and Cooking Class Improves Student Vegetable Consumption and Liking, and Nutrition Knowledge in a 2-Year Control Study (OR04-04)**

Natalie Goldsworthy, Elizabeth Miller, and Neilé Edens

Common Threads

**Objective:** The aim of this study was to determine if an after-school cooking program significantly improved student nutrition knowledge, vegetable liking and exposure, cooking self-efficacy, vegetable consumption, and self-reported cooking at home compared with students in other after-school programs.

**Methods:** Cooking Skills and World Cuisine (CSWC) and Advanced CSWC (A/CSWC) is a 10-wk after-school nutrition intervention, combining education with hands-on food preparation, grounded in the socioecological model, and designed to improve nutrition behaviors and cooking self-efficacy. A study of A/CSWC was conducted over school years 2015–16 and 2016–17 with students in grades 3–8. Intervention schools were selected from a stratified sample of schools offering A/CSWC in 5 US markets. Control schools were selected from schools in the same markets that were eligible for programs and were running non-nutrition-related after-school programs for the same duration which were led by a facilitator. Program participants ($n = 474$ control and $n = 1415$ intervention) completed pre and post surveys. Mixed models were used to assess the effect of A/CSWC, with models controlling for age, gender, and ethnicity, as well as clustering of subjects within schools, nested within cities.

**Results:** A/CSWC significantly increased, compared with control, vegetable liking ($P < 0.001$), exposure ($P < 0.001$), and consumption ($P = 0.002$), nutrition knowledge ($P < 0.001$), cooking self-efficacy ($P < 0.001$), communication with family at home about cooking ($P < 0.001$), and frequency of helping to cook at home ($P = 0.003$).

**Conclusions:** The overall findings of this study demonstrate increased efficacy of an after-school experiential nutrition and cooking education program. The results show an effective improvement in vegetable consumption, nutrition knowledge, and important food behaviors. These results indicate great potential for nutrition and cooking education programs in improving long-term health outcomes.

**Funding Sources**

Walmart Foundation.

**The Illinois Junior Chefs Program: Outcome Evaluation of a Hands-On Culinary Education Intervention (OR04-05)**

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University of Illinois at Urbana-Champaign

**Objectives:** Nutrition interventions that allow for hands-on practice of culinary skills can be especially effective in generating positive long-term impacts on dietary health. This study evaluated the effectiveness of a revised version of the Illinois Junior Chefs (IJC) Program through pre- and post-intervention surveys and innovative hands-on culinary skills assessments. Gender differences in program outcomes were also assessed.

**Methods:** IJC is a statewide nutrition and culinary education program that has been implemented by the University of Illinois Office of Extension and Outreach since 2015. In summer 2017, a modified version of IJC that incorporated additional cooking skills and activities was implemented and evaluated with validated surveys and a newly developed hands-on cooking skills assessment protocol. IJC is designed to be implemented in five 2-h lessons focused on nutrition education, recipe preparation, and healthy food tastings. Participants included SNAP-Ed eligible youth ($n = 521$) between the ages of 8 and 14 y.

**Results:** Paired *t* tests indicated that participants experienced significant positive changes from pre- to post-intervention in cooking self-efficacy [$t$ (515) = 14.39, $P < 0.001$], cooking attitudes [t (504) = 6.47, $P < 0.001$], fruit and vegetable preferences [$t$ (497) = 3.87, $P = 0.001$], self-efficacy for selecting and eating healthy foods [$t$ (491) = 1.95, $P < 0.001$], and cooking behaviors [$t$ (486) = 2.73, $P = 0.007$]. Independent *t* tests indicated that male participants experienced larger improvements in cooking self-efficacy [$t$ (492) = 1.91, $P = 0.056$], cooking attitudes [$t$ (481) = 2.12, $P = 0.034$], fruit and vegetable preferences [$t$ (481) = 2.54, $P = 0.012$], self-efficacy for selecting and eating healthy foods [$t$ (477) = 1.32, $P = 0.186$], whereas female participants experienced larger increases in cooking behaviors [t (477) = −2.71, $P = 0.007$] after participating in the program. Hands-on cooking skills assessments indicated that participants improved their abilities to crack eggs, peel and grate vegetables, measure accurately, and use mixing techniques.

**Conclusions:** Results from the validated IJC survey and novel hands-on cooking assessments provide evidence for the effectiveness of the revised IJC program, as participants showed significant improvements in dietary attitudes and behaviors.

**Funding Sources**

Illinois Junior Chefs was delivered through funding from SNAP-Ed and EFNEP. This research was supported by the University of Illinois Office of Undergraduate Research.

**Effectiveness of the App "MyNutriCart" for Making Smart and Healthy Choices when Grocery Shopping on Food Selection and Food Intake (OR04-06)**

Cristina Palacios,[1] Michelle Torres,[2] Desiree López,[2] Maria Trak,[2] Catherine Coccia,[1] and Cynthia Perez[2]

[1]Florida International University; and [2]University of Puerto Rico

**Background:** Adherence to the science-based Dietary Guidelines for Americans (DGA), designed to promote health and prevent chronic diseases, is suboptimal. The main barrier for following these guidelines is their translation into practical recommendations, particularly when grocery shopping, a critical moment when individuals need assistance for purchasing healthy foods. Interventions aimed at food choice when grocery shopping may increase the DGA adherence. This could be achieved through levering technology.

**Objectives:** The objective of the current study was to test the effectiveness of "MyNutriCart", a smartphone app that produces a grocery list with healthy foods following the DGA recommendations, on food selection, dietary patterns, and weight, compared with a traditional nutritional counseling (TNC) session.

**Methods:** A pilot randomized clinical trial was conducted to test "MyNutricart" among overweight and obese adults aged 21–45 y. From

the 98 recruited participants, 75 were randomly allocated to the App or to TNC for 8 wk (App $n = 37$; TNC $n = 38$) and 51 completed the study (App $n = 26$; TNC $n = 25$). Participants were predominantly female (90.2%), had a high school degree or higher (80.8%) with a mean age of 37.0 y. Food selection (from grocery receipts), frequency of food consumption (based on a food-frequency questionnaire), intake of foods (based on three 24-h recalls), and weight were assessed at baseline and after 8 wk. Within groups-changes were evaluated with Wilcoxon's Signed-Rank Test and between-group changes were evaluated with Mann-Whitney *U* test.

**Results:** The App group had significant improvements in their selection of vegetables and whole grains (p. In terms of dietary patterns, the results indicated trends towards increased fruit and vegetable and whole-grain intake in the App group and a significant decrease in whole-fat dairy products in the TNC group (p. No significant changes were noted in weight for either group.

**Conclusions:** Both interventions led to improvements in food selection and dietary patterns over the 8-wk period but not in weight. "MyNutricart" could be a tool to help individuals improve food selection and dietary patterns but more intense follow-ups may be needed to achieve greater changes.

**Funding Sources**

This study was conducted with support in part by the Research Centers in Minority Institutions Program (grant G12 MD007600) from the National Institute on Minority Health and Health Disparities, National Institutes of Health.

### Use of an Online Dietary Behavior Change Tool: Associations with Reduced Risk of Excessive Gestational Weight Gain (OR04-07)

Christine M Olson, Myla Strawderman, and Meredith L Graham

Cornell University, NY

**Objectives:** The components of effective interventions for reducing excessive gestational weight gain (GWG) remain to be identified. This study describes the theoretical model-based correlates of using an online dietary behavior change tool with a goal-setting approach, and the association of using it with GWG.

**Methods:** The e-Moms Roc study included 898 women in the intervention arm of a randomized trial assessing the effectiveness of an integrated online and mobile phone behavioral intervention to decrease the prevalence of excessive GWG. Use of the dietary change tool was defined by completion of the first step in a 4-step goal-setting process: assessment, goal-setting, self-monitoring, and self-reward selection. The assessment step entailed completing the 23-item Rapid Eating Activity Assessment for Patients-Shortened Version (REAP-S) and questions from the Eating Stimulus Index for emotional eating and dietary restraint. Excessive GWG was defined as gaining more weight during pregnancy than is recommended by the Institute of Medicine for each woman's early pregnancy body mass index (BMI) category. Data were analyzed by chi-square analysis and modified Poisson regression analysis.

**Results:** Overall, 405 women (45.1%) completed at least one assessment; 317 (35.3%) set at least one goal; 203 (22.6%) engaged in some self-monitoring. The belief that the best way to control weight is by eating the right amount of food was related to the use of the dietary tool among women with normal BMI and overweight plus obese class 1 BMI. Other significant correlates differed by BMI group. In unadjusted analyses, engaging with the dietary goal-setting tool was positively and significantly associated with excessive GWG (52.1% compared with 43.6%; $P = 0.02$), a finding driven by women with normal BMI (37.4% compared with 28.2%; $P = 0.04$). There was no association among women with overweight and obese class 1 BMI. Among women with normal BMI, adjustment for variables associated with the use of the dietary change tool decreased the association with GWG to nonsignificance ($P = 0.42$).

**Conclusion:** The online dietary behavior change tool was not used by the majority of women, and the use of it was not independently associated with risk of excessive GWG. It does not appear to be an effective component of this online intervention aimed at decreasing excessive GWG.

**Funding Sources**

National Heart, Lung and Blood Institute and the Eunice Kennedy Shriver National Institute of Child Health and Human Development, grant U01HL096760.

### Impact of a Web-Based Gamification Program to Improve Nutrition Literacy in Families of Preschool Children: The Nutriscience Project (OR04-08)

Renata Barros,[1] José Azevedo,[1] Patrícia Padrão,[1,2] Maria J Gregório,[1] Carla Almeida,[1] Nuno Moutinho,[1] Nanna Lien,[3] and Renata Barros[1]

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**Objective:** Evidence shows a strong association between nutritional knowledge and healthy eating. However, classroom-based nutrition education strategies for children have shown little effect. We aimed to assess the impact of a web-based gamification program delivered through kindergartens on nutrition literacy of families.

**Methods:** A convenience sample of 551 families from 32 kindergartens (intervention group) and 250 families from 7 kindergartens (control group) was included. The Nutriscience program comprises a web-based social network of participants' interactions, educational materials, serious games apps, and nutritional challenges, focused on fruit, vegetables, sugar and salt topics (www.nutriciencia.pt). A nutrition literacy parental self-reported survey (20 questions/4 dimensions: nutrients, food portions, food wheel groups, food labeling) was administered before and after the intervention. Repeated-measures generalized linear modeling was performed to analyze the effect on the nutrition literacy score.

**Results:** Families uploaded 1267 items (recipes, photographs of challenges) and educators uploaded 327 items (photographs and videos) onto the interactive platform. For the intervention group, the final mean ± SD score of nutrition literacy was significantly higher than the baseline, 78.8 ± 15.6% compared with 72.7 ± 16.2%; $P < 0.001$, regardless of parental education and income perception. No significant differences in the scores of the control group were observed (final 67.8 ± 16.1% compared with initial 66.4 ± 15.6%; $P = 0.364$).

**Conclusions:** The Nutriscience program proved to be a useful, easily adapted and disseminated education tool for increasing nutrition literacy, showing the potential of web-based gamification models.

**Funding Sources**
EEA grants (Project 0085NU1).

**Body Mass Index of Parents of 4th Graders Aligns with Psychosocial and Demographic Factors but Is Stable over a Year: Considerations for Healthy Weight Intervention Design and Assessment (P18-001)**

Brenda AZ Abu,[1] Barbara Lohse,[1] and Leslie Cunningham-Sabo[2]

[1]Rochester Institute of Technology, NY; and [2]Colorado State University

**Objective:** The aim of this study was to examine the weight status of parents of 4th graders when both parents and children participated in a randomized controlled trial of a school-based intervention focused on culinary and physical activity experiences in northern Colorado.

**Methods:** Fuel for Fun (FFF) is a year-long school-based, culinary-driven program for 4th graders that includes cafeteria, physical and family-based activities as well as parent participation in online nutrition education. Student cohorts were designated as either control or FFF intervention. Parents had youth attending schools assigned to 1 of 4 treatments that varied in type and intensity of parent involvement. Data were collected via a Qualtrics online survey completed by intervention and control parents at baseline (BL), end of first year (FU1) and beginning of 5th grade (FU2). The survey included self-reported height, weight, sociodemographic factors, and eating behaviors, attitudes, and psychosocial attributes based on validated measures, e.g., sense of coherence, eating competence, stress, and physical activity. Low income was defined as either worrying about money for food or using nutrition assistance. Sociodemographic differences in baseline body mass index (BMI) were examined by chi-square and means testing. BMI stability was examined by generalized linear modeling with repeated measures controlling for BL sociodemographic factors.

**Results:** Parents ($n$ = 410 BL, 220 FU1, 219 FU2) were predominantly female (87%), white (88%), and well educated (62% undergraduate, 32% graduate degree). BL mean BMI was 25.9 ± 5.6 kg/m$^2$; 52% normal BMI, 28% overweight and 18.0% obese. Mean age was 39.2 ± 5.9 y. BL BMI was greater in males, who overall had an educational level of up to high school, a lower income, lower eating competence, and higher stress (all $P < 0.05$). BL BMI was similar among parent treatment groups and student cohorts. BMI remained stable over the study period, even after controlling for student cohort, parent treatment group, sociodemographic and psychosocial behaviors.

**Conclusions:** Parents of 4th graders have relative BMI stability. However, numerous sociodemographic and psychological factors are associated with BMI status. Healthy weight nutrition and physical activity interventions for parents of school-age youth will benefit by including activities and components that address these factors and consider them in intervention assessment.

**Funding Sources**
National Institute of Food and Agriculture, US Department of Agriculture, under award number 2012-68001-19603.

**Impact of Migration on Diet, Physical Activity, and Body Weight among International Students Moving from the Gulf Countries to the United States (P18-002)**

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University of Florida

**Objective:** The aim of this study was to explore the impact of migration on dietary intake, dietary behaviors, physical activity, and body weight among international students moving from the Gulf countries to the United States.

**Methods:** This case series was conducted during fall 2016 and spring 2017 in Florida. Eight students from Saudi Arabia and Kuwait were recruited within their first month of arriving in the United States. Participants completed questionnaires about their diet and their physical activity immediately upon arrival, and had their height and weight assessed. Anthropometric assessments and the same questionnaires were repeated in December 2016 and in April 2017.

**Result:** Over their first semester in the United States, participants experienced a significant decrease in their mean intake of fruit and vegetables (–0.45 ± 0.15 cup equivalents/d, $P = 0.02$) and sugar (−2.5 ± 1.0 teaspoons/d, $P = 0.05$), and in physical activity (–2786.3 ± 762.0 metabolic equivalent-min/wk, $P = 0.008$). Participants reported shopping for their more often from 50% to 100% ($P = 0.03$). Participants' body weight did not change significantly. No significant changes were observed between December 2016 and in April 2017.

**Conclusions:** International students from Gulf countries decreased their physical activity and consumed a less healthy dietary pattern after moving to the United States which may increase their health risk. This observational pilot signals the need for continued evaluation of the impact of students' migration from Gulf countries to the United States on health and health behaviors.

**Funding Sources**
This study was not sponsored.

**Self-Reported Eating Behaviors of Military Recruits Are Associated with Body Composition and Diet Quality, and Change during Initial Military Training (P18-003)**

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**Objectives:** Eating rate and responsiveness to satiety cues are modifiable behaviors associated with dietary intake, body weight, and body composition. However, these associations have not been examined in military recruits, and whether initial military training (IMT) alters these behaviors is unknown. The aim of this study was to determine cross-sectional associations between self-reported eating rate and satiety responsiveness with body mass index (BMI), body composition, and diet quality in military recruits at accession, and to assess whether those behaviors change during 7–12 wk of IMT.

**Methods:** An individual participant data meta-analysis of studies completed 2012–15 during Army, Air Force and Marine IMT was conducted. The included studies administered questionnaires assessing eating behaviors at accession and completion of IMT. BMI and body

fat percentage were measured at accession. Healthy Eating Index (HEI) was calculated at accession through the use of food-frequency questionnaires. Associations between eating behaviors and outcomes were assessed by multivariate-adjusted general linear models.

**Results:** Four studies and 1362 recruits (45% female; 20 ± 3 y; BMI 24.0 ± 2.7 kg/m$^2$) were included. At accession, eating fast was associated with a 1.1 ± 0.3 kg/m$^2$ higher BMI relative to eating slowly ($P < 0.001$). Eating rate was not associated with body fatness or HEI. Recruits who stopped eating before feeling full had a 0.7 ± 0.2 kg/m$^2$ higher BMI and a 5 ± 1 higher HEI relative to those eating until full, and a 4 ± 1 higher HEI compared with those eating all food on their plate irrespective of fullness ($P < 0.05$). In males, but not females, recruits who stopped eating before full had a 1.6 ± 0.6% higher percentage body fat relative to those eating until full ($P = 0.03$). More recruits reported eating fast (82% compared with 39%) and stopped eating for reasons other than fullness (55% compared with 16%) during IMT relative to accession ($P < 0.001$).

**Conclusions:** Self-reported eating behaviors are associated with body composition and diet quality in military recruits. The direction of these associations was not consistent with previous reports and may reflect changes in preparation for military training. Additional research is warranted to determine whether reported eating behavior changes are sustained and the implications for weight management.

**Funding Sources**

The views expressed in this abstract are those of the authors and do not reflect the official policy of the Department of Army, Department of Defense, or the US Government.

### Describing Independent Eating Occasions among Low-Income Adolescents Aged 10–13 Years in the United States: A Multi-State Study (P18-004)

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[1]University of Hawaii at Manoa; [2]Brigham Young University, UT; [3]Purdue University, IN; [4]University of Georgia; [5]Oregon State University; [6]The Ohio State University; [7]University of Arizona; [8]University of Oklahoma; [9]University of the District of Columbia; [10]University of Minnesota; [11]Kansas State University; and [12]Oregon State University

**Objective:** As children move into adolescence, food choices made independently may greatly affect dietary intake. Little is known regarding food choices adolescents make when not with parents/caregivers. The objective of this study was to characterize independent eating occasions (IEO) among adolescents with regards to frequency, eating location, activities while eating, and types of food consumed.

**Methods:** In a formative, cross-sectional study, low-income adolescents aged 10–13 y ($n = 46$) in 10 US states were asked to take pictures of all foods consumed over a 24-h period followed by semistructured interviews. Trained interviewers asked participants to describe the context of each eating occasion, with the use of the pictures as a guide.

**Results**: The average age of the participants was 10.9 ± 1.1 y; 60% were female. Most participants identified as Hispanic/Latino (39.1%), non-Hispanic black (26.1%), or non-Hispanic white (21.7%). Overall, participants reported more IEO (172 occasions) than non-IEO (107 occasions), with an average of 3.8 ± 2.2 IEOs daily. More than half (65.1%) of IEO were classified as "snacks." Most IEOs occurred at home (72.1%), followed by school (18.6%), someone else's house (4.7%), another location (3.5%), and car/bus (1.2%). Although 30% of adolescents were not performing any other activities while eating, others were watching TV/surfing the Internet (31.8%), hanging out with a friend (15.9%), at an after-school program (1.2%), studying/reading (0.6%), and doing something else (20.6%). The most frequent foods consumed during IEOs were sweet snacks (cakes, cookies) (15.4%), followed by grains (bread, pasta) (13.4%), fruits (8.9%), salty snacks (chips) (8.3%), dairy (milk, cheese) (7.9%), and sugar-sweetened drinks (7.1%).

**Conclusions:** Adolescents frequently made independent food choices. Many foods consumed during IEOs were energy-dense snacks eaten at home that had little nutritional value. Understanding choices made and their context may allow for promotion of healthy eating habits in this age group.

**Funding Sources**

USDA NIFA AES Multistate Research Project W3003.

### Impact of a Web-Based Food Allergy Training for Schools and Restaurants: The Food Allergy Community Program (P18-005)

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**Objective:** Food allergy is a growing public health problem, and a significant number of reactions occur in community services, such as schools and restaurants. We aimed to evaluate the effectiveness of a web-based food allergy community (FAC) program for schools and restaurants, designed to improve knowledge and good practices in the community.

**Methods:** A free learning program that gathers educational animated videos about food allergy in schools and restaurants was developed, and was hosted on the e-learning platform of the University of Porto (www.academia.up.pt). The food allergy courses included 9 video training modules, developed in video animation format with GoAnimate-GoPremium (GoAnimate, Inc.). The training courses included general concepts about food allergy, clinical manifestations, diagnosis and treatment, food allergen avoidance, emergencies, food allergen labelling, food allergy prevention, and specific topics for schools and restaurants. Food allergy knowledge survey tools were developed to address the knowledge and management skills at the baseline and at the end of the intervention program. Repeated-measures generalized linear modeling was used to analyze the improvement in the participants' knowledge.

**Results:** The FAC program included a total of 695 participants; 216 education professionals and 211 catering and food industry professionals were included in the final analysis. The final mean ± SD score on the knowledge survey tool was significantly higher than the baseline for the food allergy school training participants (88.4 ± 8.7% compared with 67.3 ± 14.1%; $P < 0.001$), and for food allergy restaurant training participants (95.7 ± 6.1% versus 83.8 ± 10.7%; $P < 0.001$).

**Conclusions:** This food allergy community program proved to be an effective web-based tool to enhance the knowledge of education and

catering professionals, potentially improving the commitment and skills of schools and restaurants to deal with food allergy patients.

**Funding Sources**

None.

**Impacts of a Nutrition Education Programme on Quality of Life and Anthropometric Status of Adults Living with HIV in Abeokuta, Nigeria (P18-006)**

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University of Pretoria, South Africa

**Objective:** This study examined the effects of a nutrition education program (NEP) on the health-related quality of life (HRQoL) and the anthropometric status of adults living with HIV (ALH) in Nigeria.

**Methods**: In 2014, 243 ALH in Abeokuta, Nigeria were examined as part of a needs assessment study on nutrition education intervention (NEI). The results were used to developed 4 nutrition education materials (trainer's manual, brochure, flipcharts, and participants' work book) incorporating selected constructs of social cognitive theory and the health belief model. The implementation involved 200 conveniently selected participants stratified for sex and duration on antiretroviral therapy through the use of a quasiexperimental design to randomly assigned 2 hospitals to intervention and control sites. Participants at the intervention hospital received face-to-face group teaching of the NEP for 12 wk with the education materials, whereas the participants at the control site only received a brochure on nutrition guidelines for people living with HIV/AIDS in Nigeria. The impact of the NEP was evaluated at week 12 and week 24. All the Short Form (SF-36) QoL questions were scored on a scale of 0 (minimum score) to 100 (maximum possible score). The interpretations of the QoL scores were done as per the provided guidelines by Rand Health. Random effects regression methods were used for group comparisons and QoL constructs. Anthropometric status was summarized by sex based on percentages and 95% CIs. ANOVA was used to compare the 2 hospitals, and to confirm the similarity of the participant populations.

**Results:** Significant improvement was detected in the physical functioning (week 12 and 24; $P < 0.01$), pain (week 12; $P = 0.01$) and role limitation due to physical health (week 12; $P = 0.01$ and week 24; $P = 0.002$) constructs of the QoL of the intervention group compared with the control group. There was no significant difference ($P = 0.07$) between the mean weights of the 2 groups at baseline.

**Conclusion:** The study broadly supports the hypothesis that a tailored NEP is vital to the QoL of ALH.

**Funding Sources**

Department of Research and Innovation (DRI) of the University of Pretoria, Tertiary Education Trust Funds (TET Funds) and Red Cross International Lagos branch.

**The Relationship between Instagram Use and Fad Dieting: Feelings of Self-Efficacy and Confidence in Nutrition Knowledge (P18-007)**

Jennifer Bennett, Zindzi George, and Shahla Wunderlich

Montclair State University, NJ

**Objective:** The aim of this study was to explore the influence of Instagram use on nutrition beliefs, attitudes, and behaviors along with body image among women 18–49 y old.

**Methods:** Data collected from adult women between the ages of 18 and 49 y, currently residing in the United States and who use the social media platform Instagram, were collected through the online survey system Qualtrics. The survey was open in fall 2017 for 5 wk. Correlations between Instagram use and participants' tendencies toward the following variables were explored: following nutrition advice based on high follower counts instead of qualifications, following fad diets, negative body image, and confidence in nutrition knowledge along with feeling of greater self-efficacy preparing healthy meals. Quantitative analysis was conducted with SPSS software to run Spearman $\rho$ correlation coefficient tests.

**Results:** The participants were predominantly white (62%) and located in the northeast region of the United States. Participants were also highly educated, with 60% having a college degree and 15.8% having some college experience, but no degree. About 36% felt that Instagram had helped them to eat more healthfully and 32% reported that Instagram had helped them to exercise more. There was a positive significant correlation between strong feelings of self-efficacy and confidence in nutrition knowledge in regular Instagram users ($P < .001$). However, <40% of participants knew the recommended daily intake for fruits, vegetables, or grains. There was also a strong positive correlation ($P < .001$) between the tendency of Instagram users to follow fad diets and purchase products promoted by the health accounts they follow. There were no significant correlations between participants' responses and negative body image or reports of following nutrition advice based on the number of followers of an Instagram account.

**Conclusions:** Instagram use is correlated with feelings of greater self-efficacy and confidence in healthy eating habits. Therefore, creating a platform health professionals can leverage to empower its audience with accurate nutrition knowledge. Further research is needed to determine the extent to which social media status (number of followers and popularity) of a user account may affect the decisions and habits of that account's followers.

**Funding Sources**

There are no funding sources or disclosures for this study.

**Salient Beliefs Underlying Eating Two Underconsumed Vegetable Groups in a Sample of Middle-Aged Women in a Midwestern Town (P18-008)**

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Indiana University School of Public Health-Bloomington

**Objective:** The aim of this study was to identify salient beliefs about eating at least one serving of dark green vegetables and at least one serving of red and orange vegetables daily over 3 mo based on the use of the reasoned action approach.

**Methods:** This study had a mixed-methods descriptive design. A face-to-face elicitation interview was conducted with a convenience sample of women aged 35–65 y (n = 48) in Bloomington, IN. A content analysis of verbatim text identified perceived consequences, referents,

and circumstances. As a measure of interrater agreement, the $\kappa$ statistic was calculated to assess the reliability of the coding. The $\kappa$ statistic yielded a value of 0.921, which indicated a high level of agreement. A frequency analysis revealed the most frequently mentioned beliefs.

**Results:** The top 3 consequences were improved health, feeling better and improved digestion. Spouse, children, and friends were the top 3 referents. Time and availability were the top circumstances.

**Conclusions:** Based on the salient beliefs identified, implications for additional research as well as specific suggestions for interventions to improve the consumption of these 2 underconsumed food groups in women aged 35–65 y can be established.

**Funding Sources**

A research grant of $500 was awarded by the Department of Applied Health Science at Indiana University School of Public Health-Bloomington to the research team to conduct this study.

**A Preliminary Study of the Effects of Cognitive-Behavior Therapy and Mindfulness Training on Weight Loss and Metabolic Health (P18-009)**

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**Objectives:** Poor adherence to diets and other weight-loss interventions is key to failure to achieve and maintain weight-loss goals. In this study we evaluated the effects of a novel program incorporating cognitive-behavior therapy (CBT) and mindfulness-based stress reduction (MBSR) on weight loss and metabolic health.

**Methods:** In the 12-wk CogniDiet program, participants were taught to use CBT and MBSR techniques to help reframe thoughts and modify food-directed behaviors. No specific diet or calorie-counting regimen was imposed, although nutrition and exercise counseling was provided. Women $\geq$40 y of age who were chronic, unsuccessful dieters participated in this single-arm study. Primary outcomes were change from baseline at 12 wk in body weight (BW), body fat mass (BFM), percentage body fat (PBF), and waist-to-hip ratio (WHR). Blood lipoprotein analyses were also conducted. Paired *t* tests were used to assess the change in study measures.

**Results:** Of the 40 women enrolled in the study, 34 completed all assessments and comprised *the* per protocol population, reported on here. Participants were largely white (76.5%), college-educated or higher (70.6%), engaged in no or infrequent exercise (67.5%), and had a mean age of 55.7 y. Mean baseline BW, BFM, PBF, and WHR were 200.9 $\pm$ 35.7 lb, 83.8 $\pm$ 20.9 lb, 41.3 $\pm$ 3.6%, and 0.95 $\pm$ 0.05, respectively. At 12 wk, we observed a significant decrease in mean BW, to 188.9 $\pm$ 35.7 lb (mean difference, 12 $\pm$ 7.5 lb, P P P

**Conclusions:** The results provide support for the efficacy of CBT and mindfulness training techniques, in tandem with nutrition and exercise counseling, in promoting weight loss and improving metabolic parameters. The 6-mo results suggest durability of the observed effects. Further follow-up is planned.

**Funding Sources**

Self-funded by the principle investigator.

**Is Parent-Child Connectedness Associated with Changes in Girls' Dietary Intake Behaviors? (P18-010)**

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Kansas State University

**Objective:** Previous observational studies have suggested that high-quality parent-child relationships are associated with higher fruit and vegetable consumption, and lower intake of fast food. Our primary purpose was to determine whether parent-child connectedness was associated with changes in girls' dietary intake behaviors when participating in a wellness coaching intervention.

**Methods:** Sixty-two girls (aged 8–13 y) participated in a 12-wk home-based wellness coaching intervention. The girls and their parents both completed self-reported surveys regarding the child's psychosocial quality of life (Pediatric Quality of Life Inventory; PedsQL) and dietary intake behaviors [intake of fruits and vegetables, noncore foods, and sugar-sweetened beverages (SSBs); and fruit and vegetable asking behavior] at baseline, post-intervention (3 mo after baseline), and follow-up (6 mo after baseline). We operationalized parent-child connectedness as concordance between self-reported and parent-reported psychosocial health for the girls through the use of the PedsQL psychosocial health summary score. Partial correlations adjusting for participant age were used to determine correlations between parent-child connectedness and change in dietary intake behaviors.

**Results:** At baseline, self-reported and parent-reported psychosocial quality of life (mean $\pm$ *SD)* for the girls (child: 78.1.1 $\pm$ 15.6, parent: 69.8 $\pm$ 13.8) were significantly different ($P = 0.002$), and positively correlated ($r = 0.61$, $pr = -0.07$, $P = 0.629$), noncore food consumption ($r = 0.15$, $P = 0.285$), SSB consumption ($r = -0.20$, $P = 0.143$), or fruit and vegetable asking behavior ($r = 0.09$, $P = 0.523$).

**Conclusions:** Self-reported and parent-reported psychosocial health were positively correlated; however, parents perceived poorer psychosocial health than daughters reported, which may warrant further investigation. Our proxy measure of parent-child connectedness was not associated with changes in dietary intake behaviors from before to after wellness coaching intervention. Future studies should explore other measures of parent-child connectedness as they relate to dietary intake behaviors.

**Effectiveness of Cooking Education Program Integrated Nutrition and Food Safety for Dietary Life of Middle-School Students (P18-011)**

Hyeja Chang and Jiyun Shin

Dankook University, South Korea

**Objectives:** Providing nutrition education for adolescents that is easy to apply and demonstrate in real life is an emerging issue. The purpose of this study was to develop a nutrition, food safety, and cooking education program for the correct dietary life of adolescents, and to evaluate how effectively the program changed knowledge, attitudes, and behavior.

**Methods:** The education model, which was intended to enhance knowledge of nutrition and food safety, and cooking skills, was developed around a program based on 8 relevant topics from 4 January

to 31 March 2016. To evaluate the effectiveness of the education program, a total of 266 students, 133 for the intervention group and 133 for the control group, participated. Their dietary knowledge, attitude, and behavior before and after the education were tested from April to November 2016. The education program was conducted over eight 90-min sessions. The questionnaire included 10 general characteristics, 10 items of dietary knowledge, 8 items of dietary attitude, and 8 items of dietary behavior. Statistical analysis was performed with SPSS to determine means, standard deviations, paired $t$ tests and multiple regressions.

**Results:** The pre- and post-test scores of the control group as well as those between the intervention and control groups before the education were not significantly different in terms of dietary knowledge, attitude, and behavior ($P > 0.05$). With regard to the effectiveness of the program for the intervention group, the knowledge correction rate was increased from 39% to 81% ($P < 0.001$) and the mean score of attitude was also increased from 3.32 to 3.82 after the program ($P < 0.001$). In addition, the behavior score was increased from 3.65 to 4.05 after the program ($P < 0.001$). Concerning the relationship between change of knowledge, attitude, and behavior after the program, the increased dietary knowledge positively affected dietary attitudes ($\beta = 0.245$) and behavior ($\beta = 0.162$). The increased attitude also positively affected dietary behaviors ($\beta = 0.170$).

**Conclusion:** This educational program offers a meaningful approach for applying actual practices to the healthy dietary life of adolescents.

**The Influence of Salty Taste Perception on Salt Usage Behavior and Dietary Sodium Intake in Korean Adults (P18-012)**

Jayong Chung and Suyeon Lee

Kyung Hee University, South Korea

**Objectives:** Studies have suggested that excessive sodium intake increases the risk for developing hypertension. Taste perception may be important in determining food intake. In the present study, we examined whether salty taste thresholds and preference are associated with salt usage behavior.

**Methods:** Detection and recognition thresholds for sodium chloride (NaCl) and pleasantness ratings for salty bean-sprout soup were measured in adults (mean age = 38.7 y; $n = 402$). The participants completed a questionnaire regarding salt usage behaviors, and a dish-based semiquantitative food questionnaire consisting of 70 salty dishes frequently consumed by Koreans.

**Results:** Recognition thresholds for NaCl were positively correlated with pleasantness ratings for the salty soup ($P < 0.05$). The recognition thresholds for NaCl were also significantly correlated with various salt usage behaviors such as "adding salt or soy sauce to dishes at the table" and "drinking up salty soup or stew." Moreover, when we compared the highest (Q5) and lowest (Q1) groups according to the frequency of salty food intake, the mean NaCl concentrations of the most preferred salty soup were significantly higher in the Q5.

**Conclusions:** These results suggest that an individual's perception of salty taste is related to one's sodium intake and warrants further investigation of factors associated with the salty taste perception.

**Funding Sources**

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**Breakfast Cognitions and Practices of Parents of Elementary School–Age Children (P18-013)**

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[1]West Virginia University; [2]Rutgers University, NJ; and [3]University of Florida

**Objective:** The aim of this study was to determine parents' perceptions and behavioral practices related to their children's breakfast consumption.

**Methods:** Focus groups were completed by 37 English- and Spanish-speaking parents of 6- to 11-y-old children from 3 states (NJ, WV, FL) and a larger sample competed a brief survey ($n = 185$).

**Results:** Parents completing the survey ate breakfast on 5.82 ± 1.56 d/wk (mean ± SD). Focus group participants felt breakfast was important because it ensured that the children were not going to feel hungry, helped them have adequate energy, and supported better behavior and focus at school. Parents realized that their children noticed what they ate for breakfast and wanted to mimic these behaviors, so parents felt it was important for them to eat foods they wanted their children to eat. The biggest barrier to eating breakfast was busy schedules resulting in inadequate time. To overcome time barriers, some parents used grab-and-go foods (bagel, cereal bars), planned breakfast options ahead, let children choose from options, and woke up earlier. Eating breakfast at school was another way parents coped with time barriers. Although many of their children ate breakfast at school, Spanish-speaking parents felt it was better for children to eat at home because they could monitor and control what the children ate. Other breakfast barriers were children not feeling hungry in the morning or not liking traditional breakfast foods. To cope, parents served snack foods instead of breakfast foods because they felt that eating something was better than nothing, let children choose their food, and served nontraditional options (quesadillas, pizza). Busy schedules got in the way of family breakfast on weekdays, and therefore parents focused on eating family breakfasts on weekends and tended to serve foods requiring more preparation time (e.g., pancakes). Since entering elementary school, parents felt they had to cater to children's requests more to avoid conflict and ensure the children ate, which made having varied breakfast options and involving children in selecting foods increasingly important.

**Conclusion:** Understanding parents' breakfast cognitions and behaviors can help nutrition educators develop interventions tailored to their needs, such as including strategies for improving the frequency and healthfulness of breakfast.

**Funding Sources**

United States Department of Agriculture, National Institute of Food and Agriculture, grant 2017-680001-26351.

**Dietary Behaviors and Cognitions of Participants 2 Years Following an Education-Based Dietary Intervention (P18-014)**

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[1]West Virginia University; [2]Cornell University, NY; and [3]University of Tennessee Knoxville

**Objectives:** The aim of this study was to determine cognitions of an 8-wk education-based dietary intervention, and if dietary behaviors are retained after 2 y.

**Methods:** Participants that were part of an 8-wk MyPlate-based dietary intervention were contacted through phone and email to gain consent for participation in a 2-y diet follow-up. An online 260-item questionnaire was distributed to gain information on current dietary habits as well as feedback of the quality of the intervention. Participants then signed up for a telephone interview and 24-h dietary recall. A repeated-measures ANOVA test was used to find differences in dietary intake through the use of data from pre-intervention, post-intervention, and follow-up. Dietary values were also tested with a specific contrast (pre-intervention and post-intervention compared with follow-up).

**Results:** Thirty-three of the 36 original participants were contacted for the follow-up, and 25 responded, resulting in a 76% response rate. Most of the participants were female (68%), and reported white (56%) race/ethnicity, with a body mass index of 26.6 $\pm$ 4.6 kg/m$^2$, and were 24.5 $\pm$ 2.3 y old. Of the 14 dietary variables analyzed, fruit and vegetable cups ($P < 0.001$), fiber ($P < 0.001$), and insoluble fiber ($P < 0.001$) were significantly lower at follow-up since the 8-wk intervention. Protein percentage significantly increased ($P = 0.02$) throughout the intervention and remained higher at follow-up. Empty calories had an overall significant decrease ($P = 0.005$) at the 2-y follow-up. Sixty percent of participants reported 8 wk as being a sufficient amount of time for the intervention, and 96% would be willing to complete the intervention again. Participants reported that the weekly counseling sessions with the dietitian helped them be accountable, provided motivation, and enabled them gain the education needed to comply with the diet. Suggestions to improve the intervention included providing cooking lessons and recipes with nutrient content, and information about macronutrient intake and timing for physical activity.

**Conclusions**: Dietary quality did decrease to a certain extent at follow-up; however, participants were able to retain some improvement in nutrient intake and had a positive outlook about the intervention and education received.

**Funding Sources**

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**Relationship between Body Fat Composition and Body Mass Index with Fitness Status of First-Year College Students (P18-015)**

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Northeastern University, MA

**Objectives:** This study examined the relationship of body mass index (BMI) and body fat percentage (BF%) by dual-energy X-ray absorptiometry (DXA) with fitness parameters of first-year college students.

**Methods:** Forty-one participants (9 males and 32 females) aged 18.3 $\pm$ 0.7 y with an average weight of 61.0 $\pm$ 14.5 kg, mean BF% of 28.5 $\pm$ 10.0%, and BMI of 22.6 $\pm$ 3.6 kg/m$^2$ were enrolled in a health and wellness program at the beginning of their first year of college. At the beginning of the first semester, each student came to the Human Performance Lab to be tested for anthropometric variables (weight, height, waist circumference, hip circumference, and body composition by DXA) and fitness variables of estimated aerobic capacity (1-mile walk test), core strength (plank test), flexibility (sit-and-reach), and leg and chest strength by 1-repetition maximum (1RM), and power in watts (PW) through the use of Keiser Pneumatics leg extension and chest press machines. Pearson product-moment correlations (r) were performed between BF% and BMI and fitness variables.

**Results:** Both BMI and BF% were negatively and significantly correlated with the estimated aerobic capacity ($P < 0.01$). However, only BF% was negatively and significantly correlated ($P < 0.01$) to other fitness variables (core strength, flexibility, leg and chest press 1RM and PW). In contrast, BMI was positively correlated with core strength, leg and chest press 1RM and PW, with leg press 1RM being the only significant measure ($P = 0.006$).

**Conclusion:** Measuring BF% may be a better indicator for identifying first-year college students at risk for poor fitness and negative health consequences than BMI. BMI indicates both muscle and fat mass relative to height, whereas independent measures of lean and fat mass help identify key body composition relationships with fitness and health.

**Funding Sources**

Northeastern University Center for Wellness Engaged Lifestyle.

**Acceptability of a Wearable Dietary Monitoring Device in Patients of a Pediatric Obesity Clinic (P18-016)**

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**Objective:** The aim of this study was to assess the acceptability of a wearable dietary monitoring device in patients of a comprehensive pediatric obesity clinic.

**Methods:** The study participants were 13- to 17-y old boys ($n = 7$) and girls ($n = 6$) who were patients of a pediatric obesity clinic in Los Angeles, CA. Two gender-specific focus groups were conducted and audio recorded for data collection purposes. The participants were provided with a brief explanation of the functionality of the prototype and were shown different prototype designs. Participants tried on the prototypes and viewed a demonstration of how the prototype and phone application worked. The participants were then asked a series of questions regarding comfort, design, functionality, others' perceptions, interest in using the device, and if they thought it would contribute to a change in their eating and drinking habits. The 2 audio-recorded sessions were transcribed. The content was coded by systematically analyzing the transcripts to draw out themes within the 2 groups based on the use of grounded theory.

**Results:** Analysis of the focus group transcripts indicated that both boys and girls found the concept of the wearable dietary monitoring device and phone application potentially beneficial and conceptually innovative. However, the participants found the prototype necklaces to be uncomfortable and lacking visual appeal. Designs that mirrored commercially sold necklaces were found to be more attractive. Suggestions to enhance the functionality of the phone application included reminders, incentives, positive reinforcement, and multipurpose features. Both groups desired customization capabilities to individualize the color and style of the prototype necklace and phone application.

**Conclusions:** The development of wearable dietary self-monitoring devices may allow for increased adherence to dietary recommendations to support patients participating in weight-management programs. However, further improvements to the comfort, design, and functionality of these prototypes should be made to increase acceptability. Additional studies should be conducted after modifications are made to distinguish an operational prototype for larger scale trials.

### Fixed Dietary Carotenoid Intake, Weight Loss, and Skin Carotenoid Level (P18-017)

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**Background:** Skin carotenoid level positively correlates with plasma total carotenoid concentrations and fruit and vegetable (FV) intake. However, as adipose tissue is a known carotenoid depot, it is not known whether the release of carotenoids into circulation as adipose tissue is catabolized during weight loss affects skin carotenoid level.

**Objective**: In this preliminary analysis, our aim was to determine the effect of moderate weight loss on skin carotenoid level while dietary carotenoid intake was held constant by controlled feeding.

**Methods**: Healthy overweight and obese women were provided with all foods for daily consumption at a level of 20% reduction of usual energy intake for a period of 8 wk. The controlled diet consisted of a 5-d repeating menu providing 4.3 cup equivalents of FV and 23 mg carotenoids/d. Diet History Questionnaire II was used to determine baseline carotenoid intake. Body weight and skin carotenoid level [assessed via pressure-mediated reflection spectroscopy (RS)] were measured at baseline and then weekly during the intervention. Body composition (assessed via dual-energy X-ray absorptiometry) was measured at baseline and week 8.

**Results:** Data from the first 3 of 46 participants to be studied showed self-reported baseline carotenoid intake of 20 $\pm$ 6 mg/d. Body weight was 86 $\pm$ 7 kg at baseline and 83 $\pm$ 8 kg at week 8. Fat mass was 37 $\pm$ 6 kg at baseline and 36 $\pm$ 6 kg at week 8. RS intensity was 265 $\pm$ 45 at baseline and 398 $\pm$ 94 at week 8. A 62% increase in skin carotenoid level occurred in the participant with the lowest carotenoid intake at baseline, whereas the participant whose baseline carotenoid intake was greater than the intervention diet (25 mg) exhibited a 45% increase in skin carotenoid level.

**Conclusions:** These preliminary results suggest that changes in skin carotenoid level during weight loss may be a function of both carotenoids being released from adipose tissue and changes in FV intake. This study will provide initial evidence for the development of standardized guidance when correlating changes in skin carotenoid level to changes in FV intake during weight loss.

**Funding Sources**

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### Relationships between Stress, Sleep, and Disordered Eating Behaviors in High-School Students (P18-018)

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**Objective:** the aim of this study was to compare the relationship of high-school students' sleep and stress as they relate to disordered eating tendencies.

**Methods:** A convenience sample of students ($n = 165$) from one high school completed surveys that included questions on demographic characteristics, sleep according to the Pittsburgh Sleep Quality Index, stress according to the Perceived Stress Scale, and eating behaviors according to the Eating Attitudes Test. Spearman correlation tests were used to determine relationships between sleep, stress, and disordered eating behaviors.

**Results:** Few students (6%) scored above the normal range on the screening survey of disordered eating behaviors. Of these, half were female, and half were male. There was a significant correlation ($P < 0.01$) between the eating disorder scores and stress scores. A significant correlation ($P < 0.05$) was also seen between stress and sleep scores. There was no significant correlation between disordered scores and sleep.

**Conclusions:** The equal proportion of genders categorized as endorsing disordered eating behaviors was unexpected and should be further examined. How stress affects disordered eating tendencies specifically would be worthwhile exploring. Further research is also needed to determine how sleep may factor in disordered eating behaviors through a relationship with stress.

**Funding Sources**

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### Effects of an Evidence-Informed Blog on Intakes of Vegetables and Fruits and Milk Alternatives among Mothers: A Randomized Controlled Trial (P18-019)

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Laval University, Canada

**Objective:** This study aimed to evaluate the effects of an evidence-informed blog on the intakes of vegetables and fruit (VF) and milk and alternatives (MA) among mothers.

**Methods:** In a parallel randomized controlled trial, we recruited in Quebec City, Canada, mothers aged $\geq$18 y, who consumed <7 servings/d of VF (560 g) and/or <2 servings/day of MA, and had at least

one child aged between 2 and 12 y. Mothers were randomly assigned to receive a 6-mo intervention delivered through a blog written by a registered dietitian who provided weekly postings promoting healthy eating (BLOG group) or no exposure to the blog (control group). Dietary variables were measured through the use of 3 automated, self-administered, web-based 24-h dietary recalls completed at baseline and at 6 mo. Differences between groups were assessed with mixed linear models for repeated measures. Linear regression analyses were conducted to explore the associations between blog use (total number of logins and posting of comments) and changes in VF and MA intakes.

**Results:** Of the 84 mothers randomized to the study (mean age = 37.6 ± 6.7 y, mean baseline VF intake = 4.8 ± 4.6 servings/d; mean baseline MA intake = 2.2 ± 2.1 servings/d), a total of 62 (73.8%) completed the intervention (BLOG group: $n = 29$; control group: $n = 33$). At 6 mo, a nonsignificant increase in VF intake was observed in both groups (time and group by time interaction effects; $P = 0.370$ and 0.923). Although the BLOG group increased their consumption of MA and the control group decreased their intakes compared to baseline, no significant difference in response was observed between the groups (group by time interaction effect; $P = 0.271$). Mothers visited the blog on average once a week and submitted an average of 5.5 ± 7.2 comments. At 6 mo, changes in VF and MA maternal intakes were not predicted by the number of logins ($P = 0.091$ and 0.452) or posted comments to the blog ($P = 0.557$ and 0.744).

**Conclusions:** The exposition to an evidence-informed healthy eating blog had neutral effects on VF or MA intakes of mothers. Blog usage was not predictive of increased intakes in those food groups.

**Funding Sources**

This had financial support from the Danone Institute of Canada which was not involved in the course of the research project or the writing of the abstract.

**Supporting Images/Graphs**

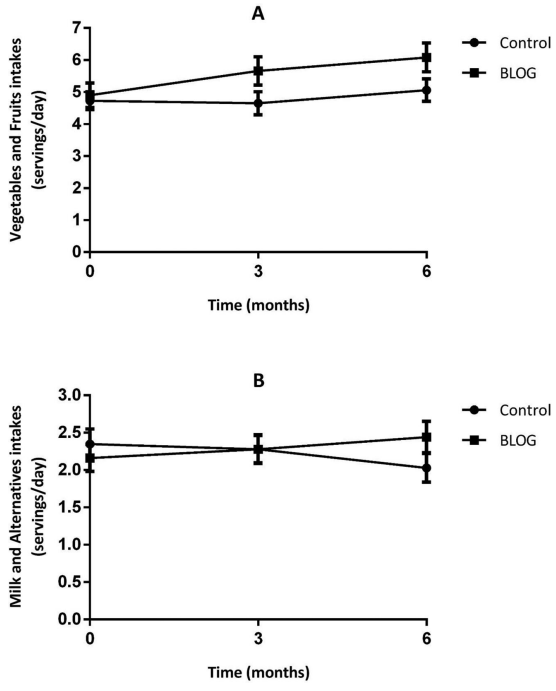


**FIGURE P18-019-1**

**Let's Play! Children's Thoughts about Active Playtime (P18-020)**

Kaitlyn Eck,[1] Alek Dinesen,[1] Colleen Delaney,[1] Karla Shelnutt,[2] Melissa Olfert,[3] and Carol Byrd-Bredbenner[2]

[1]Rutgers University, NJ; [2]University of Florida; and [3]West Virginia University

**Background:** Children ($n = 44$) aged 6–11 y in NJ, WV, and FL participated in focus groups conducted by trained moderators. Researchers trained in content analysis used constant comparison to determine data saturation and themes.

**Results:** Children reported engaging in active playtime, including organized sports and unstructured outdoor activities, such as playing tag. Children engaged in active playtime after school most days, describing social playtime and recreational sports as ways to improve health. Some children spent after-school time in nonactive activities, including watching TV and playing video games. Most believe active playtime is important for staying healthy, getting stronger, and avoiding injury. Children recognized the social aspect of active playtime and enjoyed playing with friends. Most children said parents encouraged them to play actively to keep weight healthy, manage social relationships, and limit screentime. Children reported that parents discouraged indoor active play due to physical hazards, noise, and limited space. Some indicated parents' offered playtime as an incentive for completing chores. Poor weather and lack of supervision were key reasons children were not allowed to play outside. Children felt parents could promote active play by encouraging and scheduling active playtime, providing outdoor toys, and offering incentives (money, screentime). Children thought that playtime with parents was a special time for them. Some encouraged parents and siblings to engage in active play, but found convincing them could be difficult. Others suggested that convincing parents that active playtime was healthy for them too would get parents to play actively with them. Having routines and schedules, getting reminders of health benefits, and completing homework and chores were ways children helped ensure they got frequent active playtime. Children reported that parents play an authoritative role in making them play actively outside and reminding them about the health benefits of exercise.

**Conclusion:** Most children engaged in regular active play and recognized the benefits. They felt parents played a significant role in helping them be physically active but needed help overcoming barriers to outside playtime.

**Funding Sources**

United States Department of Agriculture, National Institute of Food and Agriculture, grant 2017-680001-26351.

**Exploring Elementary School-Age Children's Fruit and Vegetable Cognitions and Behaviors (P18-021)**

Kaitlyn Eck,[1] Elena Santiago,[1] Colleen Delaney,[1] Karla P Shelnutt,[2] Melissa Olfert,[3] and Carol Byrd-Bredbenner[1]

[1]Rutgers University, NJ; [2]University of Florida; and [3]West Virginia University

**Objective:** The aim of this study was to examine cognitions and behaviors of 6- to 11-y-olds related to fruits and vegetables (F/V).

**Methods:** A survey was completed by 194 children from 3 states (NJ, FL, WV). Of these children, 33 participated in a focus group on F/Vs

conducted by trained moderators. Two researchers coded and analyzed focus group data to identify trends and common themes.

**Results:** Survey results indicate children ate fruits more often than vegetables, averaging 4.74 ± 2.56 and 4.06 ± 2.73 d/wk, respectively (mean ± SD). Lunch and dinner was when children most commonly ate the F/V they reported liking (apples, strawberries, broccoli, carrots). Focus group discussions revealed that children felt F/Vs were important to eat and demonstrated good knowledge of the benefits of F/Vs (helping bodies grow stronger, promoting good eyesight and healthy teeth, giving the body energy throughout the day). Children felt parents played a large role in influencing their F/V intake by encouraging them to eat a variety of F/Vs for health and nutritional benefits. Children reported that their F/V preferences and tastes were similar to those of their parents and indicated they often shared F/Vs with them. If they observed parents eating F/Vs frequently, children said they would try to eat F/Vs more often. Several children indicated that parents rewarded them for trying new F/Vs, whereas others reported their parents forced them to eat F/Vs. Numerous barriers prevented children from eating a variety of F/Vs often, such as disliking taste, texture, or preparation method, and lack of F/V accessibility and availability. To overcome barriers, children wanted parents to incorporate more F/Vs into meals or snacks each day. Other strategies children proposed were being allowed to help prepare F/Vs, mixing F/Vs into other foods, serving F/Vs with meals, serving sauces or dips with F/Vs (caramel, peanut butter, salad dressing), cutting F/Vs into fun shapes, being rewarded for eating F/Vs with food (candy/chips) and nonfood items (money/toys), planting a vegetable garden, buying F/Vs they prefer, and making F/Vs readily accessible and available in the home.

**Conclusion:** Future nutrition education programs should aim to help children learn effective strategies for incorporating more F/Vs into their diets and helping parents understand how children can take an active role in improving their F/V intake.

**Funding Sources**

United States Department of Agriculture, National Institute of Food and Agriculture, grant 2017-680001-26351.

### Transitioning to Elementary School: Parents Cognitions about Children's Eating Behaviors away from Home (P18-022)

Kaitlyn Eck,[1] Oluremi Famodu,[2] Rashel L. Clark,[3] Colleen Delaney,[1] Karla Shelnutt,[3] Melissa D. Olfert,[2] and Carol Byrd-Bredbenner[1]

[1]Rutgers University, NJ; [2]University of Florida; and [3]West Virginia University

**Objectives:** This study explored parent cognitions about children's eating behaviors when away from home.

**Methods:** English- and Spanish-speaking parents of 6- to 11-y-olds ($n = 37$) in 3 states (FL, NJ, WV) participated in focus groups conducted by trained moderators. Data were content analyzed by 2 trained researchers to identify common themes.

**Results:** Parents reported that their children typically ate lunch at school. Dinner was the meal families most commonly ate away from home, usually due to busy schedules. English-speaking families ate out more often, with Spanish-speaking parents tending to consider eating out a treat. Overall, parents felt that it was hard to control what children ate away from home, especially if the childred chose their own lunch/snacks at school or ate at a friend or relative's house. Providing healthy snacks to share at school events or after-school activities was a special challenge due to inconvenience and cost of healthy options and children's preferences for unhealthy snacks. Parents felt fruit was a well-accepted healthy snack option for children and that a list of healthy, affordable snack options and implementation of school policies for healthy snacks could improve the quality of shared snacks. To better control what children ate away from home, parents packed their children's lunches/snacks or checked what the children packed for themselves. Parents primarily relied on conversations with their children to learn about what they ate away from home, but emphasized that reprimanding children when they report eating a less healthy food will prevent children from accurately reporting intake in the future. Parents also reviewed school menus and talked with caregivers to learn what children ate away from home. Parents discussed healthy food choices with their children to teach them to make healthy decisions. Despite some concern over what children ate away from home, parents tended to trusted caretakers and school lunch policy to provide healthy options. They also felt that their children ate healthfully most of the time, so they did not worry about occasional intake of less healthy foods away from home.

**Conclusion:** Future nutrition programs and resources should aim to build parent skills at teaching children how to make healthy eating choices when away from home.

**Funding Sources**

United States Department of Agriculture, National Institute of Food and Agriculture, grant 2017-680001-26351.

### Behaviors and Cognitions of Parents of Elementary School Children Related to Family Meals (P18-023)

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[1]Rutgers University, NJ; [2]University of Florida; and [3]West Virginia University

**Objectives:** Frequent family meals (FMs) promote strong family bonds, improved school performance, and healthy child weights, yet little is known about parent cognitions related to FMs (e.g., values, barriers, facilitators).

**Methods:** Parents of 6- to -11-y-olds ($n = 185$) completed a survey and 37 completed focus group discussions.

**Results:** Survey results reveal that 90% of parents look forward to FMs and eat an average of 6.88 ± 4.35 FMs/wk (mean ± SD). Focus group participants reported that dinner was the meal most often eaten as a family. They valued FMs, rating them as important because FMs provided opportunities for conversation and family bonding. Common FM conversations included reviewing the day and talking about future plans. Parents emphasized the importance of limiting TV and phones at meals to promote conversation. Busy schedules, including child activities and parent work, were the greatest barrier to FMs. To cope with busy schedules, parents planned ahead, prepared meals in advance, used meal/grocery delivery services, and involved children in meal preparation. Parents reported their children assisted by washing dishes, setting/clearing the table, and helping to cook. Their children could prepare sandwiches, cereal, and smoothies, and packed lunches. Most parents did not allow children to use the

stove or oven unsupervised. Some thought that it was a hassle to let children help and preferred that the children watch or not be involved. Parents felt that a positive mealtime environment is important for building family relationships and fostering healthy relationships with food. Picky eaters and unpleasant conversation topics were noted by English-speaking parents as making meal times unenjoyable, whereas family conflict was mentioned by Spanish-speakers. Parents made meal times more enjoyable by involving children in meal preparation and redirecting conversations away from unpleasant topics or conflicts. English-speakers reported that their children's exposure to new foods at school helped them become more adventurous eaters. Spanish-speakers were mostly concerned about exposure to the unhealthy foods (burgers, pizza) that their children are served at school.

**Conclusion:** Helping parents overcome the barriers of a busy schedule and promote FMs as a time to strengthen family bonds should be a focus of future nutrition education programs.

**Funding Sources**

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**Strategies for Disseminating the HomeStyles Challenge via Preschools: Qualitative Phone Interviews with Preschool Directors (P18-024)**

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**Objective:** Disseminating at-home, parent-directed childhood obesity prevention programs, such as the HomeStyles Challenge (HC), presents numerous challenges. This study aimed to identify strategies to encourage preschool directors and families to participate in the HC.

**Methods:** Trained researchers conducted 2 rounds of interviews with preschool directors ($n = 9$) from 3 states (FL, NJ, WV).

**Results:** Round 1 of interviews gathered insight into how best to build interest in the HC among preschools and parents. Directors stressed the value of fully informing staff about the HC, including its goals, logistics, and congruence with the preschool's mission and goals, so that staff are well equipped to encourage parent participation. Directors felt that providing continuing education opportunities for staff and special recognition for the preschool would promote the value-added service that the HC offers. Providing recruitment materials and modest financial support would facilitate preschool participation. To promote participation, directors suggested showcasing the HC at after-school events and in regular communications with parents and also offering parents modest incentives that promote program goals (e.g., hula hoop to promote physical activity). Round 2 of interviews gathered feedback on the summary of round 1 interviews and provided further insight into disseminating the HC through preschools. Directors felt the most helpful and convenient way to train staff was via printed materials and webinars. Offering continuing education units would boost completion of training. Directors recommended the use of print and electronic materials to recruit parents (e.g., posters, banners, flyers). After-school events highlighting HC activities that allow parents and kids to experience aspects of the program could be an effective recruitment method, but busy family schedules tend limit participation at these events. To minimize the burden of promoting the HC, directors felt they needed ready access to the HC project team and financial support to compensate staff for time spent on project activities.

**Conclusion:** Although no schools had ever offered a program such as the HC, nearly all were interested in participating in the HC and suggested numerous strategies to overcome potential barriers and facilitate its implementation.

**Funding Sources**

United States Department of Agriculture, National Institute of Food and Agriculture, grant 2017-680001-26351.

**Power-Up with Produce TEAM Nutrition Study: Similar Attitudes and Eating Behaviors Reported by Elementary Students from Rural Treatment and Control Schools at Baseline (P18-025)**

Alyce D Fly,[1] Elizabeth Foland,[2] Sarah Kenworthy,[2] Erika Dorff,[1] Elizabeth Kaschalk,[1] Olivia Isaacs,[1] Jamie Simko,[1] and Stephanie Dickinson[1]

[1]Indiana University; and [2]Indiana Department of Education

**Objective:** The aim of this study was to compare baseline fruit and vegetable (FV) attitudes and behaviors of students in control schools with intervention schools in the Power-Up with Produce Study.

**Methods:** Data from the National Center for Education Statistics were used to create 5 strata of rural elementary schools containing grades 4–6 in Indiana (rural remote, rural fringe + mid-high poverty + 5–20% minority, rural fringe + mid-low poverty + 5–20% minority, rural-distant + mid-high poverty + 5–20% minority, rural distant + mid-low poverty + 5–20% minority). Principals were contacted to recruit 2 schools from each stratum. After recruitment, schools were randomly assigned to intervention or control. Volunteers from grades 4–5 completed a 43-item online Qualtrics survey in the first 2 mo of the academic year (prior to intervention) to collect baseline data on student characteristics; validated items were used to measure students' familiarity, preferences, attitude, FV neophobias, daily consumption and variety of FV (yes/no). Perceived importance of healthy eating, and several knowledge messages from Dietary Guidelines were also assessed. Responses were compared by independent $t$ tests and chi-square to determine similarity between treatments.

**Results:** There were 686 and 554 student volunteers in control and intervention samples, respectively. There were no differences in mean F or V familiarity ($P = 0.51$) or preferences ($P = 0.43$) by treatment, or by sex ($P = 0.17$), however, 4th graders were less familiar with FV than 5th graders ($P < 0.001$). There were no differences in F neophobia scores ($P = 0.50$) or V neophobia scores ($P = 0.16$) between treatments. There were no differences between treatments in proportions of students who said they ate F every day ($P = 0.34$) or V every day ($P = 0.90$), and no differences between student reports of daily variety in F ($P = 0.061$) and V ($P = 0.12$) between treatments. Health was equally important to students in both treatments ($P = 0.12$) and knowledge was similar except an item selecting 5 food groups that should be in every healthy eating plan ($P = 0.002$).

**Conclusions:** Students in these 2 groups of schools were similar in terms of FV familiarity, preferences, neophobias, daily intake and variety, importance of health, and most nutrition knowledge items. The intervention is currently underway.

**Funding Sources**
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**Behavior, Knowledge, and Attitude Changes in Youth Participating in the 4th H for Health Challenge Curriculum (P18-026)**

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**Objective:** The aim of this study was to assess how the implementation of the 4th H for Health Challenge curriculum, developed by the Healthy Kids Out of School initiative of ChildObesity180, affects knowledge, attitudes, and behaviors relating to fruit and vegetable intake, water intake, and physical activity in 4th and 5th graders participating in after-school programs.

**Methods:** This study was a pre-test, post-test experimental design with an intervention and control group. A survey was constructed based on the objectives of the 4th H for Health Challenge curriculum. The survey instrument, consisting of 13 questions assessing attitudes, knowledge, and behavior, was administered pre- and post-intervention to both intervention and control groups. The intervention group completed six 1-h lessons as part of the 4th H for Health Challenge curriculum in the after-school environment. The main outcome measures in this study were changes in knowledge, attitudes, and behaviors relating to fruit and vegetable intake, water intake, and physical activity. Survey answers were tabulated with frequency distribution. Chi-square test was used to analyze the differences in responses pre- and post-survey in the intervention and control group and to assess differences between the two groups. Changes in attitude, behavior, and knowledge scales pre- and post-survey were calculated with independent and dependent *t* tests. Significance was set at $P \leq 0.05$ for all statistical analysis.

**Results:** Mean age for both the intervention group ($n = 33$, 63.6% 4th graders, 36.4% 5th graders) and the control group ($n = 34$, 73.5% 4th graders, 26.5% 5th graders) was 9.6 y. The intervention group showed a significant improvement in knowledge of minutes of physical activity needed per day ($P = 0.02$). The intervention group also had positive changes in their attitudes towards choosing fruits and vegetables ($P = 0.009$) and water intake ($P = 0.000$). Behaviors improved with regard to choosing water over sugary beverages ($P = 0.000$). In comparison, the control group showed significant decline in their attitude and behavior towards water ($P = 0.004$) and consumption of vegetables ($P = 0.036$).

**Conclusion:** The 4th H for Health Challenge curriculum was effective in improving knowledge, attitudes, and behaviors in a sample of 4th- and 5th-grade students in the after-school environment.

**Let's Eat Activity Together: A Family-Focused Case-Study Intervention (P18-027)**

Gretchen L George and Jeff Cookston

San Francisco State University

**Background:** During separation and divorce, family routines are interrupted. Family routines, defined as frequently occurring positive interactions that allow for efficiency in accomplishing tasks, play a key role in the development and maintenance of healthy eating behaviors among children and adolescents.

**Objectives:** In response to evidence linking separation, divorce, and obesity, Let's Eat Actively Together, a case study intervention ($n = 3$ families; 4 youths, 3 parents), was developed with the following aims: *1*) to intervene in family routines common to divorcing families; and *2*) to reduce the risk for overweight and obesity by focusing on nutritious eating habits and cooking skills within the new family dynamic.

**Methods:** This 6-wk intervention program consisted of 6 individual 2-h lessons for parent-child dyads. Lessons focused on divorce risk, interparental conflict, and family routines associated with mealtime. The program also constructed parallels to cooking skills and nutrition-based choices for the dyads. Families were recruited through recent court records. The pre- and post-intervention evaluation included commonly used measures with divorcing families, through an online 100-question validated survey. Trained research assistants collected self-reported anthropometric data and block food-frequency questionnaires (FFQs).

**Results:** Immediate program outcomes targeted motivation to foster family routines and healthy eating habits, knowledge of skills to plan and prepare meals, self-efficacy regarding meal preparation, and improved nutritional knowledge. Both parents and children provided subjective feedback relating to attendance and material learned during both the parent course and co-cooking activity through detailed interviews. Although results were nonsignificant due to case study sample, results indicated 85% change in FFQ and positive trends in family routine survey.

**Conclusion:** Interventions on high-risk groups experiencing family dissolution may play a role in prevention of diet- and lifestyle-related risk factors. Future plans to host this study with a larger sample will provide statistical power to support the hypothesized outcomes.

**Funding Sources**
Development of Research and Creativity grant 2016, San Francisco State Universtiy Office of Research and Sponsored Programs.

**Progression through Partnership: Adaptation of the Shaping Healthy Choices Program through Partnership with UC CalFresh (P18-028)**

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Nutrition, Center for Nutrition in Schools, University of California Agriculture and Natural Resources

**Objective:** The aim of this study was to describe the process by which the Shaping Healthy Choices Program (SHCP) was adapted for implementation by the University of California CalFresh Nutrition Education Program (UC CalFresh) educators based in county Cooperative Extension (CE) offices.

**Methods:** The SHCP is a multicomponent school-based nutrition intervention with demonstrated positive nutrition and health outcomes in 4th-grade children. Through partnership with UC CalFresh and county CE offices, the SHCP was implemented in schools throughout California. To ensure continued participation of partners and expansion, feedback was solicited from educators following each implementation year through a structured forum. Program modifications based on forum results were put into effect in the subsequent year.

**Results:** The SHCP was implemented in 4 schools in 3 counties in 2014–15 (Y1), expanding to 14 schools in 7 counties in 2015–16 (Y2), and 16 schools in 8 counties in 2016–17 (Y3). Following Y1, educator feedback led to an expanded implementation timeline to allow educators to begin earlier in the school year. Educators requested greater emphasis on physical activity, which led to the development of a physical activity curriculum, Healthy Choices in Motion. Additionally, a tool was developed to assess wellness efforts in the school site environment. After Y2, educators emphasized the need to recruit schools and classroom teachers before the start of the school year; introductory workshops were moved up several months to provide additional recruitment time. Guest speakers were added to monthly professional development meetings to provide enhancement of other areas of the program, such as school wellness and gardening. Need for sustainable implementation methods was demonstrated, leading to development of an extender model for the education component. After Y3, feedback demonstrated the need for garden resources and effective alternative delivery methods for program curricula, which are currently being developed.

**Conclusions:** Implementation of a multicomponent school-based program on a wide scale requires sustained effort that adapts to meet the needs of partners. The SHCP-UC CalFresh partnership has demonstrated the importance of continued program evolution for sustainability.

**Funding Sources**

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### Parental Pursuit of Multiple and Conflicting Goals Influences the Food Choices Provided to Children (P18-029)

Rebecca K Golley

Flinders University, Australia

**Objective:** Caregivers influence children's diet quality through the foods they provide at meals and snacks. The study aim was to elicit the goal-driven preferences of parents that influence food provision to children. The hypothesis was that the multiple goals that parents are pursuing when making food choices for children will influence the nutritional quality of the food provided.

**Methods:** A randomly selected sample of 500 parents of 4- to 11-y-old children were recruited from a TEGrewards online consumer research panel to complete a 20-min online discrete choice experiment survey. Parents were presented with lunch options that varied in nutritional value, effort, and cost. Econometric analysis determined parental lunchbox provision preferences (orthogonal main effects plan with 64 lunchboxes blocked in 8 d, participants randomly allocated to 5/8 d). Explanatory variables examined the goals and trade-offs that parents prioritized. Child's age, household income, and zip code suggest a broadly representative sample reflective of the Internet population.

**Results:** Parents reported trying to accomplish a wide range of goals when making lunchbox food provision choices. "Providing a nutritious diet to my child" was the most pursued goal, followed by "Maximizing food that is available" (e.g., convenience). Parents were trading-off between multiple goals when making food provision choices. The mean $\pm$ SD number of goals explaining meal choice was $1.32 \pm 1.25$. In the multinomial logit model, all attributes significantly contributed to the model. Energy ($\beta = -0.28$), discretionary content ($\beta = -0.13$), and cost ($\beta = -0.12$) were inversely associated with choice preferences. The goals parents were trying to achieve showed a degree of conflict.

**Conclusions:** The finding supports the contention that parental food provision is an expression of goal accomplishment. This study provides evidence suggesting the potential to explore interventions to influence parenta; provision of foods to children by considering goal pursuit, e.g., goal (de)activation, goal prioritization. The association of goal and choice allows us to take a richer approach to suggesting interventions to enable/encourage behavioural change.

**Funding Sources**

University of South Australia.

### Low-Income 5th-Grade Students Enhanced their Self-Efficacy to Ask for Fruits and Vegetables after Participating in a Policy, Systems, and Environmental Intervention (P18-030)

Sabrina Hafner, Geoffrey Greene, Linda Sebelia, Maya Vadiveloo, and Adam Moore

University of Rhode Island

**Objective:** The aim of this study was to assess change in perceptions about asking for preferred fruits and vegetables (FV) after the implementation of an 8-lesson policy, systems, and environment (PSE) nutrition intervention.

**Methods:** Students in a low-income, urban school receiving a PSE nutrition intervention were assessed before and after implementation of the intervention. Lessons focused on providing 5th-grade students ($n = 85$) with opportunities to influence nutrition PSE through participating at the school Wellness Committee meetings, conducting parent/caretaker interviews, participating in a recipe contest, taste-testing recipes, marketing activities, and influencing the school menu cycle. Focus groups ($n = 8$ pre-intervention and $n = 8$ post-intervention) with different students assessed perceptions about asking for FV at school and home environments. Thematic analysis was used to assess focus group data; a single reviewer coded themes based on focus group notes, then identified and noted similarities and differences between time periods.

**Result**s: At pre-intervention, students expressed feelings of overall low self-efficacy in asking for their favorite FV at school but somewhat higher self-efficacy at home. At post-intervention, students expressed much higher self-efficacy in asking an adult at school and somewhat

higher self-efficacy in asking an adult at home. Although students both pre- and post-intervention were able to identify strategies for obtaining their favorite FV at school and home, these strategies were more specific post-intervention, e.g., implementing surveys at school or food shopping with a family member.

**Conclusion:** Focus group data showed the PSE intervention was associated with positive changes on self-efficacy in asking for FV at school and home. Students were also able to better articulate ways of obtaining their favorite FV in both food environments, which provides evidence that PSE nutrition interventions have the potential to empower students to be agents of change in their food environment.

**Active Play in Families with Elementary-School Children: Parent Beliefs and Behaviors (P18-031)**

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**Objective:** Active family play offers physical and emotional benefits, yet little is known about parental beliefs and behaviors related to active play. This study aimed to assess perceived importance of, barriers to, and facilitators of active play in parents of children aged 6–11 y.

**Methods:** Trained moderators led scripted focus group discussions related to active play with 37 parents in 3 states (FL, NJ, WV) and a brief survey was completed by 185 parents.

**Results:** The survey results revealed that parents were playing with children a mean ± SD of 2.92 ± 1.97 d/wk. Focus group interchanges revealed that parents find active play important to good health in families and encourage children to play with other children to form relationships. However, parents face barriers that influence the amount of active play their children receive. Commonly named barriers included time scarcity and dense schedules for both parents and children, with parents having to coordinate work schedules with children's school and extracurricular activities. A common barrier to parent-child co-play was parents' lack of energy. Parents felt that as their children got older it was more difficult for them to keep up with them and therefore felt children should play with other children instead of parents. Bad weather also was a barrier to outdoor active play for many families. When faced with active play indoors, parents often struggled with finding space in the home for play. Parents named dancing as a common active indoor activity that requires little space. Further, children in elementary school were less active compared with younger years, increasing the need for parental effort to motivate children to play. To overcome barriers, parents set small, reasonable goals to stay active. Utilization of available resources was encouraged by parents, with English-speaking parents recommending extracurricular activities as an avenue for active play, and Spanish-speaking parents encouraging recreational activities such playing at the park.

**Conclusions:** Parents actively play with children fewer than half the days in a week; however, parents' do recognize of the importance of active play. Obesity prevention programs could help parents learn effective strategies for engaging in active play with children.

**Funding Sources**

United States Department of Agriculture, National Institute of Food and Agriculture, grant 2017-680001-26351.

**Parental Cognitions of their Elementary School-Age Children's Screentime (P18-032)**

Rebecca Hagedorn,[1] Kaitlyn Eck,[2] Colleen Delaney,[2] Karla Shelnutt,[3] Carol Byrd-Bredbenner,[2] and Melissa D Olfert[1]

[1]West Virginia University; [2]Rutgers University, NJ; and [3]University of Florida

**Objective:** This study assessed cognitions of parents of children aged 6–11 y related to screentime (i.e., time spent with television, computers, tablets, phones), including perceived importance of, barriers to, and facilitators of screentime.

**Methods:** English- and Spanish-speaking parents ($n$ = 185) in 3 states (FL, NJ, WV) completed a brief survey and 37 participated in focus group discussions moderated by trained researchers.

**Results:** Parents completing the survey reported their children had a mean ± SD of 2.38 ± 1.77 h of screentime daily. Parents did not feel that screentime influenced their children's desire for food or beverages advertised on TV, with more than three-quarters stating their children had not asked for foods advertised on TV in the past week. Focus group discussions revealed that limiting children's screentime was a priority of parents. Parents stressed the importance of limiting screentime to promote verbal communication in the family and to prevent children from being "lazy" or inactive. However, parents commonly identified busy work schedules and stress as key barriers to limiting screentime because having children play on their tablet or watch TV or movies made it convenient for parents to complete other household tasks. Parents also felt children got restless and bored easily and that they could avoid arguments by allowing children to have screentime. Strategies to facilitate limiting children's screentime were setting time limits, being consistent with these rules, and providing other activities, such as helping with meal preparation or participation in organized activities. Additionally, parents also reported it was important for them to set an example for children by controlling their own screentime, particularly time spent on smartphones. Parents urged talking to children about the healthfulness of the foods or beverages advertised on TV, recognizing this as an opportunity to teach children the "selling" purpose of advertisements.

**Conclusions:** Children's screentime exceeds recommendations, despite parents' attempts at control. Obesity prevention programs could help parents learn effective strategies for controlling screentime.

**Funding Sources**

United States Department of Agriculture, National Institute of Food and Agriculture, grant 2017-680001-26351.

**Skin Carotenoid Status Is an Effective Tool to Measure Compliance with an Intervention to Increase Vegetable Intake among Overweight and Obese Adults (P18-033)**

Lisa Jahns, LuAnn Johnson, Zach Conrad, and James Roemmich

USDA-ARS Grand Forks Human Nutrition Research Center

**Objective:** The primary study aim was to determine whether the relative reinforcing value of vegetables compared with snack food could be increased through repeated exposure to amounts of vegetables recommended by the Dietary Guidelines for Americans (DGA). Skin carotenoid status (SCS), measured by resonance Raman spectroscopy, a novel assessment tool for measuring change in vegetable intake, was used to assess compliance with the intervention.

**Methods:** Subjects were 102 overweight and obese adults. The experimental design was a 2-armed, randomized, controlled, 8-wk feeding trial with an 8-wk follow-up. The 2 arms of the study comprised the following: *1*) intervention—participants came to the center twice each week to pick up minimally- processed vegetables and have a skin carotenoid scan; and *2*) attention control—participants received no active intervention, but came to the center twice each week to have SCS measured. Intervention participants received DGA-recommended types and amounts of vegetables based upon energy needs measured by resting metabolic rate × activity factor. ANCOVA controlling for baseline RRS score was used to test differences between intervention and control group scores.

**Results:** After controlling for baseline, the intervention group had significantly greater SCS than the control group after week 1 ($P = 0.008$). The SCS of the intervention group continued to increase up to 8 wk, the end of the intervention. At the 12-wk and 16-wk follow-up visits, intervention participants' SCS had decreased but were still greater than the control group ($P = 0.0001$).

**Conclusions:** Measurement of SCS was sensitive enough to pick up an increase in vegetable intake in 1 wk. Compliance with the intervention was very good over the 8-wk period; however, long-term adherence, measured by SCS, was poor. This study demonstrates that SCS can be used to measure compliance with consumption of DGA-recommended types and amounts of vegetables.

**Funding Sources**

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### The Reinforcing Value of Vegetables Does Not Increase during a Randomized Controlled Intervention among Overweight and Obese Adults (P18-034)

Lisa Jahns, LuAnn Johnson, Shanon Casperson, and James Roemmich

USDA-ARS Grand Forks Human Nutrition Research Center

**Objective:** The aim of this study was to determine whether the relative reinforcing value (RRV) of vegetables compared with snack food can be increased (incentive sensitization) through repeated exposure to amounts of vegetables recommended by Dietary Guidelines for Americans. The hypothesis was that repeated exposure to recommended amounts of vegetables will increase RRV more than exposure to current consumption.

**Methods:** Subjects were 102 overweight or obese adults. The design was a 2-armed, randomized, controlled, 8-wk feeding trial with an 8-wk follow-up. The 2 arms of the study comprised the following: *1*) intervention—participants came to the center twice each week to pick-up vegetables; and *2*) attention control—participants received no intervention, but attended a similar number of visits. The RRV of vegetables was tested at baseline, 8 wk, and 16 wk. For the RRV task, "work" was defined as how many times a person was willing to click a mouse while playing a computer game to win points for either a portion of vegetable or an alternative snack food, crackers. Differences in groups across time in the primary outcome, RRVveg = Pmaxveg, the maximal reinforcement schedule that participants completed/(Pmaxveg + Pmaxcrackers), was tested through the use of a mixed linear model with time (baseline, 16 wk) as a within-subject factor and treatment (intervention or control) as a between-subjects factor.

**Results:** The mean ± SE Pmaxveg was 4.2 ± 0.2 at baseline for the intervention group and 4.3 ± 0.2 in the control group, and both decreased at the 16-wk follow-up ($P < 0.023$). Pmaxcrackers was the same in both control and intervention groups at baseline, and both decreased at the 16-wk follow-up ($P < 0.001$).There were no differences between treatments for Pmaxveg or Pmaxcrackers. The RRVpmax increased by week 16 ($P = 0.051$) and there was no difference by treatment.

**Conclusions:** The RRV of vegetables relative to snack foods increased by the end of 16 wk, due to a smaller decrease in Pmaxveg than in Pmaxcrackers. However, as Pmaxveg decreased, we conclude that we saw no evidence of incentive sensitization occurring with repeated exposure to vegetables.

**Funding Sources**

This research was supported by the United States Department of Agriculture, Agricultural Research Service, 3062-51000-051-00D.

### Evaluation of the Shaping Healthy Choices Program through Nutrition Knowledge Data and Comparison with an Extender Model Pilot (P18-035)

Anna M Jones,[1] Melanie Gerdes,[1] Kelley M Brian,[2] Chutima Ganthavorn,[3] David Ginsburg,[4] Shannon Klisch,[5] Suzanne Lawry-Hall,[6] Anna Martin,[7] Jona M Pressman,[6] Chelsey L Slattery,[6] Katherine Soule,[5] Deepa Srivastava,[7] Sheri Zidenberg-Cherr,[8] and Rachel Scherr[1]

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**Objectives:** The aims of this study were to assess the effectiveness of the Shaping Healthy Choices Program (SHCP) in improving nutrition knowledge in 4th- to 6th-grade youth, and to pilot an extender model of nutrition education in the SHCP.

**Methods:** Nutrition knowledge was assessed before and after the program with a 35-item questionnaire. In 14 classrooms, pre- and post-program scores were unmatched; aggregate nutrition knowledge was assessed with unpaired *t* tests. An extender model was piloted in 4 classrooms, and was compared with direct education (4 classrooms) and control (1 classroom receiving no SHCP). The same questionnaire was

used; individual data were matched pre and post. Height and weight were assessed pre and post, and body mass index (BMI) percentile calculated. Paired *t* tests and ANCOVA, calculated with SPSS 24, were used to measure differences in nutrition knowledge and BMI percentile.

**Results:** In the aggregate nutrition knowledge group, 368 and 373 students completed pre- and post-tests, respectively. Nutrition knowledge increased from pre (20.3 ± 3.9) to post (21.8 ± 4.5; $P < 0.001$). In the extender pilot, 147 students completed pre and post-test nutrition knowledge (direct education $n = 47$, extender $n = 75$, control $n = 25$). Nutrition knowledge increased from pre to post in the direct education (pre = 17.7 ± 4.1; post = 21.0 ± 5.4; $P < 0.001$), and extender (pre = 20.7 ± 3.6; post = 23.1 ± 3.5; $P < 0.001$) groups, but not in the control group (pre = 21.3 ± 3.9; post = 22.4 ± 3.9; $P = 0.213$); ANCOVA yielded no significant difference between groups ($P = 0.249$). Pre- and post-program anthropometric data were collected from 138 students (direct education $n = 46$, extender $n = 70$, control $n = 22$). BMI percentile decreased from pre to post in the direct education group (pre = 78.8 ± 21.46; post = 74.0 ± 21.5; $P = 0.01$), but not in the extender (pre = 85.3 ± 17.9; post = 83.9 ± 20.3; $P = 0.82$) or control groups (pre = 73.6 ± 27.9; post = 73.4 ± 27.3; $P = 0.86$). ANCOVA yielded a significant difference between the three groups at post ($P = 0.024$). Post-hoc analysis indicated that the direct education group experienced a decrease in BMI percentile compared with control ($P = 0.042$).

**Conclusions**: The SHCP is effective in increasing nutrition knowledge, including in the extender model. These data indicate that BMI percentile did not improve in the extender group; however, it is possible the uneven samples between groups may have resulted in the nonsignificant results.

**Funding Sources**

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### Effect of a Short Nutrition Education Program on Nutrient Intake in Lactating Women in Korea (P18-036)

You-Mi Jung,[1] Chae Man Lee,[2] and Mi-Ja Choi[1]

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**Objective:** There is little information on the effect of nutrition education on lactating women in Korea. We evaluated the effect of a short nutrition education program on nutrient intake in lactating women.

**Methods:** Seventy-five women at 2–4 mo postpartum, aged 25–40 y, were recruited as part of a community-based project based in Daegu, South Korea, and allocated to either the control or the education group. The education group received weekly nutrition education for 1 mo. Anthropometry and demographic information were collected at baseline; and 24-h recall data were collected at both baseline and after education for the 2 groups. Data were analyzed with SAS version 9.3, and paired *t* tests were used to assess differences. Significant differences were defined as $P < 0.05$.

**Results:** The study found that lactating women were taking <75% of dietary reference intakes for Koreans (KDRIs) in vitamin A, vitamin B-6, vitamin C, vitamin D, potassium, and magnesium. After nutrition education, vitamin A, vitamin B-6, vitamin C, and potassium were up to 84–91% of KDRIs; however, vitamin D and magnesium intakes were very low (42.5% and 34.2% of KDRI, respectively).

**Conclusions:**

It is concluded that this short nutrition education program affects nutrient intake in lactating women but more investigation is recommended to find a way to increase vitamin D and magnesium intake.

### Nutritional Status in Lactating Korean Women and How this Is Related to Household Income in Daegu Area (P18-037)

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[1]Keimyung University, South Korea; and [2]University of Massachusetts Boston

**Objectives:** The objectives of this study were to assess the nutrient intake of lactating women and the effect of household income on nutrient intake.

**Methods:** Seventy-five women (aged 25–40 y), who had given birth to term infants, were recruited at 2–4 mo postpartum as part of a community-based project based in Daegu, South Korea, between November 2015 and February 2016. Nutrient intakes were assessed based on 24-h recall. Data were analyzed with SAS version 9.3, and Student's *t* test was used to assess difference. Significant differences were defined as $P < 0.05$.

**Results:** The daily energy intake of these lactating women was 1841.7 ± 513.2 kcal, the percentage of energy from protein was 15%, the percentage of energy from fat was 26%, and the percentage of energy from carbohydrates was 59%. The women in the present study did not meet the dietary reference intakes for Koreans (KDRIs) for vitamin A (68.0%), vitamin B-1 (81.4%), vitamin B-2 (73.2%), vitamin B-6 (68.5%), vitamin C (55.2%), vitamin D (34.7%), potassium (68.4%), magnesium (24.5%), protein (92.9%), niacin (88.2%), folic acid (78.0%), and calcium (78.3%). In the low-income group, fat, vitamin B-1, vitamin B-12, and vitamin K intake were lower than in the high-income group. Furthermore, the intakes of vitamin D and magnesium were significantly higher in the low-income group.

**Conclusion:** The present study shows that these lactating women were severely deficient in vitamin D and magnesium, and they had diets low in vitamin A, vitamin B-6, vitamin C, and potassium. Nutrition education is necessary to achieve a balanced intake especially for vitamin D and magnesium in lactating women.

### Exercise Performance Improvement and Anti-Fatigue Effect of Hot Water Extract of Koroso Fish (*Oreochromis niloticus*) (P18-038)

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[1]Pukyong National University, World Fisheries University, South Korea; and [2]Addis Ababa University, Ethiopia

**Objectives:** A hot-water extract of Koroso fish (*Oreochromis niloticus*) has traditionally been used in parts of Africa as a nourishing tonic soup and as an aid to recovery from physical fatigue. In this study, we investigated the antifatigue effects and exercise performance endurance of mice orally administered hot-water extracts of Koroso fish.

**Methods:** Physical parameters, including swimming endurance, forelimb grip strength, muscle density, and body weight, were assessed following oral administration of the extracts at a dose of 10 μL/g body

weight (once per day for 7 d). After 7 d of oral administration, the blood chemistry of the mice was investigated.

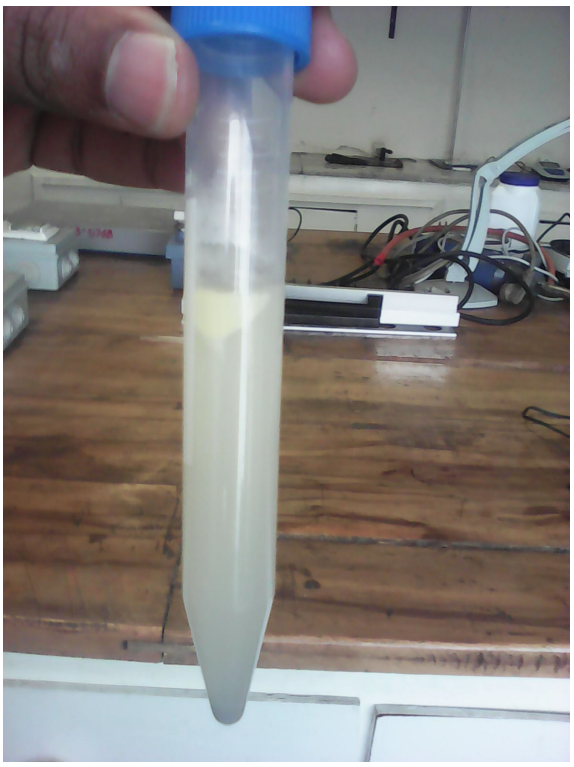
**Results:** Mice given the Koroso fish extracts from Hawassa (HF), Bahir Dar (BF), and the positive control octacosanol (OC) had significantly greater forelimb grip strength (HF: 130.07%, 133.93%; BF: 129.32%, 136.52%; OC: 136.6%, 155.4%) on day 3 and day 7, respectively, compared with the performance on day 0. HF-, BF-, and OC-fed mice had increased swimming endurance (HF: 171.52%, 152.4%; BF: 172.19%, 133.43%; OC: 177.4%, 144.8%) on day 3 and day 7, respectively, compared with their day 0 performance. Also, HF-, BF,- and OC-fed mice were found to have increased forelimb and hindlimb muscle density (HF: 131.5%, 137.5%; BF: 135.9%, 134.8%; OC: 125.2%, 122.2%) on day 3 and day 7, respectively, compared with saline-fed control mice. After exercising, on day 7, HF-, BF-, and OC-fed mice were found to have increased their blood glucose level by 161.34%, 168.54%, and 136.74%, their lactate dehydrogenase by 118.74%, 108.7%, and 121.87%, and their HDL by 154.77%, 142.79%, and 179.92% compared with the saline-fed control mice, respectively. In contrast, significant reductions were observed in the levels of urea by 90.85%, 90.91%, and 83.32%, creatine kinase by 79.21%, 74.69%, and 13.1%, LDL by 96.41%, 71.6%, and 93.1%, triglyceride by 68.26%, 66.2%, and 59.37%, and total cholesterol by 92.57%, 91.92%, and 93.26%, for HF-, BF-, and OC-fed mice, respectively, compared with the saline group mice.

**Conclusion:** These results suggest that hot-water extract of Koroso fish can improve physical exercise performance and prevent fatigue caused by exhausting physical exercise.

**Funding Sources**

Self-funded.

**Supporting Images/Graphs**



**Relationship between Reported Sleep and Physical Fitness among College Students (P18-039)**

Elise Lacasse and Jesse Morrell

University of New Hampshire

**Objectives:** As limited research has explored the role of sleep deprivation and physical fitness among college students, we examined the relationship between reported hours of sleep, daily activity, and measured physical fitness among a cohort of college students, aged 18–24 y.

**Methods:** Data were collected from an ongoing, cross-sectional health survey at a midsize, northeastern university between 2011 and 2015 ($n = 2643$; 70% female and 63% first-year students). Students self-reported sleep and physical activity via online questionnaire; daily activity was measured via pedometer (7-d step average) and fitness ($VO_{2max}$) was determined via 1-mile Rockport walk test. Mean differences ± SE were evaluated via ANCOVA; sex, age, year of data collection, health major, semester, and body mass index served as covariates.

**Results:** More than half (56%) of students reported 6–7.5 h of sleep/d, and 36.8% reported 8–9.5 h of sleep/d. Less than half (40%) of students reported participating in physical activity ≥5 times/wk; 44% of students exceeded 10,000 steps/d. Students who reported sleeping <8 h/d had a higher number of steps than those that reported sleeping >8 h (10,118 ± 92 compared with 9731 ± 113, $P < 0.01$); however, measured fitness levels did not differ (41.7 ± .1 compared with 41.6 ± .1 $VO_{2max}$, $P = 0.60$).

**Conclusions:** The findings indicate that college students who report less sleep may have modestly higher amounts of daily activity; however, the difference may not increase physical fitness in young adults.

**Funding Sources**

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**Eating Healthily when Away from Home: Elementary School-Age Children's Behaviors and Perceptions (P18-040)**

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[1]West Virginia University; [2]Rutgers University, NJ; and [3]University of Florida

**Objective:** The aim of this study was to qualitatively explore school-age children's behaviors and perceptions related to eating healthily when away from home.

**Methods:** Children ($n = 194$; aged 6–11 y) in 3 states (FL, NJ, WV) completed a survey, and 44 participated in focus groups (FG) moderated by trained researchers. Data were content analyzed by 2 trained researchers to identify common themes.

**Results:** Most children recognized the importance of eating healthy foods when not at home. However, those who infrequently ate meals away from home felt these were special occasions, so eating healthy when away from home was not important. Most meals children ate away from home were consumed at school, with children reporting they ate breakfast, lunch, and snacks at school. Lunch was the most common school meal, and frequently included pizza, hamburgers, and chicken nuggets served with milk. Almost all children reported that their parents considered it important for children to eat healthy foods when away from home to maintain good health. Children acknowledged receiving advice from parents to eat healthily (eat fruits and vegetables), but were allowed to decide for themselves what to eat when away from home. When eating out, children choose water, soda, or juice drinks, and, when eating out was a special occasion, they were more likely to drink sugar-sweetened beverages. A barrier to healthy eating when away from home was availability of unhealthy food, but children indicated they could overcome this and take responsibility by asking for healthy foods or packing healthy options to bring from home. Children suggested that parents could help them by checking what they eat or pack to eat away from home, monitoring the foods the children buy, and keeping healthy options available at home. To help them choose healthy foods when eating away from home, children thought parents should provide incentives and pack healthy options. Children also felt that parents should talk to caregivers about having healthy options available. Children acknowledged that people around them influenced their food choices, that they mimicked their parents' choices, and that siblings copy what they eat or vice versa.

**Conclusions:** Children recognize the importance of choosing healthy foods when eating away from home, but without parental oversight or healthy options available, they typically choose less healthy options.

**Funding Sources**

United States Department of Agriculture, National Institute of Food and Agriculture, grant 2017-680001-26351.

**A Baseline Snapshot of the Raising Inspirational Sons of Excellence (RISE) Project: A Nutrition and Social Behavior Management Program for Underserved Boys (P18-041)**

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[1]University of Southern Mississippi; [2]Your Legacy Begins Now; [3]Mississippi Valley State University; [4]Carroll County Men in Black and Blue Fighting Prostate Cancer; [5]Leflore County Men in Black and Blue Fighting Prostate Cancer; and [6]Montgomery County Men in Black and Blue Fighting Prostate Cancer

**Objective:** The purpose of this study was to examine the feasibility of a nutrition and social behavior management pilot program delivered among underserved male youth (aged 10–11 y) in the Mississippi (MS) Delta.

**Methods:** The study targeted a tricounty area of the MS Delta and was guided and developed by a community-academic partnership involving community health advisors (CHAs), and university faculty, staff, and athletes. The program included 16 interactive sessions developed based on social cognitive theory, and delivered during the school year. CHAs were responsible for participant recruitment, securing intervention sites, and mentorship of college athletes. College athletes were trained as interventionists to deliver the program to and mentor 5th-grade boys. Self-efficacy and social support for dietary behaviors, self-esteem, dietary behavior change intention, and the Block Kids Food-Frequency Questionnaire were measured among youth participants at baseline, mid- and post-intervention.

**Results:** Twelve CHAs and 10 college athletes participated as mentors in the program. Thirty-three boys were enrolled, and 30 completed data collection at baseline from 2 counties; 14 additional participants were enrolled in a third county at midpoint. Baseline participants were African Americans enrolled in the 5th grade, between 9 and 12 y old, with household yearly incomes <$40,000. Baseline mean ± SD scores were: healthy eating intention, 9.3 ± 3.08; healthy eating self-efficacy, 17.97 ±5.06; social support from friends, 9.80 ± 5.11; social support from role model, 13.13 ± 5.05; and self-esteem, 15.36 ± 4.32. Mean ± SD daily intakes were: 1.67 ± 1.27 cups fruits/fruit juice, 1.22 ± 1.42 cups nonstarchy vegetables, 1.08 ±0.90 ounces whole grains, 19.90 ± 15.02 teaspoons of added sugar, and 3080.81 ± 2494.41 kcal.

**Conclusions:** Baseline participants did not meet USDA recommendations for whole grains, nonstarchy vegetables, added sugars, and daily kilocalorie intake. This study will examine the impact of a dietary and social behavior program on dietary self-efficacy and intentions, and on social support, self-esteem, and dietary behaviors.

**Funding Sources**

Families First for Mississippi.

**Perceived Barriers to Implementing Nutrition and Physical Activity Instruction in Public Schools in 4 Rural Oregon Counties (P18-042)**

Jessica D Linnell and Allison Harris

Oregon State University

**Objectives:** The purpose of this study was to assess nutrition and physical activity (PA) instruction in K-12 schools in rural counties in Oregon, and the barriers to integrating these topics into classroom instruction.

**Methods:** Teachers in K-12 public schools in 4 rural counties in Oregon completed an online survey. Respondents ($n$ = 84,78.5% female) were 93.5% white, 4.8% Hispanic/Latino, and 1.7% other. Teaching experience was 10.6% <1 y, 31.8% 1–10 y, 39.3% 11–20 y, 18.1% >20 y.

**Results:** Nutrition was included in classroom instruction by 67.9% of respondents. A majority (71.6%) reported <10 h of nutrition instruction in a school year, 18.9% reported 11–20 hours, 5.7% reported 21–50 hours, and 3.8% reported >50 hours. Lack of classroom time (28.6%), lack of preparation time (17.6%), lack of quality teaching materials (12.6%), and lack of information or training (12.1%) were top barriers reported. PA was included in classroom instruction by 78.5% of teachers: 27.8% reported <20 h of PA instruction, 33.3% reported 20–80 h, and 38.9% reported >80 h. Top reported barriers to integrating PA instruction were lack of classroom time (26.9%), lack of preparation time (15.08%), and lack of information or training (13.32%).

**Conclusions:** Schools are widely considered to be an ideal setting for nutrition and PA education for many reasons. It has been suggested that a minimum of 50 h of nutrition instruction is needed to create behavior change. To meet PA guidelines, children would need 87.5 h of PA instruction per year to meet PA guidelines during school time, assuming 35 wk of instruction in one school year. The results of this evaluation indicate that children in K-12 schools in this sample may not be receiving the minimum instruction needed to improve eating behaviors and meet PA recommendations. Barriers to integrating nutrition and PA instruction reported in this sample were consistent with previous research in California and Minnesota. These findings highlight a need for evidence-based approaches to help teachers overcome barriers to nutrition and PA instruction. Alternatively, modes of instruction for nutrition and PA may need to shift to settings outside of public schools due to consistently reported constraints on time and funding.

**Funding Sources**

No funding sources to report.

**Obesity-Related Beliefs and Behaviors among Chinese Americans on the East and West Coasts (P18-043)**

Doreen Liou, Kathleen Bauer, and Emily Fowler

Montclair State University, NJ

**Objectives:** The purposes of this study were to compare obesity risk reduction behaviors and their psychosocial determinants in Chinese Americans residing on the East and West Coasts.

**Methods:** A cross-sectional survey design was used to compare a convenience sample of 203 male and female participants, aged 18–60 y, in Los Angeles (LA) with a similar sample of New York (NY) individuals ($n$ = 447). Obesity risk reduction behaviors were evaluated and psychosocial factors based on constructs from the theory of planned behavior and health belief model were measured. $t$ test comparisons and regression analyses were conducted to determine the psychosocial contributors of obesity risk reduction behavior.

**Results:** In the LA sample, regression analysis showed that 38.7% of the variance in behavior was accounted by self-efficacy and attitude. In the NY sample, self-efficacy, intention, and attitude contributed to 47% of the variance of behavior. *t* test comparisons indicated a higher frequency of healthy behaviors such as consuming nutritious snacks and the recommended daily servings of fruits and whole grains, as well as more favorable attitudes toward these behaviors, among LA participants. In contrast, the NY sample perceived greater barriers in performing obesity prevention behaviors, including the impact of the physical environment on food choices.

**Conclusions:** Nutrition professionals designing educational programs for Chinese Americans should take into consideration the special needs of the target audience. A greater emphasis should be placed on barriers and intentions when working with NY Chinese Americans. For both NY and LA population groups, assessing efficacy and attitudinal predispositions to perform obesity risk reduction behaviors are indicated for fostering a healthful lifestyle to mitigate obesity risk.

**Funding Sources**

None.

**Association between Self-Perception and Reported Fruit and Vegetable Intake among Mexican Adults from the National Health and Nutrition Survey 2016 (P18-044)**

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[1]Instituto Nacional de Salud Pública, Mexico; and [2]Centro de Investigación en Matemáticas, AC, Mexico

**Objective:** The aim of this study was to evaluate the correlation between self-perception and reported fruit and vegetable intake based on international recommendations among Mexican adults from the National Health and Nutrition Survey 2016 (2016 ENSANUT).

**Methods:** We analyzed information for Mexicans aged 20–59 y ($n = 5392$) from a probabilistic, multistage, and representative sample of the 2016 ENSANUT. Dietary data were collected through the use of a 7-d semiquantitative food-frequency questionnaire of 140 food items. A classification variable for adherence or nonadherence to fruit and vegetable consumption was established based on the WHO recommendations of 400 g for reported daily intake of fruits and vegetables. In addition, a classification of self-perception on adequate consumption of fruits and vegetables was constructed from an obesity, feeding behavior, and physical activity perception questionnaire. We performed a descriptive analysis to compare socioeconomic aspects for both adherence and self-perception classifications. Logistic regression models were used to identify associations between both classifications. Finally, a sensitivity and specificity analysis for the correspondence of self-perception of adequate consumption to adherence was used.

**Results:** According to the logistic regression model adults aged 40–49 y ($P = 0.002$) and those of the higher socioeconomic status ($P = 0.006$) showed a significant increase in adequate fruit and vegetable consumption. The same occurred with the proportion of adherence, showing a similar significant increase ($P < 0.001$), and a greater adherence for higher education level ($P < 0.001$). Finally, correct self-perception consumption of fruit and vegetables can correctly identify adherence to consumption in 41.2% (sensitivity); on the other hand, self-perception of incorrect fruit and vegetable consumption can correctly identify nonadherence in 81.3% (specificity).

**Conclusions**: Less than a half of the adults who perceive they are adhering to the recommendations for fruit and vegetable intake actually consume these amounts; those that do are characterized by having higher living standards, such as as higher education levels and socioeconomic status.

**The Effect of Socioeconomic Status and Parental Education Level on Weight Gain throughout the First Semester of College (P18-045)**

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[1]Weill Cornell Medicine, NY; [2]Keck School of Medicine of the University of Southern California; and [3]Cornell University, NY

**Objective:** It is fairly well established that socioeconomic conditions play a role in obesity prevalence in most stages of life. Additionally, it is hypothesized that adolescents from households of higher socioeconomic status (SES) and level of parental education have acquired protective eating behaviors throughout their lifetime that help them avoid weight gain. The goal of this study was to investigate the influence of household income and parental education level on weight gain in college students during the first semester.

**Methods:** Sixty freshmen at Cornell University were recruited and asked to fill out a 51-part questionnaire assessing health habits, as well as proxies for SES such as parental education level and household income. Weights obtained from precollege physicals were compared with those collected following survey completion.

**Results:** A 2-sample *t*-test was conducted to assess the association between subjects' identifying gender and weight gain during their first college semester. On average, females and males experienced 3.33% (4.19 ± 4.61 lb) and 2.42% (3.94 ± 7.55 lb) gains in body weight ($t = 0.72$, $P = 0.48$). Similarly, a single-factor ANOVA between subjects was conducted to compare the effects of a number of variables on weight gain. Stratification by household income produced an *F*-statistic of 0.48 ($P = 0.75$); categorization by parental education (maternal, paternal, and combined) yielded values of 0.17, 0.78, and 0.46 ($P = 0.92$, 0.54, 0.84, respectively). Neither household income nor parental educational level were found to be associated with weight gain.

**Conclusions:** The findings of this study suggest that relatively uniform access to nutrition and physical activity may provide a leveling field for those previously exposed or prone to a more "obesogenic" environment. Moreover, independent individual health behaviors and more immediate social influences may play a larger role than expected given that known proxies for socioeconomic background fail to predict early college weight gain. Future interventions should target first-year college students and enrich them with the healthy behaviors and skills they need to avoid weight gain.

**Funding Sources**

No funding sources.

**Weight-Loss Strategies among US Adults with Prediabetes (P18-046)**

Amy Morel L'Horset, Mackenzie Whipps, and Kristie J Lancaster

New York University

**Objectives:** Weight loss is the cornerstone of type 2 diabetes (T2D) prevention for adults with prediabetes. Evidence suggests that awareness of prediabetes is associated with efforts to lose weight. Less is understood about the strategies adults with prediabetes choose to try to lose weight. The purpose of this study was to examine weight loss strategies among a nationally representative sample of adults with prediabetes, and to determine whether these strategies differ by prediabetes awareness status.

**Methods:** We analyzed data from adults with prediabetes in the 2011–14 National Health and Nutrition Examination Surveys. In this cross-sectional analysis, prediabetes was defined as having hemoglobin A1C between 5.7% and 6.4%. Adults with prediabetes were categorized as prediabetes aware and unaware based on self-report. Weight-loss strategies were categorized as evidence based and nonevidence based. We used multivariate logistic regression, controlling for demographic characteristics, to estimate the association of prediabetes awareness with strategies to lose weight.

**Results:** In both groups, ∼60% were trying to lose weight. The most reported evidence-based strategies were "ate less food (amount)" and "exercised," whereas the most nonevidence-based strategies were "skipped meals" and "took non-prescription pills or supplements." People who were aware of having prediabetes used more evidence-based strategies to lose weight than those who were unaware ($\beta = 0.702$, $P < 0.001$). Prediabetes-aware adults engaged in an average of 2.1 weight loss strategies, whereas prediabetes-unaware adults engaged in an average of 1.5 strategies.

**Conclusions:** Efforts to lose weight among adults with prediabetes remain suboptimal. These results suggest that awareness of prediabetes can increase the use of evidence-based strategies to lose weight. Public health initiatives to improve awareness of prediabetes and adoption of healthy weight loss practices are needed to prevent or delay progression to T2D.

### Trends of Leisure Time Physical Activity among Elderly Chinese Adults from 1997 to 2015 (P18-047)

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National Institute for Nutrition and Health, Chinese Center for Disease Control and Prevention

**Objective:** Little is known about the shifts of leisure time physical activity (LTPA) of elderly Chinese. The present study aims to examine the trends in the distribution of LTPA in elderly Chinese from 1997 to 2015.

**Methods:** Data were derived from the China Health and Nutrition Survey 1997–2015. A multistage, stratified, sampling design was used. The final analysis included 8647 participants aged ≥65 y. The kernel method was used to construct nonparametric estimates of density curves to describe changes in LTPA distribution across the survey periods.

**Results:** Overall, the proportion of subjects taking part in LTPA was 10.9% in 1997 and gradually decreased over 9 y, and was only 4.3% in 2015. Moreover, the intensity of metabolic equivalent task (MET)-h/wk from LTPA declined twice from 1997 to 2015, and was 1.5 MET-h/wk in 2015. From 1997 to 2015, the distribution curve of LPTA showed shifts toward the left in both men and women with a slight decrement. The changes were much larger among men.

**Conclusions:** These findings indicate that LTPA in elderly Chinese is deficient. It is necessary to make efforts to counter the decreases in LTPA and to encourage elderly people to take optimal exercise.

**Funding Sources**

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### Folate Knowledge and Sources of Information among Undergraduate College Students (P18-048)

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University of New Hampshire

**Objectives:** The aim of this study was to characterize folate knowledge and identify folate information sources among undergraduate college students.

**Methods:** We recruited 96 students (age 20 y, 88% female) attending a US university. Facebook and student organizations were used to recruit participants to complete an online survey. Participants were categorized by correct response (Y/N) to 2 multiple-choice folate questions that ascertained knowledge on (Q1) reasons for folate consumption in women and (Q2) timing of supplementation in women. Further, participants were scored based on the percentage of correctly identified folate food sources (Q3). A separate question determined participants' primary folate information sources. Associations of folate information source with folate knowledge (Q1 and Q2) were measured by chi-square. Mann-Whitney *U* tests quantified the difference in Q3 scores of each folate information source relative to those who identified as having not received any folate information.

**Results:** In this student sample, 76% and 71% correctly responded to Q1 and Q2, respectively. The median Q3 score (25th–75th) was 50% (25%–63%). The top 2 sources of folate knowledge were the Internet (46%) and a college course (36%). Conversely, 27% reported never receiving information on folate. Compared with students who reported having not received any folate information, there was a significantly greater proportion of correct responses to Q1 for college course (89% compared with 62%; $P = 0.03$), relative/friend (100% compared with 62%; $P = 0.02$), and media (100% compared with 62%; $P = 0.04$). We observed a greater proportion of correct responses to Q2 if folate information was obtained from the Internet (75% compared with 42%; $P = 0.01$) and college course (91% compared with 42%; $P < 0.001$). Scores for Q3 were higher among those who obtained folate knowledge from the Internet [50% (38%–72%) compared with 31% (0%-63%); $P = 0.02$], college course [63% (38%–75%) compared with 31% (0%–63%); $P = 0.001$], and media [63% (44%–81%) compared with 31% (0%–63%); $P = 0.02$].

**Conclusions:** Greater folate knowledge was associated with folate information obtained from the Internet, media, and a college course. We observed that students who received information from a college course had greater folate knowledge according to all three knowledge questions, suggesting classes may be a productive way to relay folate information to college students.

**Funding Sources**

None.

**Lessons Learned from Utilizing 4-H Teenagers as Cross-Age Teachers for the Shaping Healthy Choices Program (P18-049)**

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**Objective:** The aim of this study was to determine the feasibility of implementing the Shaping Healthy Choices Program (SHCP) through the 4-H Youth Development Program with the use of teenagers as cross-age teachers.

**Methods:** After initial training, teenage 4-H members facilitated the SHCP with younger youth over a period of 6 mo. The SHCP contains 8 garden-enhanced nutrition modules and 5 cooking demonstrations that were performed with minimal adult support. The activities within the 8 modules follow the 5-Step Experiential Learning Cycle and include opening questions/prompts; procedure; sharing, processing, and generalizing (SPG); and concept and term discovery/introduction components. The classroom activities were conducted at a community center and a nearby community garden was used for garden activities. Fidelity observations that used forms specific to each activity were collected for the 8 modules. Parents completed a demographics questionnaire prior to the study and a group interview after the intervention.

**Results:** Eleven youths participated in the study, 3 serving as teenage teachers and 8 younger youths as participants. The overall average lesson fidelity was 45%, which is below the 80% goal found in previous work. The procedure had the highest average fidelity (84.6%), followed by the first half of SPG (57.7%) and the opening questions/prompts (38.5%). The sections with the lowest average fidelity were the second half of SPG (23.1%) and concept and term discovery/introduction (18.2%). Themes for higher fidelity included engaging youth during the procedure and allowing adequate time. Themes for lower fidelity included skipping sections and not making use of the follow-up prompts. The parent interview suggested that youths wanted to try new recipes at home, had some barriers to preparing the recipes, liked the gardening, and enjoyed having cross-age teachers.

**Conclusions:** These findings suggest that youths enjoyed the program, with all teen teachers confirmed to return for the subsequent year, and provide rationale for continued testing of implementing the SHCP utilizing cross-age teachers. Although overall fidelity was low, teenage teachers were able to effectively deliver the procedure portion of the activities with high fidelity, suggesting that additional facilitation training may improve future performance.

**Funding Sources**

Funding was provided in part by UC ANR competitive grant 15-3723 and USDA NIFA, Hatch project 221082.

**Characterizing Eating Behaviors of Adolescents Aged 10-13 Years in Hawaii while Eating Alone (P18-050)**

Asuka Suzuki,[1] Alex Anderson,[2] So Yung Choi,[1] Mary Cluskey,[3] Carolyn Gunther,[4] Nobuko Hongu,[5] Blake Jones,[6] Karina Lora,[7] Scottie Misner,[5] Lillie Monroe-Lord,[8] Christine Penicka,[9] Marla Reicks,[10] Rickelle Richards,[11] Glade Topham,[12] Siew Sun Wong,[3] and Jinan Banna[1]

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**Objectives:** Adolescents in Hawaii fall short of meeting dietary recommendations. As youth gain independence, food choices made when not in the presence of others may have a big impact on overall diet quality, development of obesity, and health. However, there is no published evidence characterizing eating behavior of adolescents in Hawaii when food is consumed alone. This study had the following aims: *1*) to determine how often adolescents eat alone; and *2*) to characterize occasions when adolescents eat alone, including the location, time of day, and, other activities performed while eating.

**Methods:** Early adolescents aged 10–13 y ($n = 36$; 61% female) in Oahu, Hawaii were asked to take pictures of everything they consumed throughout the day. One to three days after adolescents took the pictures, a researcher conducted one-on-one interviews with the adolescents during which the photos were used as a guide. Upon completion of data collection, descriptive statistics were calculated, with frequencies and percentages used to understand the characteristics of occasions when adolescents ate alone.

**Results:** Adolescents ate 18% of their meals and 27% of their snacks when alone. Occasions when adolescents ate meals alone occurred more for breakfast and lunch, and less for dinner. Occasions when adolescents ate snacks alone gradually increased over time within the day and peaked between 1700 and 1900, and decreased immediately after that. With regards to food consumed alone, 91.3% of meals and 72.0% of snacks were eaten at home, followed by school (meal: 4.3%; snack: 20.0%). While eating meals or snacks alone, about half of adolescents watched television or used electronic devices, whereas about half of adolescents ate without performing any other activities.

**Conclusions**: Occasions when 10- to 13-y-old adolescents ate alone were not frequent, but most often occurred at home. Examining other characteristics of eating habits, including type of food selected, may foster further understanding of eating habits for development of effective interventions to promote healthy eating behavior in adolescents to address the problem of childhood obesity in Hawaii.

**Funding Sources**

USDA NIFA AES Multistate Research Project W3003.

**The Effects of Type of School Lunch Consumed on British Adolescent's Diet Quality (P18-051)**

Ayyoub Taher and Charlotte Evans

University of Leeds, UK

**Objectives:** The aim of this study was to investigate the association between the type of lunch consumed on a schoolday and the diet quality of UK adolescents.

**Methods:** The participants were recruited from the National Diet and Nutrition Survey, which is an annual rolling program aiming to assess the nutritional status of UK people living in private households and aged $\geq$1.5 y. In this study 2045 British adolescents were included, and all participants were aged 11–18 y with valid 3- or 4-day diary

records from NDNS datasets collected in 2008–14 (years 1–6). The Diet Quality Index for Adolescents (DQI-A) tool was used to assess the adherence of British adolescents to the dietary recommendations. The DQI-A consists of 3 main components, dietary quality (DQc), dietary diversity (DDc), and dietary equilibrium (DEc), which are presented in percentages. The percentage ranges for both DDc and DEc are 0–100%, whereas the DQc percentage range is –100 to 100%. Therefore, the mean percentage of the 3 main components results in a DQI-A score ranging from –33 to 100%. A higher DQI-A score reflects a better quality of diet.

**Results:** The overall mean DQI-A score for the 2045 adolescents was 20.4%. Although few adolescents reported not eating lunch on a schoolday ($n = 30$), these students had the second lowest mean DQI-A% score, whereas those who bought lunch from cafés and shops had the lowest DQI-A score (14.1%). Food outlet consumers (reference group) had a lower overall DQI-A score than consumers of cooked school meals by 7.5% (CI = 5.3, 9.8; $P < 0.01$) and cold school sandwiches by 5.2% (CI = 2.6, 7.8; $P < 0.01$), after adjusting for confounders including age, gender, and household income. In addition, the overall DQI-A score was still observed to be significantly lower for consumers who bought lunch from food outlets by 9.6% (CI = 7.5, 11.8; $P < 0.01$) compared with consumers who had packed lunch brought from home.

**Conclusions:** UK adolescents have a low quality of diet of 20.4%, and packed lunch consumers have the highest DQI-A score. The results from this study confirm the importance of evaluating regulation policies regarding food outlets around not only primary but also secondary schools, and of improving food choices within school premises.

**Funding Sources**

This research received no specific grant from any funding agency, commercial, or not-for-profit sectors.

### Hands-On Approach for Nutrition Education in Elementary School Children (P18-052)

Rohini Vishwanathan

The Discovery Museums, Acton, MA

**Objective:** One in 5 school-age children in the United States is obese. Continued efforts to make healthy food choices available to children and promote healthy eating behavior have not reversed this trend. Effective nutrition education can promote fruit and vegetable consumption, decrease children's body mass index and weight gain, and improve academic outcomes. The goal is to educate children about basic nutrition and health through the use of simple, innovative, hands-on techniques, and empower them to make healthy food choices independently.

**Methods:** A hands-on activity focused on educating children on the dietary carotenoids found in dark-green leafy vegetables and in yellow, orange, and red fruits and vegetables was developed. The activity was a paper chromatography of spinach that used materials which are easily available for purchase such as chromatography paper, pharmacy-grade ethyl alcohol, baby spinach leaves, coins, skewers, and beakers. Children performed chromatography and observed the appearance of yellow and orange colored bands (carotenoids) on the paper within ~20 min. Children were then shown slides/pictures to make the connection of the role of these yellow/orange pigments in the body.

**Results:** This hands-on activity was shared with children and families at multiple "Meet the Scientists" events at The Discovery Museums and at American Association for the Advancement of Science 2017 meeting Family Science Days. This simple chromatography protocol revealed hidden carotenoids in spinach and educated children and families about dietary carotenoids, and their role as vitamin A precursors in the body and as macular pigment in the eye.

**Conclusions:** Hands-on nutrition-based activities such as this spinach chromatography can successfully engage children and families of all ages. There is a need to develop programs in school or after school that focus on nutrition education. This innovative approach has great potential to impact food choices, especially fruit and vegetable consumption, in school-age children.

**Funding Sources**

NA.

### Effective Short-Term Nutrition Interventions for College Populations (P18-053)

Mary J Voss and Holly Willis

St Catherine University, MN

**Objectives:** The aims of this study were to identify effective, short-term nutrition interventions conducted on college campuses, and to make recommendations for future interventions.

**Methods:** A systematic literature review was conducted to identify nutrition interventions that effectively improved eating behaviors and choices on college campuses. PubMed was used to conduct the literature search and 914 studies were identified and screened. Inclusion criteria included primary research conducted between January 2002 and June 2017, subjects enrolled at a university located in the United States, nutrition-related intervention ≤6 mo, and outcomes related to dietary intake or eating behaviors. Studies were excluded if the intervention targeted a specific population (e.g., athletes or people with eating disorders) or a specific nutrient or food item.

**Results:** Seventeen studies met inclusion criteria. Intervention foci varied and studies were organized into the following categories: dining hall and/or point of sale ($n = 6$), course-based ($n = 5$), self-regulation practices ($n = 3$), and technology-based communication ($n = 3$). The interventions measured several outcomes, including a combination of anthropometrics, dietary intake, and behavioral or attitudinal surveys. All of the interventions led to some change in eating behavior or choices when comparing pre- and post-intervention measurements; however, interventions with nutrition education as part of a course tended to have the most practical impact. Technology-based interventions based on the use of text messaging also appeared effective.

**Conclusions:** Short-term nutrition interventions on college campuses varied by design and outcome measurements, which made conclusions difficult to draw. Effective interventions will likely depend on several factors including the campus environment, resources available, and the student body; however, course-based nutrition education interventions may be most influential. Future research should consider interventions that combine simple nutrition messages as part of new or existing courses on campus along with technology-based reinforcement. Research should also plan for meaningful assessment beyond the intervention period.

**Funding Sources**
St Catherine University, Summer Scholars Program.

**Supporting Images/Graphs**


**FIGURE P18-053-1** AAAS 2017 Family Science Days

**FIGURE P18-053-2** Cambridge Science Festival 2017

**Evaluation of a School-Based Fruit and Vegetable Intervention that Uses a Digital Photography Method (P18-054)**

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[1]URI SNAP Education;and [2]University of Rhode Island

**Objective:** The primary objective of this study was to use digital photography of food to assess if a policy, systems, and environment (PSE) intervention increases the amount and variety of fruits and vegetables consumed at lunch by low-income 5th graders.

**Methods:** This quasiexperimental study used digital photographs of the students' trays pre- and post-meal both before and after the PSE intervention to analyze the consumption and variety of fruits and vegetables. The sample consisted of low-income 5th-grade students in the Providence School District (treatment school, $n = 75$; control school, $n = 55$). Consumption differences were assessed through the use of the Mann-Whitney $U$ test for between-group changes and the Wilcoxon Signed Rank test for within groups. Pearson chi-square compared variety of fruits and vegetables between groups.

**Results:** There was a difference between groups for cups of fruit ($P < 0.01$) with the treatment group decreasing (mean ± SD, 0.12 ± 0.46, $P = 0.02$) and the control group increasing (0.12 ± 0.49, $P = 0.20$). There were no differences between ($P = 0.13$) or within groups (treatment school, $P = 0.41$; control school, $P = 0.71$) for vegetable consumption. There was a statistically significant difference in variety of vegetables at baseline; 49% selected 1 or 2 vegetables at the treatment school and 6.7% of students selected 1 or 2 in the control school ($\chi^2 = 30.7$, $P < 0.001$). There was no change in variety of fruits

or variety of vegetables from baseline to follow-up within or between groups.

**Conclusions:** Although data suggested a negative effect of the intervention on fruit consumption with no effect on vegetable consumption or variety of fruits and vegetables chosen at the lunch meal, the sample size was small and fruit options varied between schools and time periods. Future research should explore changes in the eating environment to increase availability of preferred fruit and vegetable options.

**Funding Sources**

URI SNAP Education Grant.

**Perceptions of Peers, Teachers, and Parents of Factors that Influence Teens' Health (P18-056)**

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[1]University of Tennessee; [2]West Virginia University; [3]South Dakota State University; and [4]University of Florida

**Objective:** The aim of this study was to better understand perspectives of and differences between students, parents, and teachers about factors that influence health and behavior of high-school students.

**Methods:** Three modified nominal group technique focus groups (mNGT) were held: one with students ($n = 4$), one with teachers ($n = 5$), and one with parents ($n = 3$) from one high school. As a part of the mNGT process, participants individually wrote answers to questions, verbally shared their written responses, and as a group ranked the top 5 answers to each question. Participants then individually ranked the top 5 answers in writing according to a scale of 1–10, with 10 being most important. This process was repeated for 5 different questions. Following the mNGTs, the research team created summary descriptions of participant discussions for each ranked answer to the 5 questions. Ranks for responses from each focus group were summed and divided by the total number of participants to provide a score for the top 5 answers. A higher score indicated a higher perceived importance of identified factors (top possible score being 50).

**Results:** Students reported that eating habits (45) were the number 1 factor that influenced teens' health, whereas teachers and parents reported that family (49 and 50, respectively) would be the most influential factor. Students and parents both described time (49 and 43, respectively) as the biggest barriers to healthy eating, whereas teachers identified availability (50). The top factors that made it difficult for teens to be physically active were time (49, students), homework (42, parents), and parental modeling (45, teachers). Students identified school/time (49) as most the most influential factor for teens being stressed, whereas parents identified social life (48) and teachers identified expectations (50). The last question addressed changes that should be implemented at this high school to help students be healthy. Teachers and parents felt it was important to incorporate more health education (43 and 50, respectively) throughout the day, whereas students thought it was important to improve communication between teachers to help balance the students' workload (39).

**Conclusions:** These perspectives may provide valuable areas of foci for future health promotion interventions with teen populations.

**Funding Sources**

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**Self-Efficacy and Relationship with Healthy Dietary Behavior in Adolescents (P18-057)**

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**Background:** In adolescents, poor dietary quality, including low consumption of fruits and vegetables, may be associated with obesity. We suspect a lack of knowledge about nutrition and low self-efficacy prevents adolescents from adopting healthful dietary behaviors. Our hypothesis is that high self-efficacy to adopt health behaviors is associated with high intake of fruits and vegetables in adolescents who are overweight and obese.

**Objective:** The aim of this study was to determine the correlation between diet and self-efficacy, specifically consumption of fruits and vegetables.

**Methods:** This cross-sectional analysis used baseline data from an intervention evaluating the effectiveness of health coaching in adolescents who are overweight and obese. Diet was assessed based on the Technology Assisted Dietary Assessment system, whereby participants used the mobile food record to capture before and after images of their eating occasions over 4 d. Dietary intake was analyzed with the use of Nutrient Data System for Research software (Nutrition Coordinating Center, University of Minnesota). Self-efficacy towards intake of fruits and vegetables was assessed on a scale of 1 (low) to 10 (high) through the validated Diet and Exercise Behavioral Strategies questionnaire. Data are expressed as means ± SE.

**Results:** The sample was 55% girls and 85% white, 5% black, and 10% multiracial; and 10% of this group were Latino. The boys and girls were aged 14.9 ± 0.7 and 14.8 ± 0.6 y, respectively ($P = 0.94$). The population was obese (body mass index $z$ scores, girls 2.4 ± 0.1; boys 2.2 ± 0.2; $P = 0.34$). Dietary intake of fruit (servings/d) for boys and girls was 0.8 ± 0.2 and 1.3 ± 0.3, respectively ($P = 0.27$). Dietary intake of vegetables (servings/d) for boys and girls was 2.5 ± 0.6 and 2.0 ± 0.3, respectively ($P = 0.38$). Reported self-efficacy for boys and girls was 6.3 ± 0.8 and 5.2 ± 0.8, respectively ($P = 0.36$). For the total population, self-efficacy of vegetable intake was correlated with actual consumption of vegetables, $r = 0.58$, $P = 0.02$; however, self-efficacy of fruit intake was not, $r = -0.14$, $P = 0.70$.

**Conclusion:** In adolescent boys, high confidence towards vegetable consumption may influence eating behaviors.

**Examining Intrinsic Motivation and Perceived Competence to Cook in Older Adults with the Use of the Motivation to Prepare Healthy Foods Questionnaire (P18-058)**

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**Objective:** Older adults who lack positive dietary habits and food preparation skills may be at nutritional risk. It is important to understand older adults' motivation and perceived competence to cook. The purpose of this study was to examine if the Motivation to Prepare Healthy Foods Questionnaire (MPHFQ) was able to estimate intrinsic motivation (IM) and perceived competence (PC) to prepare healthy foods in an older adult population. The MPHFQ is based upon the constructs of the self-determination theory (SDT) and has been validated with a young adult population.

**Methods:** Free-living adults attending US Department of Health and Human Services, Administration on Aging, Congregate Nutrition Program events in Southeast Louisiana were recruited to participate. Subjects completed questionnaires that included 5 questions addressing IM and 5 questions addressing PC. Participants responded to the 10 statements according to a 5-point Likert scale ranging from 1 = "disagree a lot" to 5 = "agree a lot." Descriptive data were collected and survey responses were analyzed through the use of exploratory factor analysis (EFA) with principal axis factoring and promax (oblique) rotation. Internal consistency was measured with Cronbach's $\alpha$.

**Results:** A total of 107 participants from 3 Congregate Nutrition Program sites completed questionnaires. The participants' mean age was 73.4 $\pm$ 8.9 y. Most of the older adults were female ($n$ = 95; 89%). Racial/ethnic representation included 66 Caucasians (62%), 38 African Americans (36%), 1 Hispanic/Latino (1%), and 2 individuals who reported other/mixed race. Of the participants, 53 were widowed (50%), 23 were married (22%), 18 were single (17%), 12 were divorced (11%), and 1 did not indicate marital status. The Kaiser-Meyer-Olkin statistic of 0.904 indicated excellent sample size. The EFA returned 2 factors that explained 73.6% of the variance, and all statements were retained. Factor 1 statements described IM (64.3% of variance) and factor 2 statements described PC (9.2% of variance). Cronbach's $\alpha$ for factor 1 = 0.915 and for factor 2 = 0.930.

**Conclusion**: The results from this study suggest that the MPHFQ has the potential to evaluate the SDT constructs of IM and PC in an older adult population.

**Funding Sources**

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**Understanding Barriers, Motivators, and Perspectives on Reduction of School Lunch Plate Waste of Early Adolescents in the United States (P18-060)**

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[1]University of Hawai'i at Manoa; [2]Montana State University; and [3]Virginia Tech

**Objective:** The aim of this project was to determine barriers, motivators, and perspectives on reducing plate waste of early adolescents in the National School Lunch Program (NSLP) in Hawai'i, Montana, and Virginia.

**Methods:** Early adolescents ($n$ = 47, age 9–13 y) from families receiving or eligible to receive the Supplemental Nutrition Assistance Program (SNAP) benefits were recruited at each location. A semistructured interview guide was developed and pilot tested. Trained interviewers conducted audiorecorded individual interviews. Interviews were transcribed verbatim. A codebook was devised with the use of existing literature on barriers, motivators, and perspectives on reducing school lunch plate waste in the United States. Two researchers coded 3 transcripts individually with the use of NVivo software to determine interrater reliability and calculated an average Cohen's $\kappa$ coefficient. With an average Cohen's $\kappa$ coefficient of 0.68, the 2 coders then coded all transcripts independently. New codes were added to the codebook as required. Key themes were evaluated by the 2 coders separately. In discussion, the 2 agreed on final themes and collectively summarized the results.

**Results:** The main barriers to the reduction of school lunch waste were the following: *1*) poor food preparation and cooking methods; *2*) dislike of school lunch; and *3*) school policies required leftovers from school lunch be discarded. The key motivators to reduce school lunch waste were to allow students the ability: *1*) to compost food; *2*) to share food with peers; *3*) to save food in the cafeteria; *4*) to feed leftovers to animals; and *5*) to self-select foods at lunchtime. Key participant perspectives on the reduction of school lunch waste were the following: *1*) participants found it acceptable to throw undesirable food away; *2*) students perceived peers did not care if the food was being thrown away; and *3*) students perceived parents disliked wasting food.

**Conclusions:** Results suggest several factors might allow for minimization of school lunch plate waste. These included improvements in food quality with regards to food taste; food preparation and processing in the NSLP; changes in school policy to allow food choice instead of forcing students to take served lunch meals; and allowing students to save, share, compost, or feed animals the leftovers.

**Funding Sources**

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