ADULT- AND TEEN-LED EDUCATION USE IN HEALTHFUL GROCERY SHOPPING AND MENU PLANNING FOR PARENTS AND THEIR ADOLESCENTS

BY

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THESIS

Submitted in partial fulfillment of the requirements for the degree of Master of Science in Nutritional Sciences in the Graduate College of the University of Illinois at Urbana-Champaign, 2016

Urbana, Illinois

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ABSTRACT

Background. The average dietary pattern among young American adolescents does not meet the national Dietary Guidelines for Americans. Dietary habits developed in this age predict intake patterns in adulthood. Thus, poor dietary habits will persist and lead to elevated risk for obesity development. Interventions that cultivate healthful dietary habits among this population are needed to reduce obesity risk. Young adolescence is a unique life-stage of rapid physical and cognitive development that coincides with an expansion of social environments that include influences from peers, where an exponential amount of time is spent together, in addition to family.

Objective. To determine the feasibility for and effectiveness of a menu planning workshop, and a grocery store tour, to be led by young adolescent leaders to parents and their young adolescent children.

Methods. The menu planning workshop was evaluated using a randomized study design, where a convenience sample of 32 participants (15 parents and their 17 adolescent children) attended a workshop led by either an adult leader (AL) or teen leader (TL). The grocery store tour was evaluated using a randomized controlled pilot study, where a convenience sample of 132 participants (61 parents and 71 adolescent children) were enrolled. Families were randomly assigned to one of three groups: 1) an AL tour group (n=21 families); 2) a TL tour group (n=20 families); or 3) a 6-month waitlist control (CG) group (n=20 families). In both studies, process evaluations were conducted using observations as well as participant reports of perceptions of the programs. Participants completed questionnaires related to knowledge, self-efficacy, and program strategy use before participation and again immediately post- and at 3- and 6-months post-program.
Results. In the menu planning workshop pilot study, the majority of program tasks (>75%) were rated as “completed well” when led by either ALs or TLs. Among both parent and adolescent attendees, menu planning-related self-efficacy significantly increased from baseline to all follow-up assessments. Parents perceived that they had adopted an average of 5.11 behaviors (±4.86) that were encouraged during the workshop, out of 19 options; this was not significantly different between AL vs. TL groups. In the grocery store tour pilot study, the vast majority of tour tasks (>90%) were rated as “completed well” for both adult and teen leaders. Participants perceived the tour positively, but process observers noted specific shortcomings among teen leaders regarding public speaking and lesson knowledge. There were no significant differences for the majority of the shopping dynamic facets when compared over time or by AL vs. TL group. Similar to the menu planning workshop, parents and adolescents had significantly greater self-efficacy when baseline scores were compared to the last two assessment periods. Additionally, parents perceived that they adopted 6.47 behaviors (±4.19), of 11, over the six months following the grocery store tour; this was not significantly different between groups.

Conclusion. Both the menu planning and grocery store pilot studies indicated that it is feasible for young adolescents to lead programs on these topics to parents and their young adolescent children. However, an observed deficiency in public speaking skills and content expertise among young adolescents may need to be addressed using additional resources, personnel or other supportive measures. Additionally, limited but promising evidence indicates that these programs may encourage positive self-efficacy change among participants.
ACKNOWLEDGMENTS

*I am what I am because of who we all are*, Leymah Gbowee. My achievements have been possible due to the fortune I have had in receiving such awe-inspiring support from those around me. Thank you to everyone who has put some part of themselves into my personal and professional growth. Without your support, this thesis would not have been imaginable and I thank you for that.

Distinctively, I would like to thank my adviser, Dr. Sharon M. Nickols-Richardson, for providing me invaluable mentoring through this process. On my first visit to Illinois, the memory of your vigor for your research combined with your approachable nature still sticks with me today. It was the chance that I could work with you that truly solidified my decision to pursue graduate studies at the University of Illinois at Urbana-Champaign. Since, that first meeting, we have had countless more, and I still walk away from each with a revived sense of self and purpose. Thank you for always believing in my capabilities, even when I have not.

Secondly, I would like to briefly thank Dr. David L. Gee. Working with Dr. Gee, as an undergraduate student at Central Washington University, opened my eyes to the possibilities of research. My background never showed me that this was a potential path, and I appreciate your foundational guidance.

I would like to express my gratitude for the research funding I have received from the Academy of Nutrition and Dietetics Foundations’ Rita Campbell Weaver Memorial Scholarship, the USDA-NIFA Childhood Obesity Prevention Challenge Grant program, and the Division of Nutritional Sciences’ Kraft Fellowship. Additionally, I want to express my gratitude towards my committee members, Dr. Chapman-Novakofski and Dr. Gundersen. Their critical eye has been invaluable and I am thankful to have access to their combined expertise.

The Division of Nutritional Sciences has provided me an excellent experience, which has given me insight into the myriad of nutritional science research areas. I want to recognize several of
my fellow DNS students who I have grown close to; this has not only allowed me to see my research through the eyes of different fields but it has also provided me lifelong friends. I have been fortunate to grow close and learn from both students and faculty in DNS as well as the Department of Food Science and Human Nutrition, and for that I am eternally grateful.

Thank you to the other members of the Nickols-Richardson Lab. Carli Liguori, Catherine Metzgar, Henna Muzaffar, Amanda Oakley, and April Winslow: I am truly blessed to have had the opportunity to work with such powerful and brilliant women. You have all provided me support, in each of your unique ways, and I thank you for that. Additionally, I am grateful to the numerous undergraduate research assistants who have assisted with the implementation of these pilot studies. Special thanks to Virginia Anderson, Karen Chan, Helen Cheung, Charlie Knox, and Mia Zou for the exceptional role that you each played. It was a true honor to work with and mentor you, and I hope to continue to see your advancement in your respective fields.

Finally, I want to thank both my family and friends. To my family, thank you for allowing me to have the space to study when I needed it, while always being available and ready to share time with me when I came home. Your patience and enduring support has been precious to me. To my friends, both those I have met in Illinois and those that I have known for years, thank you for letting me shamelessly express myself as a superhero fanatic, science enthusiast, food obsessed, and sarcastic comedian (who is only sometimes funny). It is among your company, that I have learned how to accept myself while learning from others. Lastly, thank you to Peter. Words cannot capture how grateful I am to have you and PJ in my corner. How you can simultaneously inspire me to work harder while also encouraging me to pursue relaxation and joy, still perplexes me. With you at my side, I have learned how to pursue my professional dreams while never losing sight of what is truly important: the people who have supported me along the way.
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AL</td>
<td>Adult leader</td>
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<tr>
<td>BMI</td>
<td>Body Mass Index</td>
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<td>CON</td>
<td>Waitlist control</td>
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<tr>
<td>EFNEP</td>
<td>Expanded Food and Nutrition Education Program</td>
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<td>IRB</td>
<td>Institutional Review Board</td>
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<td>SCT</td>
<td>Social Cognitive Theory</td>
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<td>SNAP-Ed</td>
<td>Supplemental Nutrition Assistance Program-Education</td>
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<td>TL</td>
<td>Teen leader</td>
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<tr>
<td>TPB</td>
<td>Theory of planned behavior</td>
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<td>UIUC</td>
<td>University of Illinois at Urbana-Champaign</td>
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<tr>
<td>USDHHS &amp; USDA</td>
<td>U.S. Department of Health and Human Services and U.S. Department of Agriculture</td>
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CHAPTER 1: Introduction

Overweight and obesity in childhood is associated with annual healthcare expenditures of $14.1 billion (Trasande & Chatterjee, 2009). Overweight and obese youth are at an increased risk of maintaining an elevated body mass index (BMI) when they become adults (Patton et al., 2011; Singh, Mulder, Twisk, van Mechelen & Chinapaw, 2008), and costs elevate further as they develop obesity-related chronic diseases that require treatment (Cawley, 2010).

A low quality dietary pattern has been suggested to contribute to childhood overweight and obesity development (Davison & Birch, 2001). The average dietary pattern in the U.S. is below recommendations for fruit, vegetable and dairy intakes while exceeding recommendations for sodium, solid fats and sugars (U.S. Department of Health and Human Services and U.S. Department of Agriculture [USDHHS & USDA], 2015). Parents play unique roles in the development of their children’s dietary patterns. Parents not only provide food for their children, but also model food-related behaviors (Patrick & Nicklas, 2005). These two factors can have life-long implications for children as they develop independent dietary patterns into adulthood (Savage, Fisher & Birch, 2007). Behaviors developed in childhood are thought to lay a foundation for dietary behaviors in adulthood; adolescent health-related behaviors have been found to be significant determinants of dietary behaviors in young adulthood, when assessed five years later (Larson et al., 2008; Larson, Neumark-Sztainer & Story, 2009).

Numerous initiatives have attempted to address the growing concern of childhood obesity, with varying degrees of success. The most promising obesity prevention approaches are multi-component programs, combining environment, education, and parent engagement strategies (USDHHS & USDA, 2015). Within these comprehensive interventions, each element needs to work effectively and efficiently. Educational components are delivered using diverse modes (traditional lectures vs. contextual hands-on learning) and sources (professionals vs.
volunteers) without being tested for their particular efficacy, often based on convenience or subjective choices. Of interest, is the efficacy of using peers as educational leaders, due to the well-documented effect that peers have on influencing behaviors in other children, particularly in young adolescence (Péneau et al., 2009; Salvy, Coelho, Kieffer & Epstein, 2007; Guidetti, Conner, Prestwich & Cavazza, 2012).

The following research was conducted as part of the “PAWS Club: Peer-education About Weight Steadiness” program, supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Childhood Obesity Prevention Challenge Grant program. The long-term goal of this project is to prevent childhood obesity by utilizing and evaluating an evidence-based program. The original nine-lesson Family Fitness Program, based on Stages of Change Learning Theory and Social Cognitive Theory, was expanded to 12 lessons to further address intra- and inter-individual factors in the curriculum. The new, full curriculum is being empirically evaluated as an after-school program where middle school students are assigned to an adult leader (AL) or teen leader (TL) group. The research presented here includes the pilot testing of the additional “Grocery Shopping” and “Family Menu Planning” curricula.

Pilot studies were undertaken to evaluate these programs. The objective of the first pilot study, as shown in Chapter Three, was to evaluate the process validity and efficacy of the Grocery Shopping tour, and compare outcomes in AL and TL groups. The objective of the second pilot study, as found in Chapter Four, was to evaluate the process validity and efficacy of the Family Menu Planning program, and compare outcomes in AL and TL groups.
REFERENCES


CHAPTER 2: Literature review

In this chapter, foundational literature review that guided both pilot studies is presented. Theories of behavior change are reviewed, with special attention to the role that family and peers are hypothesized to take in forming behaviors. Cross-sectional and experimental evidence evaluating peer and family influence are then explored in-depth. The evidence for menu planning and grocery shopping, as health-related behaviors of interest, is provided. Finally, interventions that have attempted to modify these behaviors are outlined and assessed.

Theoretical foundations of behavioral change

In 1985, Ajzen outlined the theory of planned behavior (TPB) as an evolution of the previously established theory of reasoned action (Fishbein, 1979). The TPB proposes that behavioral attempts are based on an individual’s personal factors. These variables include behavioral intentions, which are independently predicted by attitudes, subjective norms, and perceived control (Ajzen, 1991). The TPB improves upon the theory of reasoned action by acknowledging that behavioral attempts are not always successful and desired outcomes are not produced. Ajzen illustrates this with examples of unsuccessful weight loss or exercise attempts, and he speculates that these are caused by changed intentions, a lack of willingness to try, or will-power deficits. The notion of external factors influencing behaviors, is acknowledged but not explored in any depth. The usefulness of the TPB was tested in a sample of female undergraduate students (Ajzen, 1985), where the relationship between weight loss, TPB factors, and personality traits were studied. TPB was successful at predicting intentions to lose weight as well as actual weight loss in the 6-week study, while personality factors were not. TPB provides a foundation for many successful public health interventions, but its narrow focus on the

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1Additional review of grocery shopping-related literature can be found in Appendix A, as this piece of writing was an accepted manuscript at the time of thesis submission.
individual leads some experts to argue that it is insufficient because powerful external variables are not considered.

Stokols (1992) posited that health promotion efforts were too narrowly focused on the individual and that the impact of healthy environments was of greater importance. Ecological models have thrived in the following decades; they have been used as frameworks for cross-sectional work, interventions, clinical trials, and have even helped to inform the Dietary Guidelines for Americans (U.S. Department of Health and Human Services and U.S. Department of Agriculture [USDHHS & USDA], 2015). As described by Story, Kaphingst, Robinson-O'Brien and Glanz (2008), ecological theories outline environmental influences on dietary behaviors. The framework has four distinct levels: 1) individual, which includes biological and cognitive characteristics (such as motivation, self-efficacy, outcome expectations, and behavioral capabilities); 2) social, which emphasizes the influential role of family, friends, and peers; 3) physical, which includes locations where people eat and procure food; and 4) macrolevel, which incorporates far-removed societal influences such as marketing, social norms, production, distribution networks, pricing, and policies. These environments are described in order of proximity to the individual, but the hierarchical power of each level is not well understood (Story et al., 2008).

Ecological theories have informed studies at each of the environmental levels. Examples are presented below for each. Familial influences at the social level have inspired studies of the home food environment, where availability of healthful or unhealthful foods in the home is associated with children’s fruit and vegetable intakes (Couch, Glanz, Zhou, Sallis & Saelens, 2014; Loth, MacLehose, Larson, Berge & Neumark-Sztainer, 2016). Regarding the physical environment, tremendous attention has focused on retail food environments, but research has
produced mixed results. Concentration of convenience stores has been associated with lower dietary quality in adults, with strongest consequences among low-income households (Rummo et al., 2015). However, this concentration does not predict weight gain in children, even when low-income families are over-sampled (Lee, 2012). At the macrolevel, research on the influence of soda taxes on childhood obesity shows that financial barriers may be trivial, except among at-risk minorities or for low-income families (Sturm, Powell, Chriqui & Chaloupka, 2010).

Incorporating both personal and external variables and how these elements interact to predict behavior is the defining premise of the Social Cognitive Theory (SCT; Bandura, 1991). The SCT describes the interaction between individuals and their environment as well as learning and adaptation capacities (McAlister, Perry & Parcel, 2008). Since its initial introduction in 1977 as the social learning theory, the SCT has been widely used in various public health interventions. It is renowned for the concept of self-efficacy, or an individual’s confidence about capacity to perform a specific behavior. However, the SCT attempts to explain all human behavior (health-related or otherwise). It thus includes additional concepts, beyond self-efficacy, that are categorized by McAlister et al. (2008) into five components: 1) psychological determinants of behaviors; 2) observational learning; 3) environmental determinants of behavior; 4) self-regulation; and 5) moral disengagement.

Numerous studies involving children have demonstrated that these constructs predict desirable health behaviors, such as physical activity (Harmon et al., 2014; Dai & Sharma, 2014), water consumption (Dai & Sharma, 2014; Elmore & Sharma, 2014) and a variety of healthful dietary habits (Dai & Sharma, 2014; Elmore & Sharma, 2014; Lubans et al., 2012; Mirzaei, Ghofranipour, & Ghazanfari, 2016). When used as a foundation for development and implementation of childhood obesity interventions, a review of 57 interventions revealed that
SCT was the theoretical foundation for the only four trials that resulted in statistically and clinically significant outcomes (Thomas, 2006). However, positive results have not always been linked to SCT. A recent study compared a nutrition education curriculum for children based on SCT to one based solely on knowledge and found that both led to similar positive behavioral outcomes (Branscum, Sharma, Wang, Wilson, & Rojas-Guyler, 2013).

*Parent and peer influence on behaviors*

Parents play unique roles in developing their children’s dietary patterns by not only providing food, but by modeling food-related behaviors (Patrick & Nicklas, 2005; Brug, 2008). As children grow older and attend school, their social circles expand beyond simply familial influence. During young adolescence, specifically the ages of 10 to 14 years, children spend the most time with their peers (Eisenberg, 2006). Therefore, the combined ability of parents and peers to influence behaviors in school-aged children is hypothesized to be remarkable.

Each theoretical model discussed above indicates this potential for social influences to impact behavior in unique ways. In the TPB, family and peer influences are implicated in developing an individual’s subjective norms through social pressure (Ajzen, 1991). However, the basis of social pressure and how subjective norms are built by external social factors has not been explored. Ecological models highlight the power of social influence within a distinct social environment, just one sphere removed from personal characteristics (Story et al., 2008). In the SCT, family and peers are considered some of the influencers that impact an individual’s ability for observational learning (McAlister et al., 2008). Observational learning happens when acquiring skills or knowledge by watching or listening to models such as family, peers or media. The SCT, additionally, acknowledges that family and peers facilitate an individual’s social outcome expectations. Similar to subjective norms in the TPB, if an individual’s social circle
values a behavior, then positive outcome expectations can influence their motivation. Yet, McAlister et al. (2008) note that this influence is limited by the weight placed on the opinion of family and peers; outcome expectations based on an individual’s self-evaluation can be more powerful, depending on the individual and setting. These theoretical considerations have inspired researchers to investigate familial and peer influence using both observational and experimental methods.

Cross-sectional work has produced evidence of parent and peer influence on food- and health-related behaviors. Dietary intake, specifically fat and energy consumption, of parents and children has been correlated, but the relationship was unexpectedly weak (Wang, Beydoun, Li, Liu, & Moreno, 2010). Robson et al. (2016) recently re-evaluated this question by comparing dietary patterns, as dietary quality scores, of parents and their children; they found that this method suggested parent and child dietary intake were more closely related than previously estimated. Children’s fruit and vegetable intakes have more consistently been associated with parental education level (van Der Horst et al., 2007). Parents’ attitudes and feeding styles also predict children’s food preferences and intake regulation (Patrick & Nicklas, 2005). Parents and peers influence discrete outcomes. For example, attitudes towards fruit in adolescents were predicted by parents’ attitudes, while savory snack preference was predicted by friends’ preferences (Guidetti, Conner, Prestwich, & Cavazza, 2012). Peers also influence social norms (Stok et al., 2015), and boys and girls respond differently to the influencing behaviors of peers (Larson, Wall, Story, & Neumark-Sztainer, 2013).

Controlled experimental trials studying social influence on food-related behaviors has primarily focused on peers. Peer modeling positively influenced bell pepper consumption among 3- to 5-year-old children after seven days when they were shown videos of children eating bell
peppers, compared to a control group (Staiano, Marker, Frelier, Hsia, & Martin, 2016). In contrast to literature reporting increased intake among adults when in groups, research shows that children’s intake in groups is more variable. In a lunchroom setting, normal weight high school students who ate in groups consumed less food when compared to eating alone (Péneau et al., 2009). In comparison, a sample of 6- to 10-year-old children revealed that normal weight children consumed more in groups while overweight children consumed less, when compared to eating alone (Salvy, Coelho, Kieffer, & Epstein, 2007a). Additionally, eating partner characteristics may impact children’s food intake. Intake increases when children eat with siblings (Salvy, Vartanian, Coelho, Jarrin, & Pliner, 2008) or with their friends (Salvy, Howard, Read, & Mele, 2009) as compared to eating with unknown peers or alone. Overweight children consumed more food when eating with other overweight children in comparison to normal weight children, who were not impacted by their eating partner’s weight (Salvy et al., 2009; Salvy, Romero, Paluch, & Epstein, 2007b). However, concerns have been voiced about the conclusions that are being drawn by some analyses of peer effects on obesity (Cohen-Cole & Fletcher, 2008).

The body of cross-sectional and experimental research has inspired authors to call for interventions utilizing the social influences of parents and peers. Interviews with parents and their elementary-aged children revealed that meal and snack decisions were rarely discussed; thus, Ndiaye et al. (2013) suggested that future interventions should cultivate food and nutrition discussions between parents and children. Many of the experimental investigations of peer influence have been conducted by the Salvy research group, and in a recent review article, they urged future research to include peers in public health interventions (Salvy & Bowker, 2014).
In response, reviews of programs and research interventions that incorporate either parents or peers into nutrition education efforts have evaluated this integration. A recent systematic review found that including peers as nutrition education leaders was not associated with anthropometric improvements but promising influences on mediators of behavior change were documented (Nelson & Nickols-Richardson, 2014). Additionally, almost all effective childhood obesity interventions utilized parental or family involvement (Ho et al., 2012), and Niemeier, Hektner, and Enger (2012) found that parent participation was an important predictor of weight-related program effectiveness. Parental involvement in interventions can vary widely; parents may receive an entirely separate program (Kalarchian et al., 2009; McGowan et al., 2013), parents may join children at lessons (Trost, Sundal, Foster, Lent, & Vojta, 2014; Anderson, Newby, Kehm, Barland, & Hearst, 2014), or parents may simply receive supplementary information in the mail (Folta et al., 2013).

**Benefits and barriers of menu planning**

Menu plans built by nutrition professionals have elicited greater weight loss when combined with a 26-week standard behavioral treatment as compared to standard behavioral treatment alone (Wing et al., 1996). Moreover, when groups were provided food, whether free or charged, no greater weight loss resulted (Wing et al., 1996), suggesting that menu plans have compelling potential for transforming nutrition knowledge into practice when built by professionals. Of interest, is whether a layperson’s menu planning can influence eating patterns and ultimately his or her individual or family health.

Evidence, though limited, suggests that menu planning is associated with positive outcomes. Among parents with 2- to 5-year-old children, higher self-efficacy for menu planning was linked to planning weekly menus and making shopping lists as well as eating less frequently
at fast food restaurants (Morin, Demers, Turcotte, & Mongeau, 2013). Darko, Eggett and Richards (2013) suggest that meal planning can also keep families from over-spending on food, as based on focus group findings with low-income families. African American mothers report using meal plans to provide fruits and vegetables to their children (Reimer et al., 2004), and in a survey of 1,136 Australian women, frequency and enjoyment of meal planning was associated with consuming two or more servings of vegetables per day (Crawford, Ball, Mishra, Salmon, & Timperio, 2007). In a survey of Expanded Food and Nutrition Education Program (EFNEP) participants, women of low-income who planned their meals were more likely to meet the recommended vitamin A intake than women who did not plan (Hersey et al., 2001). These cross-sectional studies are promising, but generalizability of results is limited by disparate characteristics of samples.

Evidence of the effectiveness of menu planning may be bolstered by incorporating the use of grocery lists into study outcomes, but this requires the assumption that list use is an indicator of planning before grocery shopping. Dubowitz, Cohen, Huang, Beckman and Collins (2015) found that reporting “always” using a list was associated with a higher quality diet and lower body mass index (BMI), among low-income adults. Au, Marsden, Mortimer and Lorgelly (2013) extended previous work by Wing et al. (1996), with a computational simulation that showed encouraging grocery list use along with standard behavioral treatment for obese and overweight subjects was efficacious and cost-effective at improving body weight outcomes. However, Beneke and Davis (1985) observed that list users purchased more calories in groceries per family member when compared to non-list users in a cross-sectional survey.

Other investigations have explored how families deal with a scarcity of time. Researchers often find that families have to cope with food-related decisions that can either hinder or
facilitate diet quality such as eating fast food or planning meals, respectively (Blake et al., 2009; Devine et al., 2006). Lack of meal preparation self-efficacy is associated with lower nutrient quality of children’s evening meals as well as prioritization of convenience in meal preparation (Beshara, Hutchinson, & Wilson, 2010). Lesser menu planning frequency is associated with lower healthfulness of family dinners (Neumark-Sztainer et al., 2014). Additionally, lack of menu planning is associated with eating family dinners together less frequently (McIntosh et al., 2010), a particularly important finding as family meals have been associated with several positive food-related outcomes (Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003).

Based on the evidence, menu planning and grocery list use are potentially powerful ways by which consumers maintain healthy eating patterns for themselves and their families. However, use of and confidence regarding menu planning is relatively low. Self-efficacy for menu planning is much lower, in comparison to that for grocery shopping and cooking in parents with young children (Morin et al., 2013). Studies indicate that only 20-50% of adult shoppers report planning weekly menus before shopping (Beneke & Davis, 1985; Abbot & Byrd-Bredbenner, 2010; Morin et al., 2013; Koszewski, Sehi, Behrends, & Tuttle, 2011). Parents with a higher education level are more likely to plan meals in advance (Morin et al., 2013).

**Menu planning interventions**

Fulkerson et al. (2011) found a strong desire among working parents for menu planning and preparation programs that focused on skill building. Yet, few interventions address menu planning as a primary focus or include it as an outcome of interest in research. Education efforts have focused on menu planning skills to improve diabetes management (Camelon et al., 1998; Raidl et al., 2007; Raidl & Safaii, 2013). However, these addressed audiences with chronic
disease management concerns, in contrast to prevention, with individuals who were more likely to be motivated to learn and change behaviors compared to the general public.

One of the first published studies that focused on menu planning was conducted in an experimental setting in which Beneke, Davis and Vander Tuig (1988) examined a group of adult women interested in weight loss (another potentially highly motivated group of individuals). Women participated in a weight loss trial and were taught at their fifth lesson, of 12, how to create a menu plan and grocery list. Beneke et al. (1988) analyzed participants’ grocery receipts and calculated average kilocalories purchased per family member per week to compare how food purchases changed over time. Participants purchased significantly fewer kilocalories of food after the menu planning lesson for the remainder of the trial as well as during the 12 weeks that followed the trial, in comparison to before the lesson. In contrast, a non-equivalent control group of women not attempting weight loss did not alter their purchases of kilocalories of food in the same time period.

Dixon, Condrasky, Corr, Kemper and Sharp (2014) sought to elevate menu planning importance as a skill that complements cooking lessons for children. They did this within an existing 5-day intensive cooking camp for 10- to 14-year-old children by introducing an online menu-planning tool during the camp. Using a pre- vs. post-questionnaire design, menu planning self-efficacy and beliefs about meal planning to increase fruit and vegetable intakes were evaluated. Results from their pilot test of 53 children indicated that menu planning self-efficacy increased at the end of camp, compared to baseline. This was consistent across questions about planning a single meal, planning meals for a day, and planning for a week. However, belief that planning meals would influence vegetable intake decreased significantly and beliefs that planning meals would influence fruit intake did not change. Dixon et al. (2014) suggested that
measurement changes and parent inclusion would be critical to include in future menu planning interventions.

Parent inclusion in three menu planning interventions have been published (Cullen & Thompson, 2008; Abbot & Byrd-Bredbenner, 2010; Court, Vince-Cain, & Jefferson, 2010). Each trial utilized online mediums so families could easily be reached. Cullen and Thompson (2008) tested a culturally tailored website in an 8-week intervention with 55 African American families who had at least one 9- to 12-year-old child. The intervention was SCT-based, with healthy behavior modeling demonstrated by brief “photo-novella” stories. Website content changed weekly, with two weeks focusing on menu planning skills. Despite low reach, with only an average of 59% log-on rates, fruit- and vegetable-focused menu planning self-efficacy positively improved. Abbot and Byrd-Bredbenner (2010) also reported a significant increase in menu planning self-efficacy among mothers who participated in a 4-week distance “Kitchen Makeover” intervention, when they tested a novel menu planning tool. Participating mothers reported feeling less stressed about meal preparation, and they perceived their meals as healthier at the end of the intervention. Court et al. (2010) were the only authors to report measures of menu planning frequency, as measured by a 7-item questionnaire. Menu planning behavior positively increased in a sample of 528 parents who participated in a 4-week online intervention in the United Kingdom. Court et al. (2010) encouraged healthful behaviors through website content as well as daily e-mail “challenges” and a discussion forum that provided access to a Registered Dietitian. Overall, distance menu planning education techniques seem to have been successful at influencing parents. However, the inclusion of children was not discussed in these studies.
The most common source of menu planning-focused education is within programs targeting low-income audiences. Extension programs are one of the most common sources of these intervention publications. Extension is a service of all land-grant universities, which serves to “extend” the learning and knowledge from within universities through community programming. Many extension programs are responsible for oversight of local EFNEP and Supplemental Nutrition Assistance Program-Education (SNAP-Ed) activities, which are federally funded initiatives encouraging nutrition and food-related knowledge in low-income families.

Eating Smart – Being Active and Cent$ible Nutrition are two of the most widely used curricula in EFNEP (Murray, Auld, Inglis-Widrick, & Baker, 2015). According to M. Meuli, the Cent$ible Nutrition Program Director (personal communication, January 4, 2016), the “30-Minute Menu Planning” lesson is 1 of 17 lessons in the program and is primarily based on their affiliated cookbook. In this lesson, menu planning benefits and barriers are discussed and food resources are identified to establish a monthly food budget. Before the lesson is over, participants utilize a menu planning tool and MyPlate diagram to practice menu planning and develop menu-based grocery lists.

Eating Smart – Being Active is based on the 2010 Dietary Guidelines for Americans, the SCT, and principles of adult learning (Colorado State University Extension, 2007). The program contains eight core lessons with three supplementary lessons for pregnant women or mothers. Each lesson begins with a brief discussion-based lecture focused on saving money, followed by physical activity and a food-related activity or tasting. An “enhancement item” (such as a resistance band or measuring cups) is given to participants to encourage behavior change after the lesson. Similar to Cent$ible Nutrition, their “Plan, Shop, Save” lesson is the only one focused
solely on menu planning and also addresses two additional shopping skills: reading a nutrition facts label and comparing prices in the store.

Menu planning-related outcomes of extension programs have primarily been reported in the *Journal of Extension*. Two studies were conducted with new curriculum implementation. Cullen et al. (2009) conducted a large randomized controlled trial to compare the standard EFNEP curriculum to a new version based on the SCT and enhanced with videos as well as goal-setting. Participants were primarily female, Hispanic and an average age of 35 years. Significant improvements from baseline in self-efficacy for and frequency of menu planning behaviors were reported. This improvement was sustained at a 4-month follow-up, and there was no difference between curriculum groups. Both EFNEP and SNAP-Ed were evaluated by Hoover, Martin and Litchfield (2009), when a new curriculum was compared against an existing curriculum. One item was used to assess how often meals were planned ahead of time, and data were collected at baseline and immediately post-intervention. Data were collected over three program years, and participants consistently reported a significant increase in menu planning frequency.

In an effort to establish program effectiveness over time, Koszewski et al. (2011) conducted a pre- vs. post-evaluation that included three time intervals: prior to the classes, immediately post and at a 6-month follow-up. They evaluated 1,100 adults, who attended a minimum of six SNAP-Ed or EFNEP lessons, using a 15-item questionnaire at each time interval. Again, only one item was used to examine how often meals were planned ahead of time. Participants reported more frequent menu planning, with over 60% reporting planning meals ‘most of the time’ or ‘almost always’ immediately post-program and at the 6-month follow-up. Similar positive results were reported for use of grocery lists, with 65% reporting use of a list
‘most of the time’ or ‘almost always’ both immediately post-program as well as at the 6-month follow-up.

A comparison of the efficacy of SNAP-Ed when taught with distance education methods compared to traditional face-to-face interaction was published (Campbell, Koszewski, Behrends, King & Stanek-Krogstrand, 2013). As with other Extension evaluations, a 15-item behavior questionnaire was administered pre- and post-program, with a single item querying about the frequency of planning meals ahead of time. Both the traditional and distance education group participants reported a significant increase in meal planning frequency.

The published extension outcomes are promising evidence across versatile education methods and measurements over time. However, many results are based on one or two questionnaire items. Additionally, EFNEP and SNAP-Ed programs are restricted to serving limited-resource audiences and, thus, results may not be generalizable to other populations. Additionally, extension studies were conducted solely with adults, and childhood obesity prevention efforts would be most effective if parents were included along with their children in programs.
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CHAPTER 3: Feasibility of an obesity prevention-focused family menu planning workshop: Evaluation of adult- and peer-led instruction²

ABSTRACT

Objective: To evaluate the feasibility of a menu planning workshop led by young adolescents or adults, delivered to parents and their young adolescent children.

Methods: A convenience sample of 15 parents and their 17 adolescent children were randomly assigned to attend a menu planning workshop taught by either an adult or teen leader. Process evaluation was conducted using workshop observations as well as participant perceptions. Adults and adolescents completed questionnaires before attending as well as immediately after and 3- and 6-months after the workshop. Questionnaires measured menu planning-related knowledge, self-efficacy and program strategy use.

Results: Both adult and teen leaders were observed completing the majority (>75%) of program tasks well, and participants had positive perceptions of the workshop. Menu planning-related self-efficacy significantly increased for both parents and adolescents from baseline to all three follow-up assessments.

Conclusions and Implications: Current findings support that young adolescent leaders and adult leaders can feasibly teach a menu planning workshop to parents and their young adolescent children. Additional outcomes provide limited but promising indications that menu planning-related self-efficacy may increase after the workshop and remain elevated when assessed 6-months later, regardless of teacher type.

² To be submitted to the Journal of Adolescent Health
INTRODUCTION

Childhood obesity is a paramount public health concern. A low quality dietary pattern is one factor contributing to obesity development (Davison & Birch, 2001), and the average U.S. diet does not meet recommendations (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). Dietary behaviors developed in childhood lay a foundation for behaviors in adulthood. Health-related behaviors in adolescence have been shown to significantly predict dietary choices in young adulthood (Larson et al., 2008; Larson, Neumark-Sztainer & Story, 2009). Thus, developing healthful dietary patterns is critical.

Menu planning is a behavior of interest associated with various positive health outcomes. Menu planning has been correlated with eating less frequently at fast food restaurants (Morin, Demers, Turcotte, & Mongeau, 2013), consuming two or more servings of vegetables per day (Crawford, Ball, Mishra, Salmon, & Timperio, 2007) and a greater likelihood of meeting vitamin A intake recommendations (Hersey et al., 2001). Lesser menu planning frequency is associated with lower healthfulness of family dinners (Neumark-Sztainer et al., 2014) and fewer family dinners (McIntosh et al., 2010), a particularly important finding as greater frequency of family meals has been associated with several positive food-related outcomes (Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003). This cross-sectional work provides promise, but inherently is limited by selection bias and cannot be used to infer causality.

Interventions addressing menu planning skills have successfully influenced positive behavior change, or mediators of it. Dixon, Condrasky, Corr, Kemper and Sharp (2014) successfully increased menu planning self-efficacy in 10- to 14-year-old children attending a cooking camp by introducing an online menu planning tool. However, they suggested parent inclusion would be critical to include in future menu planning interventions (Dixon et al., 2014).
Adolescents have reported assisting in food preparation and purchasing activities (Larson, Story, Eisenberg, & Neumark-Sztainer, 2006), but their participation in menu planning behaviors has not been established. In practice, menu planning is primarily, if not solely, conducted by parents in a family setting. Three published menu planning interventions have included parents (Cullen & Thompson, 2008; Abbot & Byrd-Bredbenner, 2010; Court, Vince-Cain, & Jefferson, 2010). Cullen and Thompson (2008) tested an 8-week intervention based on Social Cognitive Theory (SCT) with 55 African American families who had at least one 9- to 12-year-old child; despite low reach, fruit- and vegetable-focused menu planning self-efficacy positively improved. A significant increase in menu planning-related self-efficacy was also found among mothers participating in a 4-week “Kitchen Makeover” intervention that included a menu planning tool (Abbot & Byrd-Bredbenner, 2010). Court et al. (2010) reported a positive increase in frequency of menu planning among a sample of parents who participated in a 4-week online intervention in the United Kingdom. Additionally, federally-funded programs such as the Expanded Family Nutrition Education Program and Supplemental Nutrition Assistance Program-Education, targeting low-income audiences, have reported adults increased menu planning frequency after program participation (Koszewski, Sehi, Behrends, & Tuttle, 2011; Campbell, Koszewski, Behrends, King & Stanek-Krogstrand, 2013). Thus, interventions have achieved some success in influencing self-efficacy and menu planning behaviors with child and parent audiences, but no interventions have included both children and parents as participants in the same program.

Additionally, interventions have not capitalized on peer influence. The strong role that peers play in developing social outcome expectations and promoting observational learning is outlined in the SCT (McAlister, Perry, & Parcel, 2008). Cross-sectional studies have demonstrated the influence that peers have on social norms (Stok et al., 2015) and snack
preference among children (Guidetti, Conner, Prestwich, & Cavazza, 2012). Experimental research has further evaluated peer influence on dietary intake in controlled settings. Compared to eating alone, eating in groups influenced high school students to eat less (Péneau et al., 2009), while 6- to 10-year-old children ate more in groups if they were normal weight and ate less if they were overweight (Salvy, Coelho, Kieffer, & Epstein, 2007a). Additionally, peer characteristics may further mediate peer effects. Intake increases when children eat with their friends (Salvy, Howard, Read, & Mele, 2009) as compared to eating with unknown peers or alone. Overweight children consumed more food when eating with other overweight children in comparison to normal weight children, who were not impacted by their eating partner’s weight (Salvy et al., 2009; Salvy, Romero, Paluch, & Epstein, 2007b). Thus, the influence of peers is complex and multi-faceted but nonetheless powerful.

Public health interventions have capitalized on this peer influence by utilizing peers as leaders, and a systematic review found that these programs may successfully influence mediators of dietary behavior change (Nelson & Nickols-Richardson, 2014). Based on the SCT, a family menu planning workshop that could be taught by young adolescent peers, the age where the most time is spent with peers (Eisenberg, 2006), was developed. Building on the previous literature, this program included both parents and children in the workshop and incorporated the power of peer influence. The purpose of this pilot study was to evaluate the feasibility of the family menu planning workshop being led by young adolescents, before it was incorporated into a 12-week after-school childhood obesity prevention program.
METHODS

Workshop Development

The workshop was designed by experts in human nutrition, based on existing extension curricula and a review of the limited relevant literature. The workshop established menu planning as a process of creating a weekly plan of meals, while also addressing the foundations of a healthy meal and recommendations for eating out. The workshop had five objectives for participants: “1) Use dietary recommendations to plan family meals; 2) Create weekly family meal schedules; 3) Plan healthy meals away-from-home; 4) Plan quick healthy meals; and 5) Build cost-effective healthy shopping lists” (Nelson, 2013, p. 92). The curriculum was designed to be taught to 11- to 14-year-old children in two hours and primarily used a structured group discussion format while also incorporating hands-on menu planning-related activities. When reviewed by eight experts for content validity, the workshop materials were found to be ‘somewhat relevant’ with ‘neutral’ to ‘some ability’ to meet the stated objectives (Nelson, 2013).

Formative evaluation was conducted with a pilot study of the workshop in an after-school setting with eight, female, 11- to 14-year-old children, where focus groups and surveys were completed after the program (Nelson, 2013). The workshop took 1 hour and 41 minutes to deliver, and seven children were able to attend the entire session. Process evaluation indicated that participants had difficulty with the family schedule, because they reported not knowing all of their family’s activities, and they asked multiple times for additional time to complete the shopping list development activity (Nelson, 2013). In the focus groups, participants indicated they enjoyed the workshop, felt it was age-appropriate, wished they had more time for activities, and felt it would be useful to take the shopping list handout home. Participating girls indicated
that they had high self-efficacy, social support, and outcome expectations related to family menu planning in post-lesson questionnaires (Nelson, 2013).

Previous pilot work indicated the workshop had promise, but based on the feedback received, modifications to program materials were necessary before further use. Concerns about knowing the full family’s schedule and potential confusion with the shopping list development activity were mitigated by including parents as participants in the workshop. In response to concerns about adequate time to complete lesson activities, components of these activities were simplified, the number of steps were reduced, and additional resources to facilitate activity completion were provided.

**Recruitment, Screening & Enrollment**

Families were recruited by word-of-mouth, electronic mail messages, and flyers from the University of Illinois at Urbana-Champaign (UIUC) campus and Urbana-Champaign (IL, USA) communities. A flow diagram of response, screening, and randomization steps is displayed in Figure 3.1. A total of 33 individuals, representing 33 families, responded to recruitment efforts, between April and July 2015. Of these, 24 families met eligibility criteria (adult parent/guardian and their child in 6th to 7th grade or 11- to 14-years old with adequate transportation) and were invited to attend the program. Fifteen of these families attended the workshop. The Institutional Review Board (IRB) for the protection of human subjects at UIUC approved the study protocol (UIUC IRB#15447). Parents provided written informed consent, adolescents provided written informed assent, and families were provided compensation valued at $15 for their participation.

**Study Design**

This was a six-month randomized obesity prevention-focused pilot study of families with children in 6th to 7th grade or 11- to 14-years old. After enrollment, families selected one of two
weekday evenings that they were available. Once a day was designated, families were randomly assigned to attend one of two simultaneously conducted programs: 1) a menu planning workshop delivered by a teen leader (TL) or 2) a menu planning workshop delivered by an adult leader (AL). The TL and AL workshops were identical in curriculum; the only difference was the age of the individuals leading the program. The workshop that families (one parent with one or two children in the age range) attended was a single, 75-minute program, hosted in university building conference rooms.

Adult and teen leaders were recruited from the community using word-of-mouth and electronic messages. Two female ALs, over the age of 25 years, and two male TLs, between the ages of 11 to 14 years, were recruited in this manner. The four leaders were trained on the workshop curriculum and materials by the lead investigator. Leaders had an opportunity to learn the program parts, receive a demonstration of a mock workshop, and practice leading the workshop themselves.

**Outcome Measures**

Outcome measures were collected from parents and adolescents at four time periods: 1) before attending the program (referred to as pre-); 2) after attending the workshop (referred to as post-); 3) three months after attending the program (referred to as 3-months post-); and 4) six months after attending the workshop (referred to as 6-months post-). All participants completed paper questionnaires in-person at the pre- and post-assessment periods. At the 3- and 6-month post-assessments, all families were sent questionnaires by postal or electronic mail, based on their preference.

*Demographics.* Data on age, race, ethnicity, gender, marital status, number of children, highest level of education, height, weight, and income were collected pre-, when parents
completed a demographic questionnaire. Adolescents completed a similar questionnaire that asked about age, race, ethnicity, gender, and grade in school.

**Feasibility Outcomes**

*Process observation.* During the program, a member of the research team evaluated the workshop progress with an investigator-designed process observation checklist. This evaluated attendance, length of session, topic completion, and participant engagement. An observer rating at least 80% of session tasks as “completed well” was the threshold used to consider the workshop feasibly completed. A comment box was also used to note general comments that the process observer deemed relevant. Evaluations assessed whether the entire dose of the workshop was delivered. Participant’s level of engagement was rated every 30 minutes on a 5-point scale (ranging from 1=‘Not engaged at all’ to 5=‘Very engaged’).

*Program perception.* At post-, parents and adolescents completed a perception of program questionnaire. This questionnaire contained open-answer questions; five items related to the overall workshop, and four items regarding activities. Items on the questionnaire were based on focus group questions used in the previous formative work (Nelson, 2013). Participants indicated whether they liked elements of the workshop, their thoughts on the difficulty level, appropriateness of time allotments for activities, suggestions that would improve the program, and whether they would recommend the workshop to others if it were provided again.

**Workshop Outcomes**

*Knowledge.* Both parents and adolescents completed investigator-designed quizzes as assessments of menu planning-related knowledge. These quizzes contained five items, with one correct answer for each item. If the participant answered the question correctly, they were given one point, resulting in a score ranging from 0 to 5. Knowledge was assessed using this method at
pre-, post-, 3-months post- and 6-months post-workshop, with slight changes in item wording (to avoid assessment memorization) at each time point but consistent topic coverage.

**Self-efficacy.** Both parents and adolescents completed investigator-designed menu planning self-efficacy questionnaires. The questionnaire contained 11 statements of menu planning-related tasks and assessed the participant’s confidence level in performing each task on a scale of one (NOT at all confident) to five (Extremely confident). This Likert-type scale is similar to that used previously in a menu planning intervention (Cullen & Thompson, 2009). The 11 confidence ratings were averaged to represent an overall self-efficacy score. This questionnaire was completed pre-, post-, 3-months post- and 6-months post-program.

**Strategy utilization.** At the 6-month follow-up, a questionnaire assessing the use of health-promoting behaviors taught in the menu planning workshop was administered to parents. The questionnaire contained 19 statements of behaviors, and parents rated each behavior as “decreased,” “no change” or “increased” in the last six months. Answers of “decreased” were coded as -1, “no change” as 0, and “increased” as 1 before being summed as a score representing net change, with scores ranging from -19 to 19.

**Data Analyses**

All statistical analyses were conducted using SAS software (version 9.4, 2011, SAS Institute Inc). Categorical variables were compared using chi-square tests. Due to lack of normal distributions, continuous variables were analyzed using non-parametric tests. Kruskal-wallis tests were used to compare groups, and Wilcoxon signed-rank tests were used to analyze change over the four assessment time points. These non-parametric tests are recommended for use with small sample sizes (Fagerland, 2012). The level of significance was 0.05.
Qualitative open answers from the process observation notes and the workshop perception questionnaire were analyzed for themes. These themes were quantified as percentages for each group and then compared to explore differences between AL and TL groups. Qualitative analyses provided a chance to identify discrepancies between groups that may have otherwise been missed using purely traditional quantitative measures.

RESULTS

Program participants:

Fifteen families (15 parents and 17 adolescents) attended the workshops. Six families were randomly assigned to the AL group and nine families randomly assigned to the TL group. Fourteen families completed pre- and post-program surveys, with one family unable to remain at the workshop after consenting due to a family emergency. Participating parents were all women (100.0%), primarily non-Hispanic (93.3%) and White (80.0%) and aged 45.4 (±4.2 [SD]) years with self-reported BMI of 24.9 kg/m² (±4.7). The majority were married (73.3%), had a Bachelors degree or more (80.0%), and had an annual household income of $50,000 or more (78.6%). Adolescent attendees were primarily female (58.8%), non-Hispanic (93.8%) and White (88.2%), and aged 12.2 (±1.0) years. Teens reported attending 13 different schools in the community with a grade level of 7.2 (±1.0). Demographic characteristics of groups are shown in Table 3.1. Champaign county, IL, has 50.1% female, 73.8% White, and 94.3% Non-hispanic residents with 42.5% having a Bachelor’s degree or greater (U.S. Census Bureau, 2016). In comparison to the average county residents, a higher proportion of study participants were female, white, and had a Bachelor’s degree or more.

At 3-months post-, 5 of the 15 consented families had withdrawn from the study (AL=3, TL=2) which represented a 50% attrition for AL and 22% attrition for TL groups. At 6-months
post-, the AL group had a 50% withdrawal rate (n=3 remaining) and the TL group, a 33% attrition rate (n=6 participants remaining). Evans et al. (2009) also reported difficulties maintaining participation in a 6-month long health-related intervention for adolescents.

**Feasibility Outcomes**

*Process observation.* Measures of process are reported in Table 3.2. The total time taken to deliver the program was 76.3 (±13.9) minutes, and an average of 8 (±3) participants attended each workshop. Participant engagement was rated by the observer as 4.2 (±0.4) on average. Fidelity of each workshop was high, with at least 80% of tasks completed in each program. Workshops led by teens tended to be shorter in length, have more attendees, and had fewer tasks completed well when compared to those led by adults. Qualitative notes from the process observer indicated that TLs had difficulty addressing comments of participants and often “read directly off paper” in comparison to ALs who “did good job on giving suggestions” and “went through the room to ask questions to get engaged.”

*Workshop perception.* All parents who completed the AL workshop reported positive perceptions of the experience; 100% (n=5) agreed that they liked the program; thought it was taught at an understandable level; liked the handouts; would recommend the program to friends; and activities were clear, likable, at an appropriate difficulty level and were given enough time for completion. When asked for suggestions that would improve the workshop, parents in the AL group suggested providing links to online resources and introduction sections for facilitators to provide details about their training and position.

Parents who attended the TL workshop had more varied perceptions of the experience. Only four of the attendees reported that they liked the lesson, with the remaining five reporting they either “did not like it” or it was “okay.” All parents in the TL workshop indicated that the
program was taught at an understandable level and they liked the lesson handouts. When asked about activities, parents in the TL group reported the activities were clear, at an appropriate difficulty level and were given enough time or could have used less. The majority of parents in the TL group (n=6, 67%) reported liking the program activities, and those who did not like the activities indicated some were too involved or they were hoping for “recipe development strategies”. When asked if they would recommend the workshop to a friend, only four of the parents in the TL workshop said they would. Parents in the TL group provided three types of improvement suggestions: 1) Provide more information, such as picky eater tips or pre-planned meal plans for children; 2) Customize the activities by having parents take photos of their pantry and refrigerator; 3) Increase the interaction between participants by having a set time for participants to mingle with each other.

All adolescents in the AL group (n=5, 100%) reported liking the program because it provided them new ideas and ways to assist with purchasing and preparing meals. Additionally, they reported that the program was taught at an appropriate level, they liked the handouts, and they either would or might recommend the workshop to friends. Including games like jeopardy or including visual aids like a PowerPoint or video were potential improvements that adolescents in the AL group suggested. When asked about the workshop activites, all adolescents in the AL group reported they were at a good difficulty level and the instructions were clear. Two adolescents in the AL group thought the activities were not enjoyable, reporting that the program “felt too much like school” and involved a lot of writing; all other adolescents reported liking the activities. The majority of adolescents (n=3) reported that the time for the activity was just right, and the remaining two adolescents in the AL group reported they would have liked more time.
The majority of adolescents (n=9) in the TL group reported liking the workshop. Those that did not indicate liking the workshop (n=2) noted that “it was not realistic” or they had already thought about the content itself but it was helpful “hearing from other people.” All adolescents in the TL group thought the program was taught at an understandable level, and the majority (n=10) liked the handouts. Only two adolescents in this group provided suggestions: 1) “have things to do when we were waiting” and 2) “having a larger scope on information would allow a bigger picture.” The majority of adolescents (n=9) in the TL group indicated they would recommend this workshop to friends, with the remaining two adolescents indicating “maybe” and “not sure.” All adolescents in the TL group liked the activities, and reported that they enjoyed working with their parent or they found that “menu planning is easier than I thought.” All adolescents in the TL group reported that the activity difficulty level was “okay” and instructions were clear, but when asked if they needed a different amount of time, two adolescents wanted more time, two adolescents wanted less time, and the remaining seven adolescents thought it was adequate.

Workshop Outcomes

Knowledge. At pre-, parents (n=15) had a baseline knowledge score of 4.47 (±0.52), with no significant difference between AL and TL groups (Figure 3.2, Panels A and B). There was no significant difference between pre- and post- scores of knowledge; however, a significant difference in knowledge between parents in the AL (5.00±0.00) and TL (4.44±0.53) groups were found (P<0.05) at post-. All parents had a significant decrease (P<0.05) in knowledge from post- (4.64±0.50) to 3-months post- ([3.70±0.67] See Figure 3.2, Panel A), but not from post- to 6-months post- (4.67±0.50; P>0.05).
At pre-, adolescents (n=17) had a baseline knowledge score of 4.18 (±0.81), with no significant difference between AL and TL groups (Figure 3.3, Panels A and B). Knowledge decreased significantly (P<0.05) from pre- (4.18±0.81) to 3-months post- (3.50±0.80) and significantly increased (P<0.05) from 3-months post- to 6-months post- (4.45±0.69). At the 3-month post- assessment, there was a significant difference (P<0.05) in knowledge between AL (2.67±0.58) and TL (3.78±0.67) groups (See Figure 3.3, Panel B).

**Self-efficacy.** Before the workshop, parents had a baseline menu planning-related self-efficacy score of 3.47 (±0.67), with no significant difference between AL and TL groups (Figure 3.4, Panels A and B). Parent self-efficacy significantly increased (P<0.005) from pre- to post- (4.06±0.63), and remained significantly greater at 3-months post- (4.03±0.56, P<0.05) and 6-months post- (4.08±0.65, P<0.05). Parents in the TL group had a significant change (P<0.005) in self-efficacy from pre- (3.70±0.68) to post- ([4.11±0.77] See Figure 3.4, Panel B).

At pre-, adolescents had a baseline self-efficacy score of 3.48 (±0.70), with no significant difference between AL and TL groups (Figure 3.5, Panels A and B). In a similar pattern to parents, self-efficacy significantly increased (P<0.005) from pre- to post- (3.97±0.71), and remained significantly greater at 3-months post- (3.83±0.73, P<0.05) and 6-months post- (4.01±0.68, P<0.005). Adolescent self-efficacy in the TL group significantly increased (P<0.05) from pre- (3.70±0.55) to post- (4.18±0.73) and at 6-months post- (4.30±0.44). Adolescents in the AL group had no significant changes in self-efficacy over time (P>0.05). At 6-months post-, adolescent self-efficacy in the TL (4.30±0.44) and AL (3.24±0.64) groups were significantly different (P<0.05).

**Strategy utilization.** Overall, parents reported increasing behaviors that were encouraged in the menu planning workshop by an average of 5.11 (±4.86) during the six months that
followed their workshop participation. Parents in the AL group reported increasing an average of 6.67 behaviors (±4.04), and parents in the TL group reported increasing an average of 4.33 behaviors (±5.39). These changes were not significant between groups.

**DISCUSSION/IMPLICATIONS**

The current pilot study results provide evidence that adult peers and early adolescent peers can feasibly teach a menu planning workshop to parents and their young adolescent children. Process observations indicated that both AL and TL workshops were able to keep audiences of approximately eight participants ‘somewhat engaged’ to ‘very engaged’. Some tasks were ‘not completed well’ by TLs and they were observed having difficulties engaging with the audience, compared to ALs. However, both ALs and TLs were able to complete the vast majority of workshop tasks well, and participants did not report direct concerns about their leader’s abilities.

Furthermore, both parents and children both reported enjoying working together during the program. However, the parent’s presence did not alleviate children’s desires for more time with some tasks, which had previously been reported (Nelson, 2013). Both parents and children had valuable suggestions that could be used to further improve the workshop. Parents reported desiring online resources in addition to the printed resources provided. These suggestions were not surprising, as previous research has shown that parents are more likely to use the internet when compared to non-parents and mothers, specifically, frequently use the internet for health-related information (Allen & Rainie, 2002). Children, on the other hand, reported that they wanted an experience that included learning games. Adjustments such as this may reduce children’s concerns about the lesson feeling “too much like school.”
Knowledge questionnaires revealed significant differences between parents in the AL and TL group post-lesson, but all parents in the AL group had scores of 5, out of a 5-point scale, diminishing comparative capacity. This also may indicate flaws in the measure and lack of discriminatory ability. Additional concerns about the knowledge questionnaire are raised, based on the significant decrease in knowledge scores from post- to 3-months post-, in both parents and children. This may indicate that knowledge is not retained, but 6-month knowledge scores increased to levels where they were no longer statistically different compared to post-. This provides evidence to suggest the decrease in scores at 3-months post- was a questionnaire issue. The lack of significant differences between groups or from pre- to post- or 6-months post- may be due to the measurement issues discussed, but could also be due to the statistical power of the sample size and the nonparametric tests used, or a lack of the workshop impacting declarative knowledge. Previous studies in this population have not measured menu planning knowledge, and these results indicate that measurement refinement would be necessary if true indications of knowledge change can be acquired.

Both parents and children experienced significant increases in menu planning-related self-efficacy from pre- to post-, 3-months post-, and 6-months post-. This sustained elevation in scores over time suggests a greater perceived confidence in their ability to perform menu planning-related tasks after participating in the workshop. Significant increases in menu planning-related self-efficacy among parents who participated in menu planning interventions have been previously reported (Cullen & Thompson, 2008; Abbot & Byrd-Bredbenner, 2010). Dixon et al. (2014) found significant increases in self-efficacy among children after they experienced a menu-planning tool at a 5-day cooking camp. However, these previous results were all collected immediately post-intervention. Cullen et al. (2009) found that self-efficacy for
menu planning was positively increased among low-income adults who attended a nutrition curriculum, and these increases were sustained when they were followed-up with four months after the intervention. Our results indicate these increases may persist in both adults and children for a longer period than previously measured. However, these results may be due to participation of parents and children in the study, instead of the workshop itself (ie. Social-desirability bias). Parents in the TL group had a significant increase in self-efficacy from pre- to post- when evaluated individually, while those in the AL group did not. These disparate results may be due to a lack of power with the small AL sample size, where internal variability was greater than that between assessment periods. The significantly greater self-efficacy scores among adolescents in the TL group, both at post- and at 6-months post-, suggests that these adolescents received a menu planning-related self-confidence increase from the workshop that has been retained over time, while those in the AL group were not impacted. However, this also may be due to the lack of statistical power in the AL group that was mentioned above and results comparing groups should be taken with caution.

Our results indicate that parents and their young adolescent children seem to benefit from participating in a single, 75-minute menu planning workshop. Positive self-efficacy increases among parents and their young adolescents were found after workshop attendance, even though the intervention length was shorter than previously published menu planning interventions (Cullen & Thompson, 2008; Abbot & Byrd-Bredbenner, 2010; Dixon et al., 2014). Previous work by Court et al. (2010) indicate that behavior was positively influenced by menu planning interventions, and the self-reported increase in program strategy use by parents in this study provides an indication that parents perceive that they had changed behaviors over the six months following the intervention. The majority of menu planning interventions that have included
adults have taken place online (Cullen & Thompson, 2008; Abbot & Byrd-Bredbenner, 2010; Court et al., 2010) or have targeted low-income populations (Cullen et al., 2009). This small pilot study adds to the evidence that there may be benefits to parents, who are not low-income, attending this kind of in-person workshop.

This study is not without limitations. The researchers did not have the opportunity to pilot test survey instruments before data collection began, and thus, instruments do not have established validity or reliability. A small sample of individuals completed the study, and it was over-representative of women with a higher education and income than the surrounding population. These aspects severely limit the generalizability of results. However, there is greater confidence in accuracy of the self-efficacy findings, because they are similar to those reported by others who have conducted similar interventions (Cullen & Thompson, 2008; Abbot & Byrd-Bredbenner, 2010; Dixon et al., 2014). Due to the small sample size as well as a lack of normality among outcome variables, non-parametric tests were used that lacked statistical power. As is true of all statistical tests, the results are only estimations and may not accurately reflect true phenomena. As mentioned above, positive outcomes could be over-stated due to social-desirability bias. Participants were not blinded to the intervention type and may have reported what they believe the researchers wanted them to report; social-desirability bias has been shown to impact dietary reports of both adults and children (Hébert et al., 2001; Guinn et al., 2010). Additionally, Lim et al. (2016) have recently reported on the phenomena of children taking into account their mother’s perceived food-related choices when making decision for themselves. This process led to more healthful choices among children (Lim et al., 2016), and may be a force at work when children report on health-related mediators, such as self-efficacy, where they assume what their parent or guardian would want them to report. Whether this effect
manipulated adolescent reports in this study, or if the influence is also present for parents, are unknown.

Based on the promising evidence collected in this pilot study, the menu planning lesson was added to a 12-lesson curriculum, which covers additional aspects of obesity prevention through healthful dietary and physical activity behaviors. The curriculum is currently being tested as an after-school program for middle school students and their parents, where the young adolescents are being taught the curriculum by adult or teen leaders. This program seeks to prevent obesity development by addressing intra- and inter-personal factors from the SCT, and the researchers expect the integration of multiple aspects of healthful eating will lead to more pronounced effects on participants.

CONCLUSION

Our pilot study indicates that there is promise for use of young adolescents as peer leaders as well as the potential for menu planning interventions to positively influence mediators of behavior change. Young adolescent leaders had minor difficulties presenting lesson content, but this did not impact attendees’ perceptions of the workshop. Additionally, participant outcomes in the TL group were more often statistically greater or not different instead of smaller, when compared to the AL group. Evidence indicates that participation in a menu planning workshop can be beneficial for parents and their young adolescent children, based on their perceptions of the experience as well as increases in menu planning-related self-efficacy.

ACKNOWLEDGMENTS

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2012-68001-22032. Any
opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.
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FIGURES AND TABLES

Figure 3.1. Flow-diagram of recruitment and retention of families in a pilot study of a menu planning workshop for parents and their young adolescent children

33 Contacted research team

24 Eligible, after screening

15 Consented to participate and were randomized into groups

9 Excluded
4 Unavailable on lesson dates
3 Ineligible
2 Lost to follow-up

6 in Adult-led lesson

5 in Teen-led lesson

1 Excluded
1 Reported lack of transportation

9 Completed post assessment

2 Excluded
2 Lost to follow-up

7 Completed 3-month follow-up assessment

3 Completed 6-month follow-up assessment

6 Completed 6-month follow-up assessment

1 Excluded
1 Reported lack of time
### Table 3.1. Descriptive sociodemographic characteristics of families attending a menu planning workshop (n=15 families)

<table>
<thead>
<tr>
<th>Characteristics of Parents</th>
<th>All Parents (n=15)</th>
<th>Adult-led Workshop Parents (n=6)</th>
<th>Teen-led Workshop Parents (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (±SD)</td>
<td>45.4 (±4.2)</td>
<td>45.5 (±3.3)</td>
<td>45.3 (±4.8)</td>
</tr>
<tr>
<td>Race, % White</td>
<td>80% (n=12)</td>
<td>66.7% (n=4)</td>
<td>88.9% (n=8)</td>
</tr>
<tr>
<td>Ethnicity, % Not Hispanic</td>
<td>93.3% (n=14)</td>
<td>100% (n=6)</td>
<td>88.9% (n=8)</td>
</tr>
<tr>
<td>Gender, % Female</td>
<td>100% (n=15)</td>
<td>100% (n=6)</td>
<td>100% (n=9)</td>
</tr>
<tr>
<td>Marital Status, % Married</td>
<td>73.3% (n=11)</td>
<td>83.3% (n=5)</td>
<td>66.7% (n=6)</td>
</tr>
<tr>
<td>Education, % Bachelors degree or more</td>
<td>80% (n=12)</td>
<td>100% (n=6)</td>
<td>66.7% (n=6)</td>
</tr>
<tr>
<td>BMI, mean (±SD)</td>
<td>24.9 (±4.7)</td>
<td>22.4 (±1.2)</td>
<td>26.6 (±5.4)</td>
</tr>
<tr>
<td>Household Income, % $50,001 or above</td>
<td>78.6% (n=11)</td>
<td>100% (n=5)</td>
<td>66.7% (n=6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics of Teens</th>
<th>All Teens (n=17)</th>
<th>Adult-led Workshop Teens (n=6)</th>
<th>Teen-led Workshop Teens (n=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (±SD)</td>
<td>12.2 (±1.0)</td>
<td>12.0 (±0.9)</td>
<td>12.3 (±1.1)</td>
</tr>
<tr>
<td>Race, % White</td>
<td>88.2% (n=15)</td>
<td>66.7% (n=4)</td>
<td>100.0% (n=11)</td>
</tr>
<tr>
<td>Ethnicity, % Not Hispanic</td>
<td>93.8% (n=15)</td>
<td>100.0% (n=5)</td>
<td>90.9% (n=10)</td>
</tr>
<tr>
<td>Gender, % Female</td>
<td>58.8% (n=10)</td>
<td>66.7% (n=4)</td>
<td>54.6% (n=6)</td>
</tr>
<tr>
<td>Grade in School, mean (±SD)</td>
<td>7.2 (±1.0)</td>
<td>7.0 (±0.9)</td>
<td>7.3 (±1.1)</td>
</tr>
</tbody>
</table>

SD=Standard Deviation, BMI=Body Mass Index

*a* Participants chose from options: “White,” “Black, African-American,” “American Indian or Alaska Native,” “Asian Indian,” “Chinese,” “Filipino,” “Japanese,” “Korean,” “Vietnamese,” “Native Hawaiian,” “Guamanian or Chamorro,” “Samoan,” or an “Other” option where specifics could be entered into an open-space

*b* Participants chose from options: “No, not of Hispanic, Latino, or Spanish origin,” “Yes, Mexican, Mexican American, Chicano,” “Yes, Puerto Rican,” “Yes, Cuban,” or “Yes, another Hispanic, Latino, or Spanish origin”

*c* Participants chose from options: “Married,” “Living as married,” “Widowed,” or “Single, never married”

*d* Participants chose from options: “Less than high school,” “High school diploma/GED,” “Some college or post-high school, but no degree or diploma,” “Associate (2-year) degree, or Vocational/Technical diploma,” “Bachelors degree (4-year),” or “Graduate degree including Masters, PhD, MD, DDS, etc.”

*e* Participants reported height (in feet and inches) and weight in pounds; this was converted to kilograms and meters by an investigator who then calculated BMI (kg/m²)

*f* Participants chose from options: “Less than $10,000,” “From $10,001 up to $30,000,” “From $30,001 up to $50,000,” “From $50,001 up to $70,000,” “From $70,001 up to $90,000,” or “More than $90,001”
Table 3.2. Comparison of process observations of menu planning workshops (n=4) for parents and their young adolescents when taught by adult or peer leaders

<table>
<thead>
<tr>
<th>Component of Checklist</th>
<th>Adult-Led Workshops</th>
<th>Peer-Led Workshops</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Workshop #1</td>
<td>Workshop #2</td>
</tr>
<tr>
<td>Attendance (actual number of attendees divided by expected)</td>
<td>23.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Number of attendees</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Workshop length (minutes)</td>
<td>---&lt;sup&gt;a&lt;/sup&gt;</td>
<td>88</td>
</tr>
<tr>
<td>Average engagement of attendees (scale of 1=low to 5=high)</td>
<td>4.5</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**Completion Assessment of Workshop Tasks**

<table>
<thead>
<tr>
<th>Learning objectives clearly stated</th>
<th>CW</th>
<th>CW</th>
<th>CW</th>
<th>CW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearly described MyPlate principles for building healthy plates</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
</tr>
<tr>
<td>“Build Your Plate” activity</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
<td>NCW</td>
</tr>
<tr>
<td>Clearly described family menu planning tip #1: Time management</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
</tr>
<tr>
<td>“Create Your Family Schedule” activity</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
</tr>
<tr>
<td>Clearly described family menu planning tip #2 with discussion of “Family Food Task Examples”</td>
<td>CW</td>
<td>CW</td>
<td>NCW</td>
<td>CW</td>
</tr>
<tr>
<td>Clearly described family menu planning tip #3, including “Quick Cooking Tips” and “Eating Out Tips”</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
</tr>
<tr>
<td>Clearly described how to create a family shopping list</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
</tr>
<tr>
<td>Clearly described how to revise shopping lists with budgeting techniques</td>
<td>CW</td>
<td>CW</td>
<td>NCW</td>
<td>CW</td>
</tr>
<tr>
<td>“Create Your Family’s Shopping List” activity</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
<td>CW</td>
</tr>
</tbody>
</table>

**Assessment of Time Provided for Activities**

| “Build Your Plate” activity | Adequate | Adequate | Adequate | Adequate |
| “Create Your Family Schedule” activity | Adequate | Adequate | Adequate | Adequate |
| “Create Your Family’s Shopping List” activity | Adequate | Adequate | Adequate | Adequate |

CW=Completed Well, NCW=Not Completed Well

<sup>a</sup>Workshop length was not recorded during the first adult-led workshop
Figure 3.2. Menu planning-related knowledge of parents in a 6-month pilot study of a menu planning workshop in which families were randomly assigned to an adult-led (AL) or teen-led (TL) group.

*Panel A: Parent's menu planning-related knowledge scores over four assessment periods, comparison of change over time in entire sample*

*Panel B: Parent's menu planning-related knowledge over four assessment periods, comparison of change over time within each randomly assigned group*

*p-value <0.05

At baseline, AL n=6 and TL n=9; at post-, AL n=5 and TL n=9; at 3-month, AL n=3 and TL n=7; at 6-month, AL=3 and TL n=6
Figure 3.3. Menu planning-related knowledge of children in a 6-month pilot study of a menu planning workshop in which families were randomly assigned to an adult-led (AL) or teen-led (TL) group.

Panel A: Adolescent's menu planning-related knowledge scores over four assessment periods, comparison of change over time in entire sample.

Panel B: Adolescent's menu planning-related knowledge over four assessment periods, comparison of change over time within each randomly assigned group.

* p-value <0.05

At baseline, AL n=6 and TL n=11; at post-, AL n=5 and TL n=11; at 3-month, AL n=3 and TL n=9; at 6-month, AL=3 and TL n=8
Figure 3.4. Average self-reported menu planning-related self-efficacy of parents in a 6-month pilot study of a menu planning workshop in which families were randomly assigned to an adult-led tour (AL) or a teen-led tour (TL) group. 

Panel A: Parent's menu planning-related self-efficacy over four assessment periods, comparison of change over time in entire sample.

Panel B: Parent's menu planning-related self-efficacy over four assessment periods, comparison of change over time within each randomly assigned group.

*p-value <0.05; **p-value <0.005

At baseline, AL n=6 and TL n=9; at post-, AL n=5 and TL n=9; at 3-month, AL n=3 and TL n=7; at 6-month, AL=3 and TL n=6
Figure 3.5. Average self-reported menu planning-related self-efficacy of children in a 6-month pilot study of a menu planning workshop in which families were randomly assigned to an adult-led tour (AL) or a teen-led tour (TL) group.

* p-value <0.05; ** p-value <0.005

At baseline, AL n=6 and TL n=11; at post-, AL n=5 and TL n=11; at 3-month, AL n=3 and TL n=9; at 6-month, AL=3 and TL n=8
CHAPTER 4: Mixed-methods feasibility evaluation of a grocery store tour for parents and their young adolescents: A randomized controlled pilot study

ABSTRACT

Objective: To evaluate the feasibility of a grocery store tour for parents and their young adolescent children being led by young adolescents or adults.

Methods: Sixty-one families (61 parents and 71 adolescents) consented to participate in this six-month randomized controlled pilot study. Participants’ tour perceptions and process observation notes were used for process evaluation. Questionnaires were completed before attendance and again immediately post-tour and at 3-, and 6-months post-tour. They assessed self-efficacy, shopping dynamic between parent and child, and tour strategy use.

Results: Over 90% of tour tasks were rated as “completed well” for both adult and teen leaders by a process observer. Participants had positive tour perceptions, but noted deficiencies in teen leaders’ knowledge and leadership skills. Overall, adolescents and parents retained significantly greater self-efficacy scores from pre-tour to the last two assessment periods. Shopping dynamics were largely not significantly different by time or group, but the qualitative analysis revealed two novel themes of ‘grocery shopping trip length’ and ‘using shopping as a learning experience’. Parents perceived they had increased healthful grocery shopping behaviors, but this was not significantly different between groups.

Conclusions and Implications: Current findings support the feasibility of young adolescents leading grocery store tours, but highlight that they may need additional resources and supportive measures to be highly effective.

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3 To be submitted to the Journal of Adolescent Health
INTRODUCTION

Despite a well-established link between healthful dietary patterns and lower risk of chronic disease, many adults and children fall short of dietary recommendations (U.S. Department of Health and Human Services & U.S. Department of Agriculture [USDHHS & USDA], 2015). According to the Bureau of Labor Statistics (2015), the average American spends about $563 on food each month and 59% of these purchases are for groceries. One activity that may facilitate a healthful dietary pattern is grocery shopping for healthy foods. Between 53% to 62% of U.S. consumers report “at least sometimes” using nutrition facts labels (Blitstein & Evans, 2006; Ollberding, Wolf, & Contento, 2011) but actual label comprehension and use for product comparisons are perceived as confusing and difficult by many (Campos, Doxey, & Hammond, 2011). Strategies to increase nutrition label use and comprehension, as a larger pattern of shopping for healthy foods, have been called for by researchers and policymakers (USDHHS & USDA, 2015; Ollberding et al., 2011; Graham & Laska, 2012; Barnes, 2010).

One method to address consumers’ grocery shopping practices and increase their nutrition label comprehension is provision of nutrition education within the grocery store setting. Lower self-efficacy for making healthy choices is a reported barrier to healthful shopping (Hollywood et al., 2013), and grocery store interventions may improve this low self-efficacy in participants. Providing dietetics counseling in the grocery store setting has been shown to encourage healthful dietary and knowledge changes among patients with obesity (Lewis, Roblin, Leo, & Block, 2015), but this approach requires considerable time to administer to a single person at a time. Facilitator-led grocery store (or supermarket) tours take small groups, instead of just an individual, through a grocery store to teach strategies and skills that enable healthful food purchasing choices. Based on the practicality of grocery stores containing tangible food items
and providing contextual learning environments, supermarket tours have flourished as a nutrition education medium. However, the effectiveness of grocery store tours is still unknown (Nikolaus, Muzaffar, & Nickols-Richardson, in press).

Previous studies evaluating grocery store tours have been primarily non-randomized non-controlled trials (Nikolaus et al., in press). Cardiac health-related dietary behaviors are a common focus of published grocery store tours, and positive participant behavior changes have been reported (Sadler, Fine, Richards, & Read, 2003; Baic & Thompson, 2007). A tour with a broader focus on general healthful dietary behaviors was conducted for elementary (K-3rd grade) students, but researchers found no significant increase in knowledge or attitude among participating children (Smith & Kalina, 2004). In contrast, Lafferty, Marquart and Reicks (2006) found increases in knowledge and intentions among elementary (4th and 5th grade) students and parents who attended a whole grains-focused tour. These contrasting results may be a result of the refined focus of the tour or the inclusion of adults in the tour audience.

To date, no published studies have investigated whether peer influences, in the form of young adolescent teen leaders, can impact the efficacy of grocery store tours. According to the Social Cognitive Theory (SCT), peers are instrumental in developing social outcome expectations and stimulating observational learning (McAlister, Perry & Parcel, 2008). This behavioral theory and others like it have inspired researchers to evaluate the role of peers in health-related behaviors. Cross-sectional researchers have shown that peers influence social norms (Stok et al., 2015) and children’s snack preferences (Guidetti, Conner, Prestwich, & Cavazza, 2012). Additional experimental work has furthermore shown that intake is influenced by presence and type of peers at an eating occasion for high school- and elementary-aged
children (Péneau et al., 2009; Salvy, Coelho, Kieffer, & Epstein, 2007a; Salvy, Howard, Read, & Mele, 2009; Salvy, Romero, Paluch & Epstein, 2007b).

The research evidence for peer influence indicates that there is great power of peers among children. Public health leaders have utilized this power in the form of peer leaders. Programs that use peer leaders have been successful in tobacco-use prevention and sex education (Ayaz & Açıl, 2015; Maticka-Tyndale & Barnett, 2010; Faggiano et al., 2010). Nelson and Nickols-Richardson (2014) conducted a systematic review of nutrition education programs that use peer leaders and concluded that mediators of dietary behavior change were positively influenced in some peer-led nutrition education programs.

Based on SCT and evidence of peer influence, a grocery store tour that could be taught by young adolescent peers was developed. Both parents and adolescents were included in the intervention to expand on previous literature. The purpose of this pilot study was to evaluate the feasibility of this grocery store tour being led by young adolescents before it was incorporated into a 12-week after-school obesity prevention program. We hypothesized that: 1) mediators of dietary behavior change would increase in participants after attending the tour; 2) adolescent participants would have a greater change after a teen-led tour, in comparison to those who attended an adult-led tour; and 3) parents would indicate that their shopping dynamic with their child changed after attending the tour.

METHODS

Tour Development

Human nutrition experts designed the tour based on the 2010 Dietary Guidelines for Americans, a literature review of content in previous similar programs, and related extension materials. The tour was designed to meet four broad objectives in a 2.5-hour single session: “1)
compare foods based on ingredients list and nutrition facts labels; 2) identify grocery store aisles that contain five major foods groups; 3) describe tips for finding healthy choices within each food group; and 4) describe tips for saving costs when buying healthy foods within each group” (Graziose, 2013, p.28). The tour used a structured group discussion format where participating families navigated different aisles of the store while incorporating hands-on activities and handouts.

Previous formative evaluation established the tour’s content validity with an expert review that rated the lesson as ‘somewhat relevant’ with ‘some’ to ‘high ability’ to achieve its objectives (Graziose, 2013). Additionally, the tour was pilot-tested with nine parents and 15 adolescents in three tours. These tours took place in three different stores (two grocery stores and one supermarket) and on average took 124 minutes to complete when taught by an adult nutrition expert. In focus groups after the tour, all parents reported liking the tour, particularly the hands-on components, and some reported their future grocery shopping trips with their adolescents may be easier and more enjoyable. Additionally, post-tour questionnaires indicated that parents felt confident they could perform many of the tasks recommended during the tour. Positive results were found in each of the stores the tour was provided in, indicating that the tour could be taught in various settings. However, this study was conducted with primarily White female parents and adolescents, limiting the generalizability of results.

This prior pilot study indicated some positive feasibility results, but constructive comments from parents and children were used to further improve lesson materials. Some participants mentioned they were concerned about the functionality of handouts and the quantity of them. Thus, the handouts were revised to increase their usability for tour activities and the number of handouts was reduced by making formatting changes. A mid-tour break, where a
A healthy snack was provided based on comments about needing a time where parents and children could use the bathroom and eat. Additionally, participants were reminded to dress in layers, because of the variability in grocery store temperatures.

**Recruitment, Screening & Enrollment**

Families were recruited from the University of Illinois at Urbana-Champaign (UIUC) campus and Urbana-Champaign (IL, USA) communities using word-of-mouth, electronic mail messages, brief presentations to local groups, and flyers. A flow diagram of response, screening, and randomization steps is displayed in Figure 4.1. A total of 143 individuals responded to recruitment efforts, between February and August 2015. Of these, 106 families met eligibility criteria (they were a parent/guardian of a child in 6th to 7th grade or 11- to 14-years old with adequate transportation) and were invited to attend a study information session. At this session, parents and adolescents were provided information about the study and provided written informed consent and written informed assent, if interested. Sixty-one families consented at these sessions. The Institutional Review Board (IRB) for the protection of human subjects at the UIUC approved the study protocol (UIUC IRB#15446). Families received a chance to win one of three $25 grocery store gift cards and then received a $10 grocery store gift card at both the 3-month and 6-month follow-up time periods if they returned questionnaires.

**Study Design**

This was a six-month randomized controlled obesity prevention-focused pilot study of families with children in 6th to 7th grade or 11- to 14-years old. Sixty-one families (61 parents and 71 adolescents) consented to participate in the study. After consenting to participate, families were randomly assigned to one of three groups: 1) an adult leader (AL) tour group (n=21 families); 2) a teen leader (TL) tour group (n=20 families); or 3) a 6-month waitlist control.
(CON) group (n=20 families). Participants in the AL and TL groups were asked to provide availability to attend a tour, and were assigned a date when a group of one to five families indicated they could attend a mutual time. Parents were asked to confirm they could attend the tour with their child and were sent a reminder two days before their assigned tour date. The TL and AL tours were identical in curriculum; the only difference was the age of the individuals leading the tour. The tours that families (one parent with one or two children in the age range) attended were a single, 90-minute program, with light refreshments provided during one break. The tours were hosted in one of two local mid-size grocery stores.

Adult and teen leaders were recruited from the community using word-of-mouth and electronic mail messages. Four ALs (over the age of 25 years), three female and one male, and three TLs (between the ages of 11 to 14 years), two male and one female, were recruited in this manner. The ALs and TLs were trained on the tour curriculum and materials, using in-store as well as traditional lecture strategies for four hours. They had a chance to learn the tour parts, receive a demonstration of a mock tour, and practice leading the tour themselves.

**Outcome Measures**

Outcome measures were collected from parents and adolescents at four time periods: 1) before attending the tour at the study information session (referred to as pre-); 2) after attending the tour or two weeks after randomization for families in the CON (referred to as post-); 3) three months after attending the tour or after returning the second set of questionnaires in the CON (referred to as 3-months post-); and 4) six months after attending the tour or approximately three months after returning the third set of questionnaires (referred to as 6-months post-). All participants completed paper questionnaires in-person at the pre-tour assessment. Families in the TL and AL groups also completed the post-tour assessment in-person, while families in the CON
were sent the questionnaires by postal or electronic mail. At the 3- and 6-month follow-up assessments, all families were sent materials by postal or electronic mail, based on their preference.

**Process Observation Outcomes**

*Recruitment.* Tactics used to recruit participants were recorded and response to these recruitment strategies were summarized based on effectiveness. Responses from participants that indicated they would not be participating, when supplied, were also recorded and summarized to identify patterns.

*Context.* The tours were administered in two mid-size grocery stores located in two cities in central Illinois. As an assessment of context for the tours, U.S. census data for the surrounding towns was reviewed. The most recent data from 2010 and 2014 census collections, available at U.S. Census Bureau (2016), were summarized.

*Reach.* At an information session, parents completed a demographic questionnaire to report age, race, ethnicity, gender, marital status, number of children, highest level of education, height, weight, and income. Adolescents completed a similar questionnaire which included age, race, ethnicity, gender, grade in school, and the school that they were attending at the time of the study. Food security was also assessed at this session; parents completed the 18-item Household Food Security Survey Module (Bickel, Nord, Price, Hamilton, & Cook, 2000) and adolescent personal food security was assessed with the Child Food Security Survey Module (Connell, Nord, Lofton, & Yadrick, 2004).

*Dose delivered.* During each tour, a member of the research team evaluated the tour progress with an investigator-established process observation checklist. On this checklist each
tour’s scheduled start time, actual start time, end time, number of expected attendees, and actual attendance were collected.

**Fidelity.** The process observation checklist was used to evaluate adequate completion of each discussion and activity within the tour. At least 80% of session tasks were required to be rated as “completed well” for the tour to be considered feasibly completed. A comment box was used to note general comments the process observer deemed relevant. These evaluations were used to assess whether the entire tour was delivered as it was planned to be. Additionally, at the post-lesson assessment period, both parents and adolescents completed a perception of tour questionnaire. This questionnaire contained six items related to the overall tour, five items regarding activities and three items about handouts. Qualitative answers were analyzed for reoccurring themes.

**Dose received.** Knowledge and self-efficacy were assessed as proxies for the dose received of the grocery store tour. Both parents and adolescents completed investigator-designed quizzes as assessments of grocery shopping-related knowledge, similar to those previously used to assess adult and child knowledge acquired during grocery store tours (Carson & Hedl, 1998; Lafferty et al., 2006; Smith & Kalina, 2004; van Assema et al., 1996). These quizzes contained 10 items with one correct answer for each item. If the participant answered the question correctly, they were given one-point and thus the score could range from 0 to 10. Investigator-designed grocery shopping self-efficacy questionnaires were completed by both parents and adolescents. The self-efficacy questionnaire contained 15 statements of grocery shopping-related tasks and assessed the participant’s confidence level in performing each task on a scale of 1 (NOT at all confident) to 5 (Extremely confident). This likert-type scale is comparable to those used in previous assessments of self-efficacy of adolescents (Fitzgerald, Heary, Kelly, Nixon, &
Shevlin, 2013) and adults (Carson, Gillham, Kirk, Reddy, & Battles, 2002). The 15 confidence ratings were averaged to represent an overall self-efficacy score. The lesson knowledge and self-efficacy questionnaires were completed pre- and post-tour and the difference between these scores were considered an indicator of the tour dose received.

Additional Outcomes

*Shopping dynamic.* Parents completed eight items on an investigator-designed semi-qualitative questionnaire assessing the dynamic with their child while grocery shopping. Assessment of this relationship between parent and child while at the grocery store is a proxy of the potential social support for nutritious food purchases and a glimpse into social environmental pressures illustrated in the SCT (McAlister et al., 2008). Themes and observations from related qualitative studies were incorporated into the assessment as questions and response items (Wingert, Zachary, Fox, Gittelsohn, & Surkan, 2014; O’Dougherty, Story, & Stang, 2006; Maubach, Hoek, & McCreanor, 2009; Wiig & Smith, 2009). Frequency of responses was compared by group and over time. Qualitative responses were analyzed for recurring themes. Parents completed this questionnaire pre-, 3-months post- and 6-months post-tour.

*Retention.* The self-efficacy and knowledge (with slight changes in item wording but consistent topic coverage) questionnaires were repeated by parents and adolescents at the 3-month and 6-month follow-up to assess whether any change from the tour was retained over time. Additionally, at the 6-month follow-up, a “strategy utilization” questionnaire assessing the use of health-promoting behaviors taught in the tour was administered to parents. The questionnaire contained 18 statements of behaviors and parents rated each behavior as “decreased,” “no change” or “increased” in the last six months since attending the tour. Answers
of “decreased” were coded as -1, “no change” as 0, and “increased” as 1 before being summed overall as a score representing change with a range of -18 to 18.

**Data Analyses**

Using knowledge quiz score change, with an effect size of 0.25 (as reported in Carson, 1998), a power analysis using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that 101 participants would be necessary to detect change in knowledge scores. Accounting for 85% retention (Paineau et al., 2008; Curtis, Adamson, & Mathers, 2012), a sample size goal of 120 participants was established.

Categorical data were analyzed with chi-square tests when comparing groups and McNemar’s test when comparing repeated measures over time. Due to lack of normal distributions, continuous variables were analyzed using non-parametric tests. Continuous data were analyzed using Kruskal-wallis when comparing groups and Wilcoxon signed-rank test when analyzing change over the four assessment time points. As there were three groups, if groups were found to have statistical differences from the Kruskal-wallis test, a Mann-Whitney U test was used as a mean separation test to identify which groups were different. Non-parametric test use with small sample sizes has previously been recommended (Fagerland, 2012). All analyses were conducted using SAS software (version 9.4, 2011, SAS Institute Inc). The level of significance was 0.05.

Qualitative open answers from the process observation notes, the tour perception questionnaire, and the shopping dynamic questionnaire were analyzed for themes. Themes were quantified as percentages for each group and then compared to identify potential differences between groups. These qualitative analyses were undertaken as an opportunity to identify novel findings that could not have been captured using conventional quantitative measures.
RESULTS

Process Observation Outcomes

Recruitment. Word-of-mouth, online advertising on parenting website, a television appearance, posts in electronic mail listservs, and paper flyers were all used as methods to recruit participants. Of the 143 people who contacted the research team (see Figure 4.1), 93 reported how they had been recruited. Electronic listservs recruited 36 people, flyers in the community recruited 35 people, word-of-mouth recruited 16 people, four people contacted the research team after viewing a television interview, and two people contacted the team after seeing online advertising. As shown in Figure 4.1, the primary reason for exclusions after contacting the research team was due to non-response (n=17) or a reported lack of time (n=11).

Context. Measures used in the census that were also collected in this pilot study are shown in Table 4.1; U.S. Census Bureau (2016) provided all the data displayed in this table. Both cities, Urbana and Champaign, IL, USA, have primarily White and non-Hispanic populations with an even distribution of male/female and Bachelors-educated individuals.

Reach. Sixty-one families (61 parents and 71 adolescents) consented to participate in the pilot study. Families were randomly assigned to groups, with 21 families in the AL group, 20 families in the TL group, and 20 families in the CON. Sixty families completed the baseline surveys, with one family unable to remain at the information session after consenting due to a family emergency. Parents were primarily White (76.7%), non-Hispanic (100%) and female (91.7%) with a high level of education (85.0% had a Bachelors degree or more) and family income (51.7% had an annual income of $70,001 or greater); adolescents primarily were White (78.6%), non-Hispanic (95.7%) and female (55.7%). Adolescents came from 28 different schools in the area, with 63.7% in 5th or 6th grade at the time of recruitment. Average age of parents was
43.0 years (±6.6 SD) and adolescents was 11.9 years (±1.1 SD). Parents self-reported an average BMI of 27.0 kg/m² (±5.6 SD). Descriptive differences between groups are reported in Table 4.2. Families closely resemble participants who have volunteered to participate in similar studies (Robson, Stough, & Stark, 2016). However, a higher proportion of parents were females, with a Bachelors degree or more, and with a higher income than that reported in U.S. census data for the surrounding cities.

Tours were attended by 18 families in the AL group and 15 families in the TL group. “Post-tour” surveys were completed and returned by 17 families in the CON. Thus, at post-tour, 13 of consented families had withdrawn from the study (AL= 4, TL=6, and CON=3) which represented a 19% drop for AL, a 30% drop for TL, and a 15% drop for the CON. At three months, a total of 25 consented participants had withdrawn from the study (AL=10, TL=9, and CON=6) which represented a 48% drop for AL, a 45% drop for TL, and a 30% drop for the CON. At six months, the AL group had a 57% attrition rate (n=9 families remaining), the TL group had a 50% dropout rate (n=10 families remaining), and the CON had a 40% dropout rate (n=12 families remaining). Difficulty maintaining participation in health-related interventions for adolescents has been reported in a previous 6-month study (Evans et al., 2009).

**Dose delivered.** Overall, the total time taken to deliver the tour averaged 89.1 minutes (±19.5, Table 4.3). The length of TL tours were an average of 77.0 minutes (±13.0), and this was more than 20 minutes shorter than the average of 99.6 minutes (±18.6) for AL tours. The tour took less time to complete than previously reported (Graziose, 2013).

**Fidelity.** Results from the process observation checklist overall and for each group are shown in Table 4.3. TL groups had a lower attendance rate, but the average number of attendees
is quantitatively similar between AL and TL groups. Overall, leaders in both groups were able to complete the majority of the tasks well.

Six themes (mentioned >4 times) were identified from the process observation qualitative notes: 1) Participant engagement; 2) Speech sound and volume; 3) “Scavenger Hunt” activity comments; 4) Ability to address participant comments; 5) Difficulties using in-store examples; and 6) Enhancement of presentation with additional educational strategies. The first four of these themes were present in both the AL and TL group tour notes. In both the AL and TL groups, there was a mixture of comments about participants being actively engaged and losing interest. The process observer noted that adults seemed to be more engaged than their children, though there were exceptions for some groups, and participants were more likely to get easily distracted or begin to lose interest near the end of the tour. Notes on speech volume and speed were contrasting in groups, with the TLs more frequently “talking too fast” or “speaking too quietly” while ALs were noted as having “good volume” or “going through info slowly” even when they had to compete with the noise of grocery store music and customers. The “Scavenger Hunt” activity was noted as instigating “good conversations among participants” and enjoyed by attendees in the AL tours, but notes from the TL tours indicated the explanation provided by TLs and time provided for the activity were insufficient. Disparate comments between groups were also reported regarding ALs and TLs addressing participant questions; ALs were noted as answering questions well, while TLs were less consistent and comments varied from “answering questions well” to “can’t really answer questions.”

Two themes from the process observation notes were distinctive to each group. The TL group notes indicated that TLs were the only ones to have difficulties identifying in-store examples. Notes indicated that they forgot to show examples of certain foods, used incorrect
examples of foods, or they could not find appropriate examples in the store. These instances were mentioned frequently. The process observer suggested the TL may need to review food locations in the store before they begin each tour, but even when they lacked an example some leaders still “explained the info well, although.” In contrast, ALs were the only ones to receive comments of presentation enhancement by use of additional educational strategies. ALs were frequently noted as using a hands-on approach, explaining concepts well, improvising for attendees, and providing a quality presentation by being “very good at teaching.”

The tour perception questionnaire provided further insight into attendee’s qualitative thoughts on their experiences in the AL and TL tours. In both groups, the majority of participants (>75%) reported enjoying the tour, thought it was taught at an understandable level, and would recommend the tour to other families. When asked how the overall tour could be improved, parents and adolescents in the AL group suggested providing more than one opportunity for families to practice comparing labels, cooking or menu planning resources, and decreasing the overall time as well as the standing time. In contrast, TL tour attendees remarked that they wished the leader spoke louder or interacted more with the participants (“less reading from book”) and they desired that an “expert” be available to answer more detailed questions as the TL was not able to answer all questions. When asked about the tour activities, again, the majority of parents and children in both groups thought the “Label Scavenger Hunt” instructions were clear and the activity was enjoyable, as it allowed them to work with their family. However, when attendees were asked if they wish they had more time for the activity, 88.2% of parents and 81.8% of adolescents in the AL group found the time was sufficient while in the TL group only 71.4% of parents and 57.1% of children thought the provided time was enough. This time difference was again illustrated when attendees were asked for suggested improvements to the
activity. In the TL group, parents suggested speeding up the process of comparing food items and also asked that two different types of foods be compared (instead of just one) while adolescents commented that they would have liked “more time, like five minutes.” These time-conscious comments were not provided by AL tour attendees, who more frequently focused on improving the activity handout and suggested pencils be provided for the children, instead of pens. Overall, the majority of attendees (>85%) liked the handouts and 100% of attendees reported that the handouts were helpful. Suggestions to improve handouts included providing “more explanation”, removing the provided answer key, and providing more handouts or online resources that could be used on a cellphone.

*Dose received.* As shown in Figure 4.2 (Panel B), parents had a baseline quiz score of 8.17 (±1.40) and there was no significant change in their scores from pre- to post-. Adolescents, however, had a baseline quiz score of 5.94 (±1.76), and overall, significantly increased (P<0.0001) their quiz score from pre- to post- ([7.25±1.47] Figure 4.2, Panel C). Significant increases were found among adolescents in all groups (P<0.05).

Parents significantly increased (P<0.0005) their grocery shopping-related self-efficacy scores from pre- (3.87±0.62) to post- ([4.37±0.51] Figure 4.3, Panel A). Parents had significant increases in self-efficacy in the AL (P<0.005), TL (P<0.005), and CON (P<0.0005) groups (Figure 4.3, Panel B). When scores at post- were compared between groups, parents in the AL group (4.59±0.33) and TL group (4.49±0.46) had significantly greater scores (P<0.05) than those in the CON, (4.05±0.56). Overall, adolescents also significantly increased (P<0.0005) their grocery shopping-related self-efficacy from pre- (3.31±0.79) to post- ([3.75±0.71] Figure 4.3, Panel C). When each group was evaluated independently, only the AL and TL groups had significant score increases (P<0.05) from pre- to post- (Figure 4.3, Panel D). However, there
were no significant differences between adolescent self-efficacy in each group at post-tour 
(P>0.05).

**Additional Outcomes**

*Shopping dynamic.* Figure 4.4 displays frequency of responses to each shopping dynamic 
questionnaire item. Parents who reported their adolescents asking for “sweets and snacks” at pre-
were significantly more likely not to select this option at 3-months post- (P<0.05). Parents were 
more likely (P<0.005) to report that they buy more items when they were grocery shopping with 
their child at 6-months post-. When compared by group, the CON was significantly less likely to 
report at pre- that they made “more impulse purchases” when they were grocery shopping with 
children (P<0.05; data not shown). No other group differences were discovered when groups 
were compared at 3-months post- or 6-months post-.

All qualitative open answers from the shopping dynamic questionnaire were evaluated 
together, regardless of assessment time, due to the majority of quantitative questions not 
revealing significant changes over the four assessment times and when groups were compared. 
Six themes were identified: 1) Emotion reactions, both positive and negative; 2) Shopping as a 
learning experience for children; 3) Children impacting trip length, both increasing and 
decreasing time at the store; 4) Children’s requests as the store, further categorized into less 
healthful foods and non-food items, 5) Purchases made; and 6) Helpfulness of children at the 
store. Exemplary excerpts from parent’s responses are provided in Figure 4.5.

*Retention.* Compared to pre- and post-, overall parent knowledge score was significantly 
lower (P<0.05) at 3-month post- and 6-month post- (Figure 4.2, Panel A). When each group was 
evaluated independently, this significant decreased (P<0.05) remained true for CON only (Figure 
4.2, Panel B). Adolescents had an overall significant decrease (P<0.05) in knowledge from post-
to 3-month post- and 6-months post- (Figure 4.2, Panel C). When each group was evaluated, this significant decrease (P<0.05) in adolescent knowledge remained for AL and TL groups but not the CON group (Figure 4.2, Panel D).

Parent self-efficacy overall remained significantly greater (P<0.001) at 3-months post- and 6-months post- when compared to pre- (Figure 4.3, Panel A). This was also significant when the change was evaluated in the AL and TL group but not in the CON (Figure 4.3, Panel B). Additionally, when self-efficacy scores at 6-months post- were compared between groups, AL scores (4.43±0.46) were and significantly greater (P<0.05) than that of the CON (4.30±0.54). Adolescents retained their increase (P<0.05) in self-efficacy from pre- (3.31±0.79) to 3-months post- (3.56±0.65) and 6-months post- ([3.62±0.62] Figure 4.3, Panel C). However, when groups were evaluated independently, only adolescents in the AL group had significant increases (P<0.05) from pre- (3.48±0.90) to 3-months post- ([3.87±0.76] Figure 4.3, Panel D) and groups were not significantly different at any of the four time assessments.

On the strategy utilization questionnaire, all parents reported increasing an average of 6.47 behaviors (±4.19) encouraged in the grocery store tour during the six months that followed. The number of behaviors parents reported increasing was not significantly different between groups (P>0.05).

**DISCUSSION**

The present study provides support for the feasibility of grocery store tours being taught by young adolescent leaders to parents and their young adolescent children. TL tours took less time to complete when compared to AL tours. Despite the differences in time taken to lead tours, the vast majority of tour lesson was considered to be “completed well” by a process observer for both adult and teen leaders. Previous research has demonstrated the feasibility of teen leaders in
the school setting (Story, Lytle, Birnbaum, & Perry, 2002), but this is the first to demonstrate their capability in a grocery store setting. Qualitative process observation comments and participant perceptions may indicate that TLs need further support for nuances required to effectively teach grocery store tours. Inherently, TLs tend to have less experience in leadership situations as well as less experience independently making grocery shopping choices, when compared to ALs. In a previous study conducted by Story et al. (2002), even when peer leaders were provided a full day of intensive training, 45% of peer leaders reported that they wished they had been provided further training. Story et al. (2002) additionally reported an adult teachers presence at each lesson was important for the quality of the program’s implementation. Our work provides further evidence that TLs may need additional training prior to tours or additional adult support, particularly when they are teaching topics that include practices traditionally performed by adults. However, if an AL is present at the tour to provide guidance and further expertise, this may degrade the potential peer influence that TLs can provide to young adolescent attendees.

The process evaluation provided further insight into the feasibility of conducting grocery store tours for an audience of parents and young adolescents. Electronic listservs and flyers were the most effective recruiting strategies for this population, as 76% were recruited by these methods for the grocery store tour, among those who reported how they obtained tour information. “Lack of time” was the most frequently reported reason for not participating, and this likely stems from the work-life balance that many American families experience in today’s society. According to Presser (2005), almost half of adults work some combination of weekends, evenings, and nights. This provides intense pressure on parent’s available time for personal development activities, such as attending nutrition education events. Among those who could participate in the tour, many reported desiring more practice with the information provided,
development of complementary skills (such as menu planning and cooking), and access to reputable online resources that could be used after the tour. This supports the notion that healthy eating behaviors require several interconnected skill sets. Ideally, nutrition education interventions would address these concerns by providing a set of courses, instead of a stand-alone tour or lesson, and by providing online supplementary materials.

Conducting nutrition education using grocery store tours presents unique considerations for program administrators. Some participants mentioned they did not enjoy the amount of standing and walking required for the tour, but this is inherent with the design of grocery store tours. Ability to stand long periods of time may be a barrier to participation, unless grocery store tours integrate sitting breaks or motorized chairs are provided for attendee use. Of the three contacted, one grocery store owner requested that tours be conducted during off-hours and was thus not included as a site in the study due to the inability to accommodate parent and child availability within the owner’s approved times. Grocery stores also have limited space capacity that reduces the number of attendees that can be included per tour, requiring more sessions to be provided with a few number of attendees, in comparison to traditional venues that can accommodate larger numbers in fewer sessions. For this reason, alternative education methods that require less facilitator time commitments have been explored. Bangia and Palmer-Keenan (2014) found that consumers who listened to an educational podcast (an intervention that only required the leader to be present for the podcast recording) while grocery shopping improved their self-efficacy for purchasing foods rich in omega-3 fatty acids.

Grocery shopping-related knowledge results among parents and adolescents in this study did not conform to researcher hypotheses. Only adolescents had significant increases in knowledge from baseline to post-tour and this was true for even those who did not receive any
intervention. These results bring into question the capability of the measurement tool to capture the content administered in the tour and elicits concerns about its use as an indicator of intervention dose received. Quiz-style questionnaires have been used in the past to assess adult and child knowledge acquired during grocery store tours (Carson & Hedl, 1998; Lafferty et al., 2006; Smith & Kalina, 2004; van Assema et al., 1996). However, nutrition knowledge was not correlated with dietary behavior when assessed among adolescents (Pirouznia, 2001), and the relationship in adults has been found to be modest (Tepper, Choi, & Nayga Jr., 1997). These results present the question of whether assessing nutrition knowledge is a worthwhile effort. At both follow-up assessments, parents and adolescents experienced significant decreases in quiz scores, when compared to post-tour. This could indicate that no knowledge was retained, but this interpretation may be hasty due to concerns with the measurement tool.

Results from the self-efficacy and lesson strategy questionnaires completed by parents and their adolescent children, provided more promising indications that participants may be positively impacted by their tour attendance, even six months later. Rimal (2000) showed that self-efficacy is a mediating factor between the relationship of behavior and knowledge, and an “…individuals’ ability to act in knowledge-consistent ways is largely a function of their perceived abilities” (Rimal, 2000, p. 230). In this study, both parents and adolescents had positive change in their self-efficacy scores at all three follow-ups, when compared to baseline. These improvements were either only in the AL and TL groups or the post-tour scores were significantly lower in CON attendees. Carson and Hedl (1998) published the only grocery store tour study which assessed self-efficacy among participants; they found improvements among participants who attended both a single and three tour(s). Our findings are similarly positive, but are based on a 15-item questionnaire in comparison to a single-item that had been previously
used. When adolescent groups were compared individually, only those in the AL group had positive significant increases at 3-months post- but not 6-months post. These less consistent self-efficacy results among adolescents, when compared to their parents, may be due to their level of involvement with the regular grocery shopping routine. This lower intensity or frequency of experiences where skills can be practiced reduces the potential for mastery experiences to occur, one of the four critical ways for self-efficacy to be developed (McAlister et al., 2008). Parents reported, on average, increasing their use of approximately six strategies that were taught in the tour over the six months that followed the intervention. This perceived behavioral change among adults indicates they feel they adopted more healthy behaviors after participating in a grocery store tour, but an objective measure of behavior change would have been beneficial. Grocery store receipts are a potential method for collecting objective purchasing data but difficulties have been reported in collecting them (Lewis et al., 2015) and analyses of the varied item annotations used by independent retailers provide immense interpretation difficulties without industry-university partnerships.

Semi-qualitative results from the shopping dynamic questionnaire provided further insight into parent’s perceived relationship and interactions with their young adolescent child while grocery shopping. When asked whether grocery shopping with their children was less desirable, parents were approximately evenly distributed at all assessment periods. These results are not surprising, as previous work has indicated that shopping with children can place strains on the family’s budget with additional requests and children can serve as a strong barrier to making healthful purchases (Wingert et al., 2014). However, about 80% of parents reported that their children were helpful while grocery shopping, further providing evidence that children are perceived as being helpful when grocery shopping, that had previously been recorded among
low-income families (Wiig & Smith, 2009). Parental perceptions of children’s engagement during a grocery shopping trip were primarily not impacted by either TL or AL grocery store tours or the passage of time. Only a minority of parents reported having conflicts with their children while grocery shopping. The themes of concerns about grocery shopping trip length and utilization of the trip as a learning experience are novel themes that have not previously been reported. A clear research gap exists regarding the aspects and stability of parent’s perceptions of grocery shopping with their young adolescent children. It would be thought-provoking to compare the perceptions regarding grocery shopping reported among parents to those reported by their children.

The current study had several limiting factors that should be considered when results are interpreted. Recruitment did not yield the desired sample size that was targeted based on a power analyses, and a higher proportion of participating parents were female with high incomes and education levels than the surrounding residential areas. These limitations, compiled with the high attrition rate over the six-month data collection, likely reduced the statistical power as well as the generalizability of the results. Social-desirability bias may be a potential explanation for self-efficacy results, rather than a true effect of the grocery store tour. Finally, we did not have the opportunity to pilot test survey instruments before data collection began, and thus survey instruments do not have established validity or reliability.

CONCLUSION

Providing grocery store tours to parents and their young adolescent children is feasible. Recruitment utilizing electronic listservs and flyers is effective, but time constraints may prevent parents from participating. Teen leaders are able to conduct grocery store tours to a similar degree of adequacy as adult leaders. However, additional support, such as a nutrition expert’s
presence or extra leadership training, may be necessary to maximize their effectiveness. Positive effects from the tour, even when assessed 6-months later, are noted for both parents and adolescents, despite a largely absent change in knowledge. Future research should: 1) examine the dimensions of parents’ shopping dynamics with their children; and 2) investigate whether grocery store tours impact behavior change, using valid and reliable instruments.

ACKNOWLEDGEMENTS

The authors thank the County Market Store Directors, Scott Sanders and Craig Peacha, for allowing our research team to conduct the grocery store tours within their stores. This material is based upon work that is supported by the National Institute of Food and Agriculture, United States Department of Agriculture, under award number 2012-68001-22032.
REFERENCES


FIGURES AND TABLES
Figure 4.1. Flow-diagram of recruitment and retention of families in a pilot study of a grocery store tour for parents and their young adolescent children

- 37 Excluded
  - 17 Lost to follow-up
  - 11 Reported lack of time
  - 3 Reported compensation too low
  - 3 Ineligible
  - 2 Personal association with researchers
  - 1 Reported child not interested

- 143 Contacted research team

- 106 Eligible, after screening

- 61 Consented to participate at in-person info session and were randomized into groups

- 20 in Control group
  - 3 Excluded
    - 2 Lost to follow-up
    - 1 Moved from area

- 20 in Teen-led group
  - 17 Completed post-tour assessment
  - 6 Excluded
    - 5 Lost to follow-up
    - 1 Reported lack of time
  - 11 Completed 3-month follow-up
  - 2 Excluded
    - 1 Lost to follow-up
    - 1 Reported lack of time
  - 10 Completed 6-month follow-up

- 21 in Adult-led group
  - 17 Completed post-tour assessment
  - 4 Excluded
    - 1 Reported “personal reasons”
    - 1 Reported lack of time
    - 1 Lost to follow-up
    - 1 Unable to attend tour
  - 11 Completed 3-month follow-up
  - 9 Completed 6-month follow-up

- 45 Excluded
  - 13 Reported lack of time
  - 12 Lost to follow-up
  - 12 Unable to attend info session
  - 4 Reported child not interested
  - 3 Reported lack of transportation
  - 1 Reported compensation too low

- 6 Completed 6-month follow-up
  - 3 Excluded
    - 2 Lost to follow-up
    - 1 Moved from area

- 11 Completed 3-month follow-up
  - 1 Excluded
    - 1 Lost to follow-up

- 14 Completed post-tour assessment
  - 3 Excluded
    - 3 Lost to follow-up

- 17 Completed post-assessment
  - 3 Excluded
    - 3 Lost to follow-up

- 20 in Control group
  - 12 Completed 6-month follow-up
  - 2 Excluded
    - 2 Lost to follow-up
Table 4.1. Sociodemographic characteristics of population surrounding the grocery stores that hosted grocery store tours (U.S. Census, 2010)

<table>
<thead>
<tr>
<th>People</th>
<th>Urbana, IL</th>
<th>Champaign, IL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, % Female</td>
<td>49.9%</td>
<td>49.1%</td>
</tr>
<tr>
<td>Race, % White</td>
<td>60.4%</td>
<td>67.8%</td>
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<tr>
<td>Ethnicity, % Not Hispanic/Latino</td>
<td>94.8%</td>
<td>93.7%</td>
</tr>
<tr>
<td>Education, % Bachelors degree or more&lt;sup&gt;a&lt;/sup&gt;</td>
<td>53.6%</td>
<td>50.3%</td>
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<tr>
<td>Annual Household Income, mean (dollars)</td>
<td>20,057</td>
<td>25,651</td>
</tr>
</tbody>
</table>

<sup>a</sup>Among persons aged 25 years or older
Table 4.2. Descriptive sociodemographic characteristics of families in grocery store tour pilot study (n=61 families)

<table>
<thead>
<tr>
<th>Characteristics of Parents</th>
<th>All Parents (n=60)</th>
<th>Adult-led Tour Parents (n=20)</th>
<th>Teen-led Tour Parents (n=19)</th>
<th>Control Group Parents (n=19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean (±SD)</td>
<td>43.0 (±6.6)</td>
<td>44.4 (±5.3)</td>
<td>42.0 (±5.0)</td>
<td>42.5 (±9.0)</td>
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<tr>
<td>Race, % Whitea</td>
<td>76.7% (n=46)</td>
<td>90.5% (n=19)</td>
<td>80.0% (n=16)</td>
<td>57.9% (n=11)</td>
</tr>
<tr>
<td>Ethnicity, % Not Hispanicb</td>
<td>100.0% (n=60)</td>
<td>100.0% (n=20)</td>
<td>100.0% (n=19)</td>
<td>100.0% (n=19)</td>
</tr>
<tr>
<td>Gender, % Female</td>
<td>91.7% (n=55)</td>
<td>81.0% (n=17)</td>
<td>95.0% (n=19)</td>
<td>100.0% (n=19)</td>
</tr>
<tr>
<td>Marital Status, % Marriedc</td>
<td>76.6% (n=46)</td>
<td>71.5% (n=15)</td>
<td>90.0% (n=18)</td>
<td>68.5% (n=13)</td>
</tr>
<tr>
<td>Education, % Bachelors degree or mored</td>
<td>85.0% (n=51)</td>
<td>81.0% (n=17)</td>
<td>85.0% (n=17)</td>
<td>89.5% (n=17)</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²), mean (±SD)e</td>
<td>27.0 (±5.6)</td>
<td>27.0 (±6.0)</td>
<td>27.5 (±6.3)</td>
<td>26.4 (±4.6)</td>
</tr>
<tr>
<td>Household Income, % $70,001 or abovef</td>
<td>51.7% (n=31)</td>
<td>57.1% (n=12)</td>
<td>60.0% (n=12)</td>
<td>36.9% (n=7)</td>
</tr>
<tr>
<td>Food Security Status, % Highg</td>
<td>91.7% (n=55)</td>
<td>95.2% (n=20)</td>
<td>95.0% (n=19)</td>
<td>84.2% (n=16)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics of Teens</th>
<th>All Teens (n=70)</th>
<th>Adult-led Tour Teens (n=26)</th>
<th>Teen-led Tour Teens (n=23)</th>
<th>Control Group Teens (n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean (±SD)</td>
<td>11.9 (±1.1)</td>
<td>11.8 (±1.0)</td>
<td>12.1 (±1.2)</td>
<td>11.9 (±1.2)</td>
</tr>
<tr>
<td>Race, % Whitea</td>
<td>78.6% (n=55)</td>
<td>80.8% (n=21)</td>
<td>78.3% (n=18)</td>
<td>76.2% (n=16)</td>
</tr>
<tr>
<td>Ethnicity, % Not Hispanicb</td>
<td>95.7% (n=67)</td>
<td>100.0% (n=26)</td>
<td>95.7% (n=22)</td>
<td>90.5% (n=19)</td>
</tr>
<tr>
<td>Gender, % Female</td>
<td>55.7% (n=39)</td>
<td>61.5% (n=16)</td>
<td>47.8% (n=11)</td>
<td>57.1% (n=12)</td>
</tr>
<tr>
<td>Grade in School, mean (±SD)</td>
<td>6.5 (±1.2)</td>
<td>6.4 (±0.9)</td>
<td>6.7 (±1.5)</td>
<td>6.3 (±1.3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food Security Statush</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% High</td>
<td>66.7% (n=46)</td>
<td>69.2% (n=18)</td>
<td>68.2% (n=15)</td>
<td>61.9% (n=13)</td>
</tr>
<tr>
<td>% Marginal</td>
<td>17.4% (n=12)</td>
<td>19.2% (n=5)</td>
<td>13.6% (n=3)</td>
<td>19.1% (n=4)</td>
</tr>
<tr>
<td>% Low</td>
<td>14.5% (n=10)</td>
<td>11.5% (n=3)</td>
<td>18.2% (n=4)</td>
<td>14.3% (n=3)</td>
</tr>
<tr>
<td>% Very Low</td>
<td>1.5% (n=1)</td>
<td>0.0% (n=0)</td>
<td>0.0% (n=0)</td>
<td>4.8% (n=1)</td>
</tr>
</tbody>
</table>

Sixty-one families consented to participate in the study, but one parent-child dyad was unable to remain at the information session where demographic information was collected due to a family emergency and thus has missing data for all items.


b Participants chose from options: “No, not of Hispanic, Latino, or Spanish origin,” “Yes, Mexican, Mexican American, Chicano,” “Yes, Puerto Rican,” “Yes, Cuban,” or “Yes, another Hispanic, Latino, or Spanish origin.”

c Participants chose from options: “Married,” “Living as married,” “Widowed,” or “Single, never married.”

d Participants chose from options: “Less than high school,” “High school diploma/GED,” “Some college or post-high school, but no degree or diploma,” “Associate (2-year) degree, or Vocational/Technical diploma,” “Bachelors degree (4-year),” or “Graduate degree including Masters, PhD, MD, DDS, etc.”

e Participants reported height (in feet and inches) and weight in pounds; this was converted to kilograms and meters by an investigator who then calculated BMI (kg/m²).

f Participants chose from options: “Less than $10,000,” “From $10,001 up to $30,000,” “From $30,001 up to $50,000,” “From $50,001 up to $70,000,” “From $70,001 up to $90,000,” or “More than $90,000.”

# Participants completed the “Six-Item Short Form of the Food Security Survey Module” and were categorized into food security of High, Marginal or Low categories based on Bickel, Nord, Price, Hamilton, and Cook, 2000.

h Participants completed the “Self-Administered Food Security Survey Module for Children Ages 12 Years and Older” and were categorized into food security of High, Marginal or Low categories based on Connell, Nord, Loften, and Yadrick, 2004.

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Table 4.3. Comparison of process observations of grocery store tours (n=15) for parents and their young adolescents when taught by adult or peer leaders.

<table>
<thead>
<tr>
<th>Component of Checklist</th>
<th>All Workshops (n=15)</th>
<th>Adult-Led Workshops (n=8)</th>
<th>Peer-Led Workshops (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance (actual number of attendees divided by expected)</td>
<td>83.2%±27.9</td>
<td>100.0%±23.9</td>
<td>64.4%±19.5</td>
</tr>
<tr>
<td>Number of attendees</td>
<td>4.7±2.1</td>
<td>5.1±2.4</td>
<td>4.3±1.8</td>
</tr>
<tr>
<td>Workshop length (minutes)</td>
<td>89.1±19.5</td>
<td>99.6±18.6</td>
<td>77.0±13.0</td>
</tr>
</tbody>
</table>

**Assessment of Tasks, % Completed well**

<table>
<thead>
<tr>
<th>Learning objectives clearly stated</th>
<th>100.0% (n=15)</th>
<th>100.0% (n=8)</th>
<th>100.0% (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearly describes steps to reading nutrition facts labels</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td>Clearly describes steps to reading ingredient lists</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td>Delivered “Choose This Not That” example</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td>“Label Scavenger Hunt” activity</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td>Clearly describes tips for making healthy choices and saving costs in the perimeter</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td>Identified in-store examples from the “Illinois…What’s in Season” handout</td>
<td>86.7% (n=13)</td>
<td>87.5% (n=7)</td>
<td>85.7% (n=6)</td>
</tr>
<tr>
<td>Identified in-store examples from the “Ripeness Test” handout</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td>Delivered “Food Cost Comparisons #1” example</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td>Clearly describes tips for making healthy choices and saving costs in the refrigerator aisle</td>
<td>93.3% (n=14)</td>
<td>100.0% (n=8)</td>
<td>85.7% (n=6)</td>
</tr>
<tr>
<td>Identified in-store fat-free dairy examples</td>
<td>93.3% (n=14)</td>
<td>100.0% (n=8)</td>
<td>85.7% (n=6)</td>
</tr>
</tbody>
</table>
Table 4.3. (cont.)

<table>
<thead>
<tr>
<th>Task</th>
<th>Completed well (n=15)</th>
<th>Completed well (n=8)</th>
<th>Completed well (n=7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered “Food Cost Comparisons #2” example</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Clearly describes tips for making healthy choices in the pantry aisle</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Identified in-store examples of cereal and bread with and without whole grains</td>
<td>80.0% (n=12)</td>
<td>87.5% (n=7)</td>
<td>71.4% (n=5)</td>
</tr>
<tr>
<td>Clearly describes tips for making healthy choices and saving costs in the dry food aisle</td>
<td>93.3% (n=14)</td>
<td>100.0% (n=8)</td>
<td>85.7% (n=6)</td>
</tr>
<tr>
<td>Identified in-store cost comparisons example of brand name versus generic form of beans and legumes</td>
<td>80.0% (n=12)</td>
<td>100.0% (n=8)</td>
<td>57.1% (n=4)</td>
</tr>
<tr>
<td>Identified in-store examples of nuts with and without added sugar and sodium</td>
<td>86.7% (n=13)</td>
<td>100.0% (n=8)</td>
<td>71.4% (n=5)</td>
</tr>
<tr>
<td>Clearly describes tips for making healthy choices and saving costs in the freezer aisle</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td>Identified in-store examples of fruits/vegetables with and without added calories and sodium</td>
<td>93.3% (n=14)</td>
<td>100.0% (n=8)</td>
<td>85.7% (n=6)</td>
</tr>
<tr>
<td>Identified in-store examples of brand name versus generic forms of fruits/vegetables</td>
<td>93.3% (n=14)</td>
<td>100.0% (n=8)</td>
<td>85.7% (n=6)</td>
</tr>
<tr>
<td>Clearly summarized grocery shopping tips</td>
<td>100.0% (n=15)</td>
<td>100.0% (n=8)</td>
<td>100.0% (n=7)</td>
</tr>
<tr>
<td><strong>Out of all 21 Tasks, Percentage “Completed well,” mean ± SD</strong></td>
<td>95.2%±5.1</td>
<td>98.8%±2.2</td>
<td>91.2%±4.3</td>
</tr>
</tbody>
</table>
Figure 4.2. Grocery shopping-related knowledge of parents and adolescents in a 6-month randomized controlled pilot study of a grocery store tour in which families were randomly assigned to an adult-led tour group (AL), a teen-led tour group (TL) or a control group.

For parents: At baseline, AL n=21, TL n=20, Control n=20; at post-, AL n=17, TL n=14, Control n=17; at 3-month, AL n=11, TL n=11, Control n=14; at 6-month, AL n=9, TL n=10, Control n=12. For adolescents: At baseline, AL n=26, TL n=22, Control n=22; at post-, AL n=22, TL n=14, Control n=19; at 3-month, AL n=14, TL n=11, Control n=16; at 6-month, AL n=10, TL n=10, Control n=14.
Figure 4.3. Average self-reported grocery shopping-related self-efficacy of parents and adolescents in a 6-month randomized controlled pilot study of a grocery store tour in which families were randomly assigned to an adult-led tour group (AL), a teen-led tour group (TL) or a control group.

* p-value <0.05; ** p-value <0.005; *** p-value <0.0005; a,b,c Significant differences between groups at each timeline, based on a Mann-Whitney U test; For parents: At baseline, AL n=21, TL n=20, Control n=20; at post-, AL n=17, TL n=14, Control n=17; at 3-month, AL n=11, TL n=11, Control n=14; at 6-month, AL n=9, TL n=10, Control n=12. For adolescents: At baseline, AL n=26, TL n=22, Control n=22; at post-, AL n=22, TL n=14, Control n=19; at 3-month, AL n=14, TL n=11, Control n=16; at 6-month, AL n=10, TL n=10, Control n=14.
Figure 4.4. Parent’s perception of child while shopping at baseline (n=60), three months (n=35), and six months (n=30) post-lesson.
Figure 4.4. (cont.)

* Significant differences when frequencies compared in McNemar’s test, p<0.05. At baseline, AL n=21, TL n=20, Control n=20; at post-, AL n=17, TL n=14, Control n=17; at 3-month, AL n=11, TL n=11, Control n=14; at 6-month, AL n=9, TL n=10, Control n=12.
Figure 4.5. Six emergent themes from qualitative parental perception of child while shopping, from assessments at pre-, 3-months post- and 6-months post-
CHAPTER 5: Conclusions and future directions

The menu planning pilot study, described in Chapter 3, provided evidence that it is feasible for young adolescents to serve as leaders in a menu planning workshop for parents and their young adolescent children. Young adolescent leaders were observed as having difficulties engaging participants but were still able to complete the majority of program tasks well, such that participant’s overall positive impressions of the workshop were not impacted. Self-efficacy and knowledge questionnaires completed by workshop participants indicated that participants in the teen-led group had statistically greater or no differences when compared to the adult-led group. That is with the exception of the parent’s knowledge scores in the adult-led group at immediately post-lesson, where all scores were at the highest range for the measure, suggesting there were questionnaire flaws. Results indicated that the menu planning workshop has promise for providing benefits to parent and young adolescent attendees, based on their self-reported perceptions and menu planning-related self-efficacy.

Positive evidence for the feasibility of young adolescent leaders teaching a grocery store tour to parents and their young adolescent children was demonstrated in the randomized controlled grocery store pilot study described in Chapter 4. Use of electronic listservs and flyers were effective methods of recruiting families to participate in the grocery store tour, but parent’s time constraints were a commonly reported reason for not participating. Both teen and adult leaders performed the vast majority of tour tasks well. However, both the process observer and participants noted deficiencies in the young adolescents’ execution of the tour. These shortcomings included forgetting to show examples of certain foods, using incorrect examples of foods, not finding appropriate examples in the store, speaking too quietly, or reading directly from the leader guide without engaging participants. These occurrences indicate a need for teen leaders to be further assisted, beyond curriculum instruction, through leadership training or the
presence of an expert to assist with technical questions. Both parents and adolescents reported being positively impacted by the tour, even when assessed 6-months after the tour took place.

Collectively, these pilot studies indicate that young adolescents can serve as adequate leaders for nutrition education programs and that single sessions can lead to improved self-efficacy and perceived behavior change among participants. Despite appropriate completion of program tasks, young adolescents were observed having moments where presentations could have been improved through leadership development. Positive participant outcomes were not consistent across all assessments, and the control group in the grocery store study often also showed positive results for some assessments. These indicate that improvements in measurement tools and recruitment of additional subjects to increase statistical power would have been beneficial to these pilot studies.

It is clear that in isolation, the menu planning workshop or grocery store tour is not sufficient to provide comprehensive guidance for families to eat healthfully. The two behaviors of menu planning and grocery shopping are interconnected. When the task of menu planning is completed, a grocery list has been produced that is intended to provide guidance at the store. This interconnectedness is not a fact lost on parents, as a comment from grocery store tour participants indicated their desire for complementary lessons on menu planning as well as culinary skills. Dietary pattern changes stem from building an individual’s skill set for multiple activities. The “domestic food cycle” that has previously proposed stages where food waste originates (Flower & Collett, 2014) can also provide insight into the skill sets required by families to eat healthfully. Flower and Collett (2014) outline the six stages of the cycle as: 1) Planning; 2) Shopping; 3) Storage; 4) Preparation; 5) Consumption; and 6) Disposal. Thus, it is clear that menu planning and grocery shopping are but a small portion of the activities that
constitute one’s dietary habits. Development of skills in all of these areas may be required before dietary patterns can meet the recommendations provided in the Dietary Guidelines for Americans (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015).

In efforts to develop skills that support healthful dietary patterns among young adolescents, the programs discussed above were added to a 12-lesson program, the “PAWS Club: Peer-education About Weight Steadiness,” supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Childhood Obesity Prevention Challenge Grant program. The curriculum addresses a spectrum of skills, as well as various intra- and inter-individual factors, in the long-term efforts to prevent childhood obesity by using an evidence-based program. This full curriculum is currently being evaluated as an after-school program for middle school students, where they are taught by adult or teen leaders.

Results from the included studies add to the promising body of literature for peer nutrition education, but there are a few specific components of these programs that should be taken into consideration for future research endeavors. Young adolescent leaders may require additional content and leadership supports beyond simple curriculum content training and adult supervision. Foundational recommendations have been previously published for implementing effective peer education programs that focus on sex education and substance misuse (Walker & Avis, 1999) and it would be useful to adapt these for use with peer nutrition education. Future studies should be careful to examine whether peer influence is still present in programs when a heavy adult presence is used, and if there is truly any benefit during these situations for attendees beyond traditional adult-led programs. As has been mentioned elsewhere (Tolli, 2012), peer education relies on the assumption that young adolescents will be more receptive to peer leaders, because the information is coming from a friend or peer that can relate to the participant’s
situation. However, in the manufactured format of nutrition education sessions, peer leaders may not know the young adolescent attendees, particularly if a program is sizable. Whether a peer leader is known to attendees and if this has an impact on program effectiveness would be useful to evaluate, as it may provide an indication of how or whether these programs can be expanded in scale. The current studies included both parents and children, as children have an influences on parent’s food choices (Wingert, Zachary, Fox, Gittelsohn, & Surkan, 2014) and family involvement is an important component of effective obesity prevention programs for children (Ho et al., 2012). This type of audience is unique to the literature, and may require special consideration when using a peer nutrition education model. Research is warranted that explores the use of two leaders, one parent and one child, for lessons that are taught to groups of parents and young adolescents. This model may be effective on influencing participant outcomes, but it requires considerable planning to implement efficiently and may have elevated cost implications.

Overall, the evidence outlined provides promising indications that young adolescent leaders can feasibly lead nutrition education sessions to parents and their young adolescent children. Education in menu planning and grocery shopping should be further paired with development of skills required to healthfully perform the remaining actions of the domestic food cycle. Further work should develop optimal parameters that increase the efficacy of peer nutrition education on public health outcomes of interest.
Reference


APPENDIX A: Grocery store (or supermarket) tours as an effective nutrition education medium: A systematic review

**Objective:** To evaluate evidence regarding grocery store tours as an effective nutrition education medium for improving nutrition knowledge and food-related behaviors.

**Design:** A systematic literature review of studies published from 1984 to 2015, concerning grocery store (or supermarket) tours and impact on nutrition knowledge and behaviors. Three investigators independently reviewed articles, extracted details, and assessed the quality of each study.

**Results:** Out of 307 citations identified, 8 were reviewed and 6 were of neutral quality. Increases in nutrition knowledge were reported in 4 studies, as evaluated by investigator-designed quizzes, with short intervals between tours and assessments. Six programs assessed behavior change using subjective reports or objective purchasing behavior measures; 2 studies did not perform statistical analyses. The 6 studies that reported positive health-related outcomes had varying topics, tour lengths, and target audiences.

**Conclusions and Implications:** Grocery store tours are increasingly used as an avenue for nutrition education to improve knowledge and/or alter food selection behaviors and may result in positive outcomes, but it is unknown whether these outcomes persist for longer than 3 months after the tour and whether there are common attributes of effective grocery store tours. More rigorous studies with uniform methodology in study design and outcome measures are needed to confirm the effectiveness of supermarket tours.

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This article will appear in its entirety as Nikolaus, C.J., Muzaffar, H.M., Nickols-Richardson, S.M. Grocery store (or supermarket) tours as an effective nutrition education medium: A systematic review. *Journal of Nutrition Education and Behavior*. 2016; in press. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is noncommercial and no modifications or adaptations are made.
INTRODUCTION

Despite a well-established link between healthful dietary patterns and lower risk of chronic disease, many adults and children fall short of dietary recommendations that promote health.\(^1\) One activity that may facilitate the achievement of healthful dietary patterns is grocery shopping for healthy foods. Interestingly, the average number of trips to a supermarket in the US has declined from 2.2 trips/wk in 2010 to 1.5 in 2015,\(^2\) likely owing to a continued increase in eating away from home\(^3\) and greater use of convenience foods.\(^4\)-\(^6\) Participants in a recent focus group indicated that price and knowledge about the risks and benefits of food choices were important motivators for healthful grocery purchasing choices.\(^7\)

In addition, 53% to 62% of US consumers report at least sometimes using nutrition facts labels,\(^8,9\) but many perceive actual label comprehension and use for product comparisons to be confusing and difficult skills.\(^10\) Researchers and policy makers have called for strategies to increase nutrition label use and comprehension.\(^1,9,11,12\)

One method to address consumers’ grocery shopping practices and increase nutrition label comprehension is facilitator-led grocery store (or supermarket) tours. Such structured tours take small groups through a grocery store to teach participants strategies and skills that enable healthful food purchasing choices. Dietitian Leni Reed is credited with beginning supermarket tours in the early 1980s, as she took individuals out of traditional classrooms and brought them into stores for experiential learning.\(^13,14\) Based on the practicality of grocery stores containing tangible food items and providing contextual learning environments, supermarket tours have flourished as a nutrition education medium. However, the effectiveness of grocery store tours has not been evaluated systematically.
A recent systematic review summarized many supermarket-based interventions. Only 2 grocery store tours were included, and findings were pooled with other assorted point-of-purchase interventions that utilized shelf-markers or printed brochures as the primary intervention. In contrast, the current review focuses only on outcomes from in-person grocery store tours to examine the effectiveness of contextual learning on consumer knowledge and behaviors.

In the current review, a supermarket tour or grocery store tour is operationally defined as the dissemination of nutrition information and/or food shopping strategies by an educator to a small group of individuals while moving from aisle to aisle within a market that sells a wide variety of food products. Using this definition, 3 primary research questions guided this review: (1) Do grocery store tours lead to knowledge gains? If so, are increases in knowledge retained ≥ 3 months after the intervention? (2) Do grocery store tours lead to behavior change? If so, do these changes remain ≥ 3 months after the intervention? (3) What attributes of grocery store tours are associated with health-related outcomes being positively met? Three months was considered a desirable follow-up interval based on the Transtheoretical Model of behavior change, which considers this to be an appropriate estimate for the transition from action to maintenance stage of change.

METHODS

Search Strategy

One graduate student of nutritional sciences (CJN) and 2 registered dietitian investigators (HM and SNR) conducted a systematic search and review of the literature published between December 2014 and June 2015, using guidelines published by the Centre for Reviews and
Two internet databases were used to identify resources (EBSCO Host Academic Search Complete and the Springer Standard Collection, which index over 14,000 journals and abstracts). Search terms, used in varying combinations, included “tour,” “nutrition,” “grocery,” “education,” “supermarket,” and “grocery store.” In addition, a manual search of each relevant article’s references was conducted, and a cited reference search based on all relevant articles was performed to expand the scope to the latest publications via Web of Science.

For inclusion, resources had to have been published in English as a research-based article or abstract between January, 1984 and April, 2015, and had to have used a supermarket tour as a nutrition education method and reported outcomes directly attributable to the tour. All types of research designs were included. Contact with authors of relevant published papers was prohibited after the review was initiated, to avoid potential bias. To provide a comprehensive review of the literature, studies were not excluded based on type of grocer, size of the sample, target audience, specific focus of the tour’s subject matter, or study design. Abstracts were not included owing to inadequate details for full data extraction and the inability to assess quality. A total of 307 citations were identified. After duplicates were removed, 241 records were excluded based on their title or abstract. One relevant article was not included, because of the inability to locate research details beyond the title. The lead investigator examined 32 full-text publications. Articles were excluded if no knowledge or behavior outcome data were reported, if the tour did not match the operational definition provided, or if the supermarket tour had a minor role in the intervention and the outcomes could not be linked solely to the tour. Eight studies were included after exclusion criteria were applied (Figure A.1) and were critically reviewed by each of 3 investigators, during which details were extracted.
Data Extraction And Quality Assessment

Data related to study characteristics, participant characteristics, intervention, and setting, as well as outcome data and results were extracted from each study in the final critical review. Although the focus was on nutrition knowledge and behavior, all outcomes were examined and evaluated. Each investigator independently performed data extractions, and component qualities were agreed upon after the authors discussed any discrepancies.

Each study was classified as A, B, C or D, according to the strength of the research design, based on the Evidence Analysis Manual’s hierarchy and classification system, to provide an initial snapshot of its level of evidence. A quality criteria checklist was used to rate each study as negative, neutral or positive. These ratings were based on answers to 4 relevance questions and 10 validity questions as determined by details reported in each article. If all relevance and most validity questions were positively answered as yes, an article was rated positive. In contrast, negative ratings were assigned when a minority of validity questions was answered positively, and neutral ratings were assigned when there was a mixture of positive and negative answers. Three investigators independently conducted quality assessments for each full article, and final quality ratings were agreed upon after any discrepancies were discussed. Research characteristics and quality ratings for each article are displayed in Table A.1.

Unique measurement tools used across studies and insufficient reporting of statistical analyses prevented a meta-analysis. Thus, a descriptive synthesis that explored themes and limitations of the current body of research was conducted. Summaries regarding knowledge and behavior outcomes along with theoretical foundations of studies were prepared. The discussion of study characteristics associated with positive health outcomes includes only studies that reported statistical analyses, owing to limitations of implying significance without analyses.
RESULTS

Six studies were non-randomized non-controlled trials with a D classification\textsuperscript{20-25} and 2 were non-randomized controlled trials with a C classification.\textsuperscript{26,27} Quality assessments of the 8 articles revealed 1 positive rating,\textsuperscript{27} 6 neutral,\textsuperscript{20,22-26} and 1 negative.\textsuperscript{21}

Some investigations did not explicitly report participant gender.\textsuperscript{21-24} Of studies that did,\textsuperscript{20,25-27} most hosted tours for exclusively female participants.\textsuperscript{25-27} No studies reported the socioeconomic status of tour participants, but low socioeconomic status was inferred in 1 study that conducted tours with \textit{Special Supplemental Nutrition Program for Women, Infants, and Children} participants.\textsuperscript{26} The 2 most common foci for grocery store tours were general healthful dietary behaviors\textsuperscript{21,24,27} and cardiac health-related dietary behaviors.\textsuperscript{20,23}

Study Designs

Six studies utilized a non-controlled trial research design in which an intervention group was the only source of data.\textsuperscript{20-25} Pre-post tests were used to assess participant outcomes in 4 of these studies\textsuperscript{22-25} whereas the other 2 included only posttests.\textsuperscript{20,21} Two programs used naturally occurring control groups in their recruited participant pool to compare with their tour group.\textsuperscript{26,27} None of the studies cited sample size goals based on power analyses. Sample sizes ranged from 9 participants\textsuperscript{20} to 947.\textsuperscript{24} Of 7 studies that reported the size of tour groups,\textsuperscript{20-25,27} the majority had groups of \(\leq 15\).\textsuperscript{20,21,23,25,27} In addition, statistical analyses were not presented in 2 of the 8 articles.\textsuperscript{20,21}

Knowledge

Five of the studies measured knowledge change in participants;\textsuperscript{20,22,24-26} 4 of these found that participants had an increase in knowledge after the tour.\textsuperscript{20,22,25,26} Investigator-designed topic-
specific, multi-question quizzes were the most common method for knowledge assessment.\textsuperscript{22,24-26} These quizzes were given to participants before and after attending the tour, to assess change. One study assessed knowledge change based on participants’ written reports of information they had gained after the tour in an open-answer format, and increased knowledge was reported based on the number of individuals who opted to write in an answer.\textsuperscript{20} None of the articles reported the validity or reliability of these instruments.

Each study that assessed knowledge,\textsuperscript{20,22,24-26} chose to measure this at unique time intervals after the tour. One study assessed knowledge gain immediately after the tour without additional follow-up.\textsuperscript{22} Other studies assessed knowledge with a delayed follow-up ranging from 1 week\textsuperscript{24} to 1 month\textsuperscript{20} and even up to 2 months after the tour.\textsuperscript{25,26} None of the studies that measured knowledge assessed retention $\geq$ 3 months after the tour, the amount of time that would place individuals in transition from an action to a maintenance stage of behavioral change.\textsuperscript{16}

**Behavior**

Behavior assessments were collected in 6 of the 8 studies.\textsuperscript{20,21,23,25-27} Measurement tools were widely heterogeneous among studies, but most assessed behavior change with subjective self-reports from participants. Self-report measures varied from general reports of “increasing variety in diets”\textsuperscript{20} or “reducing fat intake”\textsuperscript{25} to reported frequency of using strategies presented or purchasing products highlighted in the tour.\textsuperscript{21,26,27} One study assessed purchasing behavior change with objective measurements, by using grocery store loyalty card purchasing data for a 7-week period before the tour and a 7-week period after the tour.\textsuperscript{23} Neither validity nor the reliability of assessment instruments was addressed.
All 6 studies that assessed behavior change reported that participants had at least 1 positive behavior change after attending the grocery store tours.\textsuperscript{20,21,23,25–27} However, few studies described data analyses.\textsuperscript{23,26,27} In addition, the interval between the grocery tour and follow-up with participants varied among studies. The shortest follow-up interval was 1 month after the tour\textsuperscript{20,27} and the longest interval was 3 months after the tour.\textsuperscript{21} The study using loyalty cards was unclear regarding the interval between the tour and the follow-up data collection; it simply reported that data were collected for a 7-week period.\textsuperscript{23}

**Attributes Of Tours With Positive Outcomes**

The 8 studies measured additional health-related outcomes, such as participant intentions,\textsuperscript{21,22,25,26} attitudes,\textsuperscript{24,26} dietary behavior\textsuperscript{20,21,25–27} and purchasing behaviors.\textsuperscript{23} The current researchers extracted characteristics from the 6 articles that reported statistical analyses.\textsuperscript{22–27} Of these 6 studies, 5 found positive change in at least 1 health-related outcome.\textsuperscript{22,23,25–27} The topics of these tours varied, audiences differed by age and gender, and the length of tours ranged from 1 1.5-hour session\textsuperscript{23,25} to 3 1-hour sessions.\textsuperscript{26} Increased knowledge and behavior change were reported after adult women of low income completed 3 1-hour tours.\textsuperscript{26} Increase in knowledge was reported by parents and children after attending a tour focused on whole grains.\textsuperscript{22} A cardiac dietary pattern was emphasized in 1 1.5-hour tour that led to greater purchasing of heart healthy foods among participants (the characteristics of which were not reported).\textsuperscript{23} Adult women reported positive behavior change after attending 1 2-hour tour on general healthful dietary behaviors.\textsuperscript{27} Children and adults reported a statistically significant increase in knowledge after completing a 1 1.5-hour grocery store tour focused on low-fat foods.\textsuperscript{25} Additional details of each study are found in Table A.1.
Theoretical Basis

Only 1 article mentioned a theoretical basis for the grocery store tour. The Smart Shoppers Tour was based on Theory of Planned Behavior and Self-Efficacy theory with the goal “to increase the purchase of healthy foods by mothers on limited incomes (p. 323).” This study found positive changes in attitudes and intentions related to tour goals. Although they did not report the theoretical basis, 3 additional studies measured intentions and reported positive change in participants after attending tours. Participant attitudes were measured in 1 additional study, but no change was found after participants attended a tour. Of the 4 studies that found positive changes in these theoretical mediators of dietary behavior change, all reported additional positive changes when they measured participant knowledge or behavior.

DISCUSSION

The objective of this review was to identify attributes of grocery store tours that promote and sustain improvements in knowledge and behavior change. Low quality studies prevented the ability to answer the primary research questions. Limited evidence suggests that grocery store tours have the potential to increase knowledge and improve behaviors, but such studies are unique regarding multiple design parameters, and commonalities across studies do not exist to guide practices adequately at present. When measured, theoretical mediators of behavior change were positively changed, which suggests that foundations in behavior change theory would be recommended when creating future supermarket tours. To develop high-quality evidence of effective practices, valid and reliable methodological tools and high-quality study designs should be used in the future. Supermarket tours are a unique mode of education, that requires collaboration with grocers as well as the transportation of educators and participants to an
atypical site, and are often conducted with small-size groups. Their distinct requirements and popular use warrant the demand to produce evidence of their effectiveness.

The most salient observation from this review and synthesis of studies is the lack of reported qualities commonly anticipated in scientific articles. Two investigations did not report statistical analyses, and thus their results were only descriptive in nature with limited ability to make inferences. None of the publications included statements acknowledging institutional review for research involving humans. One research team that partnered with an elementary school mentioned approval from an education director.\textsuperscript{24} This suggests that tours were designed for programmatic and practical purposes, with lesser emphasis on effective systematic assessment. None of the articles addressed the reliability and validity of instruments, which cannot be assumed. No studies reported power analyses for sample size needs. The studies performed with small samples were assumed to be underpowered, and effects would be more difficult to detect. Finally, the lack of control groups was an inherent limitation of the non-controlled trial design used by the majority of studies included in this review. No study used a study design with an A- or B-quality classification.

Increased knowledge was reported in several studies.\textsuperscript{20,22,25,26} However, each assessment was custom-created for the tours’ specific focus, and thus was inconsistent across interventions. Therefore, synthesis of results should be made with caution. The short intervals between tour and assessment should also be considered, because a lack of longer-term follow-up prevented the ability to address the impact of knowledge retention beyond 3 months after the tour. Retention of participant knowledge gain beyond the short-term cannot be assumed without longer-term testing.
In all studies that assessed behavior, participants had at least 1 positive behavior change after attending a supermarket tour. However, concerns regarding social-desirability bias were present with many of the studies using self-report measures. The corroborating positive results from the study that used objective purchasing data from receipts and loyalty card information lent further evidence to suggest that positive behavior change may have resulted from attending grocery store tours. However, the longest post-tour follow-up of 3 months was in a study that did not report statistical analyses, so sustained change has yet to be determined indisputably.

Constraints of included studies made it difficult to develop strong conclusions regarding characteristics that define an effective grocery store tour. Identifying tour qualities related to any of the additional outcomes was not feasible with the current research and the limited number of high quality studies available. Studies that found significant positive health-related outcomes did not differ appreciably from studies that did not report these outcomes. This indicates that qualities related to successful change in positive health-related factors may be found in unreported or unmeasured facets of such interventions.

This review of the literature had recognized limitations. It is possible that inclusion of abstracts and unpublished work would have better informed the research questions. Only citations written in English were included in the review; this was considered appropriate as grocery store tours may have a different cultural role when performed in unique global cultures. Positive aspects of the review, such as inclusion of all study designs and range of publication dates, provided a comprehensive synthesis of published work on supermarket tours.

Based on the limited evidence, at this time it would be unwise to develop a theory of how or if supermarket tours are effective in promoting sustained positive health-related change. However, results suggesting positive change in attitudes and intentions along with knowledge
and behavior changes suggested that the Theory of Planned Behavior may be a desirable model that should be assessed with stronger experimental designs. Although not reported explicitly by name in the current literature, Social Cognitive Theory is another model that could mediate the impact of supermarket tours. Tours may influence an individual’s self-efficacy related to grocery shopping behaviors, because observational learning takes place in the contextual grocery store environment.

**IMPLICATIONS FOR RESEARCH AND PRACTICE**

Because the current literature regarding grocery store tours is primarily composed of lower-quality study designs, promising knowledge and behavior outcome results are not robust. Recommendations for future studies in this area are presented in Figure A.2. Future research should use stronger study designs, including randomized controlled trials, to show a clear relationship between intervention and any change in participants. Instruments to measure health-related knowledge and behavior change should be valid and reliable. Knowledge and behavior should be measured at least 3 months, if not 6 months, after the tour to evaluate whether changes are maintained. Encouraging results from studies using behavior change theory, support the use of theories when developing and conducting future research on supermarket tours.

**STATEMENT OF POTENTIAL CONFLICT OF INTEREST**

The first author was supported by a Kraft Human Nutrition Fellowship through the Division of Nutritional Sciences at the University of Illinois, at the time of this review. The senior author has received research funding from the United States Department of Agriculture, National Institute of Food and Agriculture; the Bell Institute of Nutrition and Health, General Mills, Inc.; Hershey Foods; and Dairy Management Institute within the past three years.
FUNDING/SUPPORT

This material is based on work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2012-68001-22032.

ACKNOWLEDGEMENTS

The authors thank the many program developers and research teams for pioneering work in this field. Their contributions in the use of supermarkets as a novel teaching environment have provided a foundation for additional avenues for nutrition education of consumers.
REFERENCES


Figure A.1. Flow diagram depicting study selection for the systematic literature review on grocery store (supermarket) tours.
Table A.1. Characteristics of Studies Assessing Grocery Store (Supermarket) Tours, 1984-2015 (n=8)

<table>
<thead>
<tr>
<th>Reference (Research Design, Class, Quality Rating)</th>
<th>Participant Sample Size and Descriptive Characteristics</th>
<th>Intervention Title, Recruiting, Theoretical Basis, Design, Objective, Tour Length, Basic Components</th>
<th>Primary Outcomes: Tool Characteristics and Timing</th>
<th>Additional Outcomes: Tool Characteristics and Timing</th>
<th>Primary and Additional Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baic and Thompson (2007)²⁰ Design: Non-controlled trial Class: D Neutral</td>
<td>Sample size: n = 58 participants; n = 10 follow-up survey recipients and 9 returned Descriptive characteristics: Equal amount of men and women</td>
<td>Heart Healthy tours Recruiting: In-store posters, local print media, health professional referrals Theoretical Basis: NR Objective: Assessment of feasibility and acceptability Tour periods: n = 1 Tour length: NR Tour size: 5-15 attendees Basic components: Focused on heart-healthy foods; label education; food preparation</td>
<td>Knowledge: Assessed n=10 clients recruited from health professionals via anonymous mail survey; 1-mo posttour Behavior: Measured with that survey</td>
<td></td>
<td>Knowledge: New information was reported in open-answer format (n = 10) Behavior: 100% (n = 9) reported increasing diet variety, 89% (n = 9) felt it was easier to follow healthy diet, (n = 9) made dietary changes Additional Results Interest: 98% (n = 48) found tour interesting Information novelty: 75% (n = 48) reported learning new information</td>
</tr>
<tr>
<td>Carson and Hedl (1998)²⁶ Design: Non-randomized controlled trial Class: C Neutral</td>
<td>Sample size: n = 315 women completed pretest; n = 128 women completed pretest and attended tour(s); n = 114 women attended tour(s) and completed 2-month follow-up Descriptive characteristics: Average age 28 y, parent of 2 children, unemployed with some high school education.</td>
<td>Smart Shoppers Tour Recruiting: Peer-leaders solicited participants from WIC clinics and other assistance programs Theoretical basis: Theory of Planned Behavior and Self-Efficacy Theory Objective: Increase healthy food purchases using labels and unit costs (facilitated by changes in attitudes, self-efficacy, and knowledge)</td>
<td>Knowledge: 16-question test with word/picture matching; at recruitment and 2 mo after tour Behavior: 2 items, agree/disagree to statements: I use the nutrition label and I compare unit cost; home food inventory of tour-specific foods; at</td>
<td></td>
<td>Primary Results: Knowledge: Mean quiz scores increased 8% from 11.96 (out of 16) to 12.89, with effect size of 0.39 (P &lt; .0001) Behavior: Increased nutrition label use (P = .005); no change in unit cost use Additional Results: Attitudes: Increased disagreement that...</td>
</tr>
</tbody>
</table>
| **Table A.1. (cntd.)** | **Majority Caucasian and WIC recipients** | **Tour periods: n =3** | **Tour length: 1 h** | **Tour size: NR** | **Basic components:** Focused on grains, produce, low-fat meat and dairy; meal planning; shopping tips; taste tests. Led by trained peers in English and Spanish. | **recruitment and 2 months after tour** | **Self-efficacy:** 1 question asked, whether agree/disagree to: Have skills to buy healthy foods for family, at recruitment and 2 mo after tour | **Subjective norms:** 2 questions, asked whether agree/disagree to: Their family thinks it is good to eat a certain amount of fruits and vegetables each day; at recruitment and 2 mo after tour | **Primary Results** | **Crawford and Kalina (1993)\textsuperscript{11}** | **Design:** Non-controlled trial | **Class:** D | **Sample size:** n = 48 participants | **Descriptive characteristics:** NR | **The Shop Smart Tour** | **Recruiting:** In-store advertisements, mailed fliers, word-of-mouth | **Theoretical basis:** NR | **Objective:** Increase food choices that decrease risk of nutrition-related diseases | **Knowledge: NR** | **Behavior:** Assessed whether dietary change intention had been realized. Purchasing behavior assessed; 3-mo posttour | **Intention:** Increased intentions regarding specific behaviors and food groups posttour | **Knowledge: NR** | **Behavior:** Assessed whether dietary change intention had been realized. Purchasing behavior assessed; 3-mo posttour | **Intention:** Increase in agreement (P = .02) | **Subjective norms:** No change | **Primary Results** | **Behavior:** People generally made intended dietary changes with exception of decreasing dietary fat. Greater number of products were being purchased | **Additional Results** | **Intention:** Expressed intentions included: 33.3% read food labels, 29.2% reduced dietary fat and 22.9% reduce red meat consumption. 41.7% incorporated low-fat
<table>
<thead>
<tr>
<th>Lafferty et al (2006)(^\text{22})</th>
<th>Sample size: n = 25 students (grades 4–5) and n = 27 parents and children</th>
<th>No title</th>
<th>Knowledge: Asked label terms and location of whole-grain products within store pre- and posttour</th>
<th>Intention: Assessed intentions to ask for parents to purchase whole-grain products (student group) or intentions to purchase products (parent-child group); pre-and posttour</th>
<th>Primary Results</th>
<th>Knowledge: Parents and children both significantly increased knowledge, but in different areas ((P &lt; .01) overall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design: Non-controlled trial</td>
<td>Class: D Neutral</td>
<td>Recruiting: NR</td>
<td>Behavior: NR</td>
<td>Skills: Ability to differentiate whole-grain from refined-grain products based on ingredient lists and nutrition facts panels, pre- and posttour</td>
<td>Additional Results</td>
<td>Intention: Parents had greater intention to purchase children’s requested whole-grain products ((P \text{ NR}))</td>
</tr>
<tr>
<td>Descriptive characteristics: NR</td>
<td>Tour periods: n = 1</td>
<td>Tour length: NR</td>
<td>Tour size: 25-27 attendees</td>
<td>Basic components: Lecture before tour, focused on identifying whole-grain products; Student group included taste-test; Parent-child group had package term activity and recipes provided</td>
<td>Motivation for attendance: 1 question asked participants why they chose to attend, posttour</td>
<td></td>
</tr>
<tr>
<td>Sadler et al (2003)(^\text{23})</td>
<td>Sample size: n = 459 participants gave evaluation; n = 223 provided purchasing information</td>
<td>Healthy Heart Store Tours</td>
<td>Knowledge: NR</td>
<td>Behavior: Increase in healthier spread purchases by 4% ((P &lt; .05)) and fruit and vegetable purchases decreased by 5% ((P \text{ NR}))</td>
<td></td>
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</tr>
<tr>
<td>Design: Non-controlled trial</td>
<td>Class: D Neutral</td>
<td>Recruiting: Posters and announcements in stores, advertisements in local press and in offices</td>
<td>Tours periods: n = 1</td>
<td>Behavior: Purchasing behavior evaluated with data from loyalty card; 7-wk period before and 7-wk period after tour</td>
<td>Additional Results</td>
<td>Motivation for attendance: Most frequent reason (42%) was health problem present in participants</td>
</tr>
<tr>
<td>Tour length: 1.5 h</td>
<td>Tour size: (\leq) 10 attendees</td>
<td>Theoretical basis: NR</td>
<td>Tour periods: n = 1</td>
<td>Tour size: 25-27 attendees</td>
<td></td>
<td><strong>Primary Results</strong></td>
</tr>
<tr>
<td>Descriptive characteristics: NR</td>
<td>Basic components: 15-min lecture before tour; emphasis on specific aisles</td>
<td>Objective: Provide tour for those interested in heart health</td>
<td>Behavior: NR</td>
<td><strong>Primary Results</strong></td>
<td>Knowledge: Parents and children both significantly increased knowledge, but in different areas ((P &lt; .01) overall)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Behavior: NR</td>
<td>Intention: Assessed intentions to ask for parents to purchase whole-grain products (student group) or intentions to purchase products (parent-child group); pre-and posttour</td>
<td>Additional Results</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Skills: Ability to differentiate whole-grain from refined-grain products based on ingredient lists and nutrition facts panels, pre- and posttour</td>
<td>Motivation for attendance: 1 question asked participants why they chose to attend, posttour</td>
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cheese/yogurt into diet, 29.2% incorporate legumes, and 22.9% incorporated whole grains
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Class</th>
<th>Positive</th>
<th>Sample size</th>
<th>Recruiting</th>
<th>Theoretical basis</th>
<th>Objective</th>
<th>Tour periods</th>
<th>Tour length</th>
<th>Tour size</th>
<th>Basic components</th>
<th>Knowledge</th>
<th>Behavior</th>
<th>Attitude</th>
<th>Additional Results</th>
<th>Primary Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silzer et al (1994)</td>
<td>Non-randomized controlled trial</td>
<td>C</td>
<td>Positive</td>
<td>n = 61 females in treatment group, 12 lost to follow-up (n = 49 final follow-up treatment group); n = 63 females in control group</td>
<td>NR</td>
<td>NR</td>
<td>Identify changes in food selection and preparation after tour, compared with control</td>
<td>n = 1</td>
<td>2 h</td>
<td>10-12 attendees</td>
<td>Led by dietitian; focused on low-fat, low-sodium foods and high-fiber foods; label education; food preparation</td>
<td>NR</td>
<td>16-question skill and behavior checklist; frequency and yes/no/don’t know format asked types of food purchased, information read on labels, and food preparation practices; pretour and 1-mo posttour via mail</td>
<td>None</td>
<td>Behaviors: Gain in behavior survey score was significantly higher in treatment group compared with control (P &lt; .001)</td>
<td></td>
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<tr>
<td>Smith and Kalina (2004)</td>
<td>Non-controlled trial</td>
<td>D</td>
<td>Neutral</td>
<td>n = 947 participants; n = 496 returned pre and post attitude surveys; n = 45 students (in grade 3 classes) returned knowledge quizzes</td>
<td>NR</td>
<td>NR</td>
<td>Impact attitudes toward trying new variety of foods and develop ability to recognize 4 food groups of Canada’s Food Guide to Healthy Eating</td>
<td>NR</td>
<td></td>
<td>20 attendees</td>
<td>NR, described in separate article not accessible at time of review</td>
<td>Quiz with questions about 4 food groups and examples that would be in each, asked to treatment and control grade 3 classes 1 week after tour</td>
<td>None</td>
<td>Attitude: Questions about attitude regarding trying new foods and eating a variety of foods with a Likert-type scale asked to caregivers, 1 wk pre- and posttour</td>
<td>None</td>
<td>Knowledge: Average scores (out of 20) were 10.24 for treatment group and 11.4 for control group (difference not significant)</td>
</tr>
</tbody>
</table>

**Table A.1.** (cntd.)
<table>
<thead>
<tr>
<th>Design: Non-controlled trial</th>
<th>Class: D</th>
<th>Neutral</th>
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<tbody>
<tr>
<td>van Assema et al (1998)&lt;sup&gt;25&lt;/sup&gt;</td>
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<tr>
<td>Sample size: n = 419, given posttour assessment; n = 145 given 5- to 7-wk follow-up behavior assessment; n = 310 given pretour knowledge assessment; n = 305 given posttour knowledge assessment; n = 86 given 5- to 7-wk follow-up knowledge assessment</td>
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<tr>
<td>No title, part of <em>Beware of Fat</em> campaign</td>
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<tr>
<td>Recruiting: Press conference, press releases, local newspaper advertisements, posters and pamphlets; local groups were contacted</td>
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<tr>
<td>Theoretical basis: NR</td>
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<tr>
<td>Objective: Increase knowledge and awareness of fat intake/content; create intention to reduce fat intake</td>
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<tr>
<td>Tour periods: n = 1</td>
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<td></td>
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<tr>
<td>Tour length: 1-2 h</td>
<td></td>
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<tr>
<td>Tour size: 8 attendees</td>
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<tr>
<td>Basic components: Brief lecture before tour; led by dietitian; focused on different food groups; used posters and products and small tasks to keep participants engaged; taste test of cheeses with different fat content; materials given to participants to take home</td>
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<td></td>
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<tr>
<td>Knowledge: 9-question quiz, assessed at pre-and posttour and 5- to 7-week follow-up phone call</td>
<td></td>
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<tr>
<td>Behavior: Questions on fat intake reduction; 5- to 7-week follow-up phone call</td>
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<tr>
<td>Intention: Questions on intentions to reduce fat intake, posttour</td>
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<tr>
<td>Awareness: Questions on awareness of fat intake, posttour</td>
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**Primary Results**

Knowledge: Student group increased from 5.3 to 6.4 posttour (*P* < .01) and 6.2 at follow-up (*P* NR). Adult scores increased from 5.8 to 6.8 posttour (*P* < .01) and 6.6 at follow-up (*P* NR). Behavior: 63% of students and 75% of adults reported reducing fat intake.

**Additional Results**

Intention: 45% of students and 70% of adults reported intention to increase purchases of low-fat items. Awareness: Most were more aware of their own fat intake.

---

NR indicates not reported; WIC indicates Special Supplemental Nutrition Program for Women, Infants, and Children.

<sup>a</sup>Studies were classified as A, B, C, or D according to the strength of the research design, based on the Academy of Nutrition and Dietetics' *Evidence Analysis Manual*’s hierarchy and classification system; <sup>b</sup>A quality criteria checklist from the Academy of Nutrition and Dietetics’ *Evidence Analysis Manual* was used to rate each study as negative, neutral, or positive. Ratings were based on answers to 4 relevance questions and 10 validity questions according to information reported within each article. If all relevance and most validity questions were checked as yes, an article was rated positive. In contrast, negative ratings were assigned when a minority of validity questions was answered positively, and neutral ratings were assigned when there was a mixture of positive and negative answers.
Figure A.2. Methodological considerations and recommendations for designing future grocery store (or supermarket) tour interventions

**Identification of Need**
- Conduct a community nutrition needs assessment to identify whether a grocery store tour is necessary (and what type of nutrition education intervention is desired) for the target audience.

**Tour Components**
- When available and appropriate for the target audience, use a previously existing curriculum to facilitate comparability of results across previous studies and program reports of grocery store tours.
- If an appropriate curriculum is not available:
  - Ground a new tour in a theoretical framework of behavioral change.
  - Develop the tour based on appropriate dietary guidance for the target audience.
  - Establish content validity with expert review.

**Research Design**
- Apply a strong design, such as randomized controlled trial or clustered randomized trial, to optimize strength of outcomes and conclusions from the grocery store tour.
- Conduct a power analysis to identify the sample size needed to detect the tour’s effect.
- Obtain approval for research with human participants before initiating the tour.
- Conduct statistical analyses, beyond simply reporting of participant characteristics.

**Assessment**
- Tailor the evaluation to the dose and content of the tour.
- Measure outcomes using tools with established validity and reliability.
- If valid and reliable measurement tools or techniques are not available:
  - Develop and pilot test new assessment materials to demonstrate validity and reliability of these instruments.
- Follow-up with participants at least three months after the tour to evaluate retention of change on outcome measures.

**Evaluation and Dissemination**
- Statistical significance and tests should be reported with enough detail to be replicable.
- Share the findings of the intervention in appropriate peer-reviewed avenues.

**Additional Resources**
APPENDIX B: IRB Approval Letters

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research
Office for the Protection of Research Subjects
528 East Green Street
Suite 203
Champaign, IL 61820

January 26, 2015

Sharon Nickols-Richardson
Food Science & Human Nutrition
260A Bevier Hall
905 S. Goodwin Ave
Urbana, IL 61801
M/C 182

RE: Grocery Shopping Intervention: Pilot testing of educational method for the PAWS Club study
IRB Protocol Number: 15446

EXPIRATION DATE: January 25, 2018

Dear Dr. Nickols-Richardson:

Thank you for submitting the completed IRB application form for your project entitled Grocery Shopping Intervention: Pilot testing of educational method for the PAWS Club study. Your project was assigned Institutional Review Board (IRB) Protocol Number 15446 and reviewed. It has been determined that the research activities described in this application meet the criteria for exemption at 45CFR46.101(b)(1).

This determination of exemption only applies to the research study as submitted. Please note that additional modifications to your project need to be submitted to the IRB for review and exemption determination or approval before the modifications are initiated.

We appreciate your conscientious adherence to the requirements of human subjects research. If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at the OPRS office, or visit our website at http://www.irb.illinois.edu.

Sincerely,

LeaAnn Carson, MS
Human Subjects Research Specialist, Office for the Protection of Research Subjects

134
Office of the Vice Chancellor for Research
Office for the Protection of Research Subjects
528 East Green Street
Suite 203
Champaign, IL 61820

February 10, 2015

Sharon Nickols-Richardson
Food Science & Human Nutrition
260A Bevier Hall
905 S. Goodwin Ave
Urbana, IL 61801
M/C 182

RE: Family Menu Planning: Pilot testing of educational method for the PAWS Club study
IRB Protocol Number: 15447

EXPIRATION DATE: February 9, 2018

Dear Dr. Nickols-Richardson:

Thank you for submitting the completed IRB application form for your project entitled Grocery Shopping Intervention: Pilot testing of educational method for the PAWS Club study. Your project was assigned Institutional Review Board (IRB) Protocol Number 15446 and reviewed. It has been determined that the research activities described in this application meet the criteria for exemption at 45 CFR 46.101(b)(1).

This determination of exemption only applies to the research study as submitted. Please note that additional modifications to your project need to be submitted to the IRB for review and exemption determination or approval before the modifications are initiated.

We appreciate your conscientious adherence to the requirements of human subjects research. If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at the OPRS office, or visit our website at http://www.irb.illinois.edu.

Sincerely,

[Signature]

LeaAnn Carson, MS
Human Subjects Research Specialist, Office for the Protection of Research Subjects