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Tionni R. Wenrich

*Pennsylvania State University*

J. Lynne Brown

*Pennsylvania State University*

Michelle Miller-Day

*Chapman University, millerda@chapman.edu*


Kevin J. Kelley

*Pennsylvania State University*

Eugene J. Lengerich

*Pennsylvania State University*

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# Family Members' Influence on Family Meal Vegetable Choices

## Comments

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## Family members' influence on family meal vegetable choices

**Tionni R. Wenrich, MS,**  
Penn State University

**J. Lynne Brown, PhD, RD,**  
Penn State University

**Michelle Miller-Day, PhD,**  
Penn State University

**Kevin J. Kelley, PhD,** and  
Penn State University - Lehigh Valley

**Eugene J. Lengerich, VMD, MS**  
Penn State College of Medicine

### Abstract

**Objective**—Characterize the process of family vegetable selection (especially cruciferous, deep orange, and dark green leafy vegetables); demonstrate the usefulness of Exchange Theory (how family norms and past experiences interact with rewards and costs) for interpreting the data.

**Design**—Eight focus groups, two with each segment (men/women vegetable-likers/dislikers based on a screening form). Participants completed a vegetable intake form.

**Setting**—Rural Appalachian Pennsylvania.

**Participants**—61 low-income, married/cohabiting men (n=28) and women (n=33).

**Analysis**—Thematic analysis within Exchange Theory framework for qualitative data. Descriptive analysis, t-tests and chi-square tests for quantitative data.

**Results**—Exchange Theory proved useful for understanding that regardless of sex or vegetable-liker/disliker status, meal preparers see more costs than rewards to serving vegetables. Past experience plus expectations of food preparer role and of deference to family member preferences supported a family norm of serving only vegetables acceptable to everyone. Emphasized vegetables are largely ignored due to unfamiliarity; family norms prevented experimentation and learning through exposure.

**Conclusions and Implications**—Interventions to increase vegetable consumption of this audience could 1) alter family norms about vegetables served, 2) change perceptions of past experiences, 3) reduce social and personal costs of serving vegetables and 4) increase tangible and social rewards of serving vegetables.

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Corresponding Author: Tionni R. Wenrich, MS, Pennsylvania State University, 222 Food Science Building, University Park, PA 16802, Telephone: 814-863-4829, Fax: 814-863-6132, trk122@psu.edu.

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**Institutional Review Board that approved this study:** The Pennsylvania State University

## Keywords

Family Meals; Vegetables; Exchange Theory; Food Preparer Role

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## Introduction

In the US, Appalachia covers a mountainous, largely rural region crossing thirteen states whose residents suffer higher rates of mortality from chronic disease than residents in other regions. (1) Reflecting the region's cultural background, traditional Appalachian food is "unpretentious, solid, and filling." (2) Meat and potatoes are a meal staple in this area, while vegetables appear less often in meals than they once did. (2) Central Pennsylvania, a part of Appalachia, is home to descendants of Irish, English, German and Eastern European settlers who favor this meal pattern.

The US Department of Agriculture recommends adults eat at least 7 to 10 (1/2 cup) servings of fruits and vegetables a day. (3,4) However, Americans consume fewer than the recommended servings (4,5) and the low-income consume even fewer fruits and vegetables. (5) Interventions to increase fruit and vegetable consumption have had limited success and often do not distinguish between intake of fruits and vegetables when reporting results. (e.g., 6,7) Studies that report intake separately often find fruit contributes the most to any increase while vegetable intake is virtually unchanged. (8,9) Other researchers have recommended that future nutrition interventions focus on increasing vegetable consumption, (9) particularly cruciferous, deep orange and dark green leafy vegetables (9,10) because their intake is consistently low, (4,11) and they contain micronutrients that offer protection against chronic diseases. (10)

Most people eat vegetables at the evening meal. (12) However, studies of European and urban US populations indicate both children's and husbands' food preferences often dictate what foods are served at family meals. (13-15) If the husband prefers few vegetables with meals, the wife may serve fewer vegetables rather than face his disapproval. (14) We have little understanding of other factors that affect family member vegetable preferences and patterns, especially for low-income, rural US food preparers. We needed to understand these factors in order to develop a community-based, family-centered nutrition program featuring vegetables for the low-income, rural populations served by the Northern Appalachia Cancer Network, of which Pennsylvania is a partner. (16)

We used Exchange Theory from the family studies literature to guide our research because it includes constructs relevant to the interaction between the food preparer and other family members on food choice decisions. Exchange Theory is based on the constructs of norms, rewards, costs, comparison level, and outcomes. A reward serves as positive reinforcement for a certain behavior, while a cost involves punishment or loss of rewards. Comparison level is the standard against which individuals assess the rewards and costs of an action, based on previous experiences, and social norms or rules that govern a situation. (17) An outcome reflects the balance of related costs, rewards, and comparison level. Exchange Theory is useful because it incorporates important factors identified in previous studies, such as personal persuasion (13-15,18) and family member expectations. (14) Although nutrition programs have used a simpler Exchange Theory for social marketing (19-21), family studies Exchange Theory has not been used extensively in nutrition-related research. Nutrition scientists are urged to examine theory from other fields to improve our ability to answer research questions. (22) Exchange Theory could illuminate outcomes of family interactions around food selection, something that is not well understood.

We hypothesized that the interaction of family norms and past experiences with rewards and costs would influence the vegetables served at a family meal. Our objectives were to: 1) characterize the process of family vegetable selection among a rural, low-income Appalachian population of married or cohabiting men and women and 2) demonstrate the usefulness of Exchange Theory for interpreting the data. Our specific interest was consumption of cruciferous, deep orange, and dark green leafy vegetables. We also examined differences between vegetable-likers and dislikers, not examined previously in the literature, and between men and women, rather than just women (e.g., 13,23,24) to the exclusion of men.

## Methods

The Penn State University Institutional Review Board approved this research with an expedited review.

## Participants

Potential participants were identified through community-based venues that provide assistance to low-income audiences (County Assistance and CareerLink offices, food pantries, etc.) in two rural Appalachian counties in Central Pennsylvania, both defined as rural by The Center for Rural Pennsylvania. Volunteer eligibility was based on the following inclusion criteria, gathered by a screening form: 1) gross annual household income of  $\leq$ \$40,000, 2) married or cohabiting for at least one year, and 3) at least one partner age 40 years or older (an age when they may realize that diet affects their health). The screening form also included a list of 18 vegetables on which respondents indicated their degree of like/dislike on a 3-point scale: 15 vegetables from the cruciferous, deep orange and dark green leafy vegetable groups plus three 'popular' vegetables (corn, tomatoes, potatoes) that were included so vegetable-dislikers would not have to reject everything. Vegetable-likers were defined as those liking at least six out of the fifteen emphasized vegetables, while vegetable-dislikers became those liking five or fewer of these vegetables. The cutoff of six was based on an analysis of 60 initial screening forms that showed a distinct separation of vegetable-likers from dislikers. Focus groups were conducted separately with each of four segments - men/women and vegetable-likers/dislikers - to increase comfort sharing opinions and to examine differences between groups. Among those interested, 182 met the inclusion criteria. When time and location of each focus group was set, eligible persons living within a reasonable distance were invited to a focus group. When we had more recruits than needed for a particular group, we invited those recruited closest to the focus group date first because it was likely they were still interested and available. In all, 88 individuals agreed to participate and, of those, 61 attended (34% of those meeting inclusion criteria; 69% of those agreeing to participate).

## Instruments

Participants filled out a demographic form and a 32-question vegetable intake form after securing written informed consent. The vegetable intake form was a validated NCI All-Day screener (25) that has been used among low-income participants,(26) which we revised. We replaced questions on the original screener about fruit, salad, beans and nonspecific vegetable groups with questions to assess intake during the previous month of our specific emphasized vegetable groups. We also added questions about a) number of family meals eaten together per week and how often our emphasized and other popular vegetables were served at family meals during the previous month, b) like/dislike of these vegetables and c) perceived cancer risk and the influence of vegetables thereon. To establish face validity and refine the instrument, questions underwent cognitive interview testing in December 2005 with six members of the target audience.

## Focus Group Procedure

Scripted questions (Table 1) came from analysis of individual interviews with eight members of the target audience in 2004 who discussed their use of vegetables, particularly those we emphasized.(27) The script was reviewed by psychology and communication faculty with focus group expertise. Eight focus groups (range=5 to 11 persons per group,) were conducted between January and July 2006, two with each segment: men/vegetable-likers (n=13); men/vegetable-dislikers (n=15); women/vegetable-likers (n=18); women/vegetable-dislikers (n=15). The 1.5-2 hour sessions were audiotaped and afterward, each participant received \$20.

## Analyses

**Quantitative Data**—Statistical analyses were conducted using SPSS (version 11.5 for windows, 2002, SPSS Inc, Chicago, IL). Descriptive statistics were calculated for demographic and vegetable-intake variables. Two-sided *t*-tests and chi-square tests were used to assess differences between groups for continuous variables and categorical variables, respectively. Cronbach's alpha assessed internal consistency of vegetable like/dislike scales. Statistical significance was set at  $P<0.05$ .

**Qualitative Data**—Focus groups were analyzed using principles outlined by Krueger.(28) Audiotapes were transcribed verbatim. One investigator reviewed the transcripts and developed a coding list of mutually exclusive categories that reflected the ideas emerging during responses to scripted questions that related to constructs of Exchange Theory (Figure 1). Each comment capturing a single idea pertinent to our objectives was considered a unique code. Codes were organized into sub-themes and two investigators independently coded the last two focus groups using the coding list. Inter-coder reliability was calculated on these two transcripts using Holsti's formula.( 29) Reliability ranged from 82 to 84 percent. After each transcript was checked, differences were discussed and reconciled. One investigator then applied the revised coding scheme of 77 coding categories, to all group transcripts. Both investigators reviewed the coded transcripts, then wrote overall thematic summaries for each segment. Sub-themes were organized into major themes and then assigned to the relevant Exchange Theory construct. Results are presented by construct with coded responses mentioned in at least two focus groups reported for each sub-theme. Relevant quotes are included. Based on the analysis, we added an additional construct, strategies to get to positive outcomes, to the model.

## Results

### Participant Characteristics

Most participants (79%) were married, and there were no significant differences in household composition or other characteristics between the groups (Table 2) or between liker/disliker subgroups (data not shown). As shown in Table 3, vegetable-likers had significantly higher mean liking scores for cruciferous, deep orange and dark green leafy vegetables, as well as tomatoes, compared to dislikers. Vegetable-likers' intakes of cruciferous and deep orange vegetables were also significantly greater than that of dislikers, as was the frequency of serving cruciferous, deep orange and dark green leafy vegetables at family meals. Liker/disliker groups did not differ in their perceived cancer risk. Vegetable-likers were significantly more likely than dislikers to agree that the vegetables they eat are likely to affect their risk of developing cancer. Participants averaged  $4.6\pm 2.3$  family meals per week.

### Norms (Family Meal Status Now)

Groups valued the traditional family meal and had similar definitions and food preparer expectations.

**Definition and Ideal Meals**—Both men's and women's groups defined the family meal as those where everyone was present eating shared food and felt this was an important family activity: “We try to make it a point to gather at the evening meal so we can also discuss family problems or plusses” (fgml1Footnote). Family meals typically were evening events, but their location (living room versus dinner table), timing (set time or whenever ready) and frequency varied.

An ideal meal for most consisted of meat, potato/starch and sometimes a vegetable and/or dessert. For some, foods had to be filling and included items they raised in gardens: “Availability in the garden is a big thing” (fgwl2). Most men's groups expressed a preference for fresh venison and wild game: “I'm also a hunter and we don't buy anything in the meat line; we eat venison” (fgml1). Some women's groups indicated an ideal meal may include fruit and has to be foods everyone likes: “the family wanting the same thing, liking the same thing. Like if I say, ‘What do you all want for dinner?’ they'll say spaghetti. So I think that would be a good family meal” (fgwl1).

**Roles and Responsibilities**—The majority of the women and about half of the men were responsible for food preparation. Both men and women indicated the food preparer's responsibilities included making a variety of nutritious, well-balanced meals that family members like and can eat, timed to members' arrival home, and keeping work surfaces and foods clean (i.e. food safety). Pleasing everyone's food preferences was important: “. . . he taught me how to cook exactly the way he wants food, so it's perfect” (fgwd2). Women's groups emphasized being sensitive to everyone's likes and needs: “My mom's diabetic, high blood pressure and stuff like that; so you have to make sure what you're preparing isn't going to hurt the person” (fgwd1). However, women vegetable-dislikers indicated a limited food budget restricted their ability to please everyone's preferences: “My daughter wants pizza all the time. I'll say, ‘Well, then you have to go out and earn money on your own if you want that kind of food’” (fgwd1).

## Rewards

The social and practical rewards or positive reinforcements for serving meat and potatoes were much greater than for serving vegetables at family meals. Vegetable-liker/disliker status did not influence perceived rewards of *meat and potatoes*, but did influence rewards linked to *vegetables*.

**Meat and Potatoes**—All groups reported they and their families viewed meat as delicious, satisfying, and/or versatile. Although members of some families questioned meat-centered diets, all groups felt meat was the meal centerpiece: “Usually an American meal, you center it around meat.” (fgwd2). Women's groups noted that meat was a good source of protein. All groups reported they and their families loved potatoes (a social reward), which were described as healthful (high in potassium), especially with skins on, and filling. Their most appreciated attribute was versatility. Both men and women described numerous ways, both traditional and unique, of fixing and serving potatoes: “make potato cakes with leftover mashed potatoes” (fgmd2).

**Vegetables**—In contrast, most rewards of vegetables expressed were personal benefits. Vegetable-likers personally felt that a major reward of consumption was their health benefits: “give you your vitamins” (fgwl1), “aren't fattening” (fgwl1), and “can bring your blood pressure down” (fgwl2). Men vegetable-likers commented on the various flavors of vegetables:

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FOOTNOTE: Indicates quoted focus group: fg=focus group; m/w=men/women; l/d=vegetable-liker/disliker; 1/2=first/second focus group within segment (i.e., fgml1 is the first focus group with men vegetable-likers).

“You don't get the same taste from a cabbage as you do a cauliflower or celery” (fgml2). The forms available (fresh, frozen, canned) were another plus to both vegetable-likers and dislikers. Regardless if vegetable-liker or disliker, the most rewarding vegetables to serve were corn, peas and carrots, based on universal taste appeal and lack of negative family member comments. In six focus groups, sweetness was a key reason for liking these vegetables: “Corn because it's sweet. It's got a sweet taste to it” (fgmd2). Men stressed how vegetables became more acceptable if baked or cooked with meat so they absorb the meat flavor: “I never could eat [cooked carrots] and I don't know why. Now, if you put it in a roast...I'll eat it that way... it has the beef flavor going through it” (fgml1).

## Costs

Serving meat and potatoes resulted in fewer social and practical costs than serving vegetables at family meals. Vegetable-liker/disliker status affected only perceptions of tangible costs of vegetables.

**Meat and Potatoes**—Some women's groups felt beef was expensive while some men's groups reported limiting meat due to prostate problems. In a men's and a women's group, some reported children were picky about choice of meat: “the only meat [my daughter] likes is chicken nuggets” (fgmd2). All women's groups and one men's recognized potatoes as starchy and potentially fattening and some women's group participants were eating fewer potatoes now: “I don't eat them all the time like I used to” (fgwd1). Vegetable-likers and dislikers did not differ in terms of *perceived* costs associated with meat and potatoes.

**Vegetables**—Some costs associated with vegetables were tangible and more often raised by vegetable likers. Men's groups indicated that fresh vegetables were not always available while both groups noted that cheaper canned varieties could contain a lot of undesirable sodium. Members of all groups were unfamiliar with our emphasized vegetables when shown a list. They did not know how to prepare them so they tasted good. Also, some lived on tight budgets and “this stuff costs money and you don't want it to go to waste” (fgwd1). Lack of flexibility produces a routine: “you get in a rut with the same old vegetables - peas, carrots, beets and stuff” (fgml1). For both vegetable-dislikers and likers, other costs were personal aversion based on taste (especially bitter flavors), smell (Brussels sprouts, spinach, mushrooms), texture (slimy or oozy okra, mushrooms or spinach; soft carrots) and appearance. A vegetable-disliker said, “[Some vegetables] taste yucky, some taste dull, and some don't have no taste at all” (fgwd2). Sometimes it just looked bad: “mushrooms to me look like dirt” (fgwd1). The social costs of ignoring key family member preferences prevented the food preparer from offering new vegetables at family meals. Regardless of vegetable-liker/disliker status, the influence of the husband and children was apparent: “I usually pick corn because that's about the only vegetable they eat.” (fgwd1) Dislikers could block family access when they were either the preparer: “if I don't like it, I know they're not gonna like it because they're like me” (fgwd1) or partner: “I just tell her, ‘You know what I like; do it’” (fgmd1).

## Comparison Level

Past experience influenced choice of vegetables served at family meals and willingness to introduce new vegetables. Vegetable-liker status affected willingness to try new vegetables.

**Vegetables Acceptable at Meals Now**—Both men's and women's groups indicated family members disliked so many vegetables that only certain vegetables (corn, peas, carrots, string beans, and to some extent, broccoli and cauliflower) fixed specific ways were acceptable. Corn was the only universally acceptable vegetable. Women vegetable-likers listed a few more acceptable vegetables than dislikers. A few women vegetable-dislikers sometimes offered personally disliked vegetables at family meals: “[My daughter] wants to eat Brussels sprouts



and she wants to eat this and that...so it's kind of like I force myself [to make vegetables]" (fgwd2). Most said there were no disagreements about vegetables at meals. Either choices avoid arguments: "if nobody likes it, I don't get it" (fgwd1), resistance is entrenched: "I have finally gotten him to the point where he will silently pick the vegetables out and push them off to the side" (fgwl2), or choices please the most powerful: "I ask her what she wants and that's what she gets" (fgmd1).

**Reactions to New Vegetables**—Participants in all groups indicated that some family members might try a new vegetable while others would not. One's willingness to try a new vegetable depended on their individual pickiness: "If it ain't creamed corn, it ain't whole kernel corn, or if it ain't on a cob, they're not doing it" (fgmd2), how the vegetable was prepared, how it looked: "[Canned kale] looks like something I would feed my dog" (fgwd2), and how unfamiliar it was to them. Generally, compared to vegetable-likers, vegetable-dislikers were less willing personally to try new vegetables. A man vegetable-disliker said "You'd be thrown out...If any one of them [emphasized vegetables] show up, this is my hand [sweeps hand across the table]" (fgmd1). In contrast, vegetable-likers were more positive: "My wife would ask what [the canned greens] were, but I would just tell her, 'Hey, let's try these tonight and see if we like it'" (fgml1).

Few participants reported having family rules about trying new foods. Some vegetable-dislikers would not pressure children to try anything 'new' based on their own negative childhood experiences. Despite being low-income, only some women indicated that family members had to eat what was served or "eat nothing else the rest of the night" (fgwd1). Discussion indicated these participants did not connect rules about trying foods to learning to like a variety of foods, perhaps because new foods were avoided.

## Outcomes

Current vegetable choices for shared meals (outcomes) appeared to reflect the balance of costs, rewards, family norms and past experience.

**Meal Patterns**—The choice of foods, and vegetables particularly, for family meals was habitually based on an established pattern of dishes that family members liked and would eat: "After 28 years of marriage, she knows what I will eat and what I won't eat" (fgmd1). Both men's and women's groups indicated choices reflected what the husband or children liked rather than the wife's preferences: "a lot of vegetables I like he doesn't, so we don't have them" (fgwd1) and "I'm just glad my kids like a white, a green and an orange vegetable" (fgwl1). Sometimes two different dishes or meals were made to please conflicting tastes or vegetables might be omitted entirely. Both men and women reported always pairing certain vegetables with certain meats (i.e., green beans with ham). Availability (in season or on sale) also affected vegetable choices. Participants in both men's and women's groups would make vegetables for themselves that no one else ate: "she don't like stewed tomatoes...So I'll heat up a can of it, and then I just keep it to the side and I'll just put it on my plate" (fgml2). Both men and women vegetable-dislikers indicated a family member's absence from a meal allowed a food that person disliked to be served.

**Freedom to Change Menus**—Both men's and women's groups claimed that the food preparer had freedom to change family meal menus. But, based on the examples given, it was evident this was typically done from within what they knew everyone liked. They could change the menu to accommodate a missing ingredient or to make something quicker than what was planned, but choices were familiar and approved dishes. Others in both groups acknowledged that 'real change' was not contemplated or allowed because the food preparer had to make what family members wanted: "I couldn't go and make new dishes. I mean, I may make it one

time and he would say, 'Don't make it again. I ate it this time. Don't expect me to eat it again.' ... he's more of a meat and potato type person" (fgw11). "She doesn't try. She's concerned about my health, but she knows she can't force me to eat anything" (fgmd1).

## Strategies

Participants were asked how new vegetables could be introduced at their family meals.

**Methods Used to Introduce New Vegetables**—Participants in all groups suggested altering the flavor by adding butter, cheese, ketchup, onions, spices or meat and camouflaging the vegetable in stews, soups, or casseroles. All groups felt tasting a vegetable at a store, restaurant or social event could inspire offering it at a family meal. Taste approval reduced the likelihood it would be wasted if prepared.

## Discussion

Our data analysis indicated that Exchange Theory could be a useful framework for future research examining food choices for family meals. In this study, food preparers felt serving most vegetables produced few rewards and high costs and evoked negative feelings, based on comparisons to family norms and past experiences. The outcome was that vegetable variety served was limited to only those liked by everyone and serving easy to identify new vegetables was avoided. Liker/disliker status did not affect perceptions of rules used to select vegetables for these shared meals. If the food preparer or any other member of the family disliked a vegetable it generally was not served.

Rewards our participants associated with foods served were indirect such as 'meeting expectations' (fixing foods everyone liked, serving on time, conformity to expected meal pattern, filling them up, complementing meat), positive family member reactions (eating what is served, occasional requests for certain dishes, eating at least a small variety of vegetables), and especially lack of conflict (no fights over tasting or finishing item, no negative comments). Serving potatoes garnered these rewards plus the personal reward of convenience (great familiarity, versatility, and adaptability to the situation). Sweet vegetables were most acceptable and rewarding to serve, as also found in Scottish families.(30) Consumers prefer sweeter over bitter vegetables, and vegetable sweetness positively predicts intake.(31) At family meals, rewards of serving meat and potatoes generally outweighed rewards of serving vegetables, in agreement with findings that meat is the center of a proper meal (32) and vegetables are 'second best.'(30) Low-income women have reported spending over one-third of their food stamp allotment on meat, which they viewed as essential for dinner and a symbol of success and status.(18)

More costs were associated with serving a greater variety of vegetables compared to meat and potatoes. Costs were tangible (money lost on rejected vegetables, lack of availability or greater expense for some forms, time required to learn new preparation methods and recipes, efforts needed to try new unfamiliar vegetables and introduce flexibility into meal choices), personal (overcoming personal aversions, not fulfilling role expectations) and social (family member objections, disagreements, rejection). Too few large supermarkets can limit availability of inexpensive vegetables in rural, low-income Appalachia.(33) Unfortunately, individuals consume fewer vegetables when they appear too costly.(34) Others have reported some but not all of these costs as barriers to fruit and vegetable consumption among low-income audiences.(23,24) But our focus on unfamiliar, protective savory vegetables illuminated the role of and extent of personal aversions and social costs of changing vegetable choices.

Acceptable family vegetable choices evolved over time based on reactions to those presented. This past history, the overwhelming preference for sweet vegetables and the intra family norm

of only serving what everyone liked produced a restricted subset of acceptable vegetables and limited the ability to introduce new ones as found for Scottish families.(30) In addition, the norm of favoring husbands' and children's preferences, also noted in other studies,(13-15) reduced the power of female food preparers, who might favor more adventurous vegetable choices, to institute change. These factors (past history and family norms), combined with parents' allowing children to refuse any food and general absence of rules about trying new foods, would make incorporation of new vegetables, especially those we emphasized (cruciferous, deep orange, dark green leafy), into family meals difficult. Having family rules for tasting and eating vegetables positively correlates with children's consumption.(35) Our participants' intake of our emphasized vegetables was low, as reported for Americans in general,(4,11) probably due to both the savory flavor and their general unfamiliarity. Our participants highlighted the low acceptability of most vegetables by focusing on disguising or hiding these if served. Other low-income women have also suggested sauces, dips and seasonings to "doctor up" vegetables for families.(23)

We found the pairing of meat (including wild game) and potatoes with a conventional group of vegetables that includes corn, peas, carrots and green beans (2,36) remains the traditional Appalachian meal pattern in the two counties of interest. Both hunting and vegetable gardening can contribute to dinner menus. Growing cruciferous, deep orange and dark leafy green vegetables in gardens overcomes availability and cost issues and encourages more vegetable experimentation, especially among children. This approach might be ideally suited to this audience, where gardening is still fairly common.(2)

This study has limitations. The focus group setting could have inhibited opposing views or encouraged socially desirable responses, although sample stratification should have minimized this. Other limitations include self-report measures, a relatively low participation rate, and use of a small convenience sample from a specific geographic location that limit generalizability to all of Appalachia. Our results should be applied cautiously. Despite these limitations, this study had substantial strengths. It was theory-driven, methodologically strong and our stratification by sex and vegetable liking status provided new perspectives. It tapped low-income, rural Appalachian resident opinions and provided rich descriptive data.

## Implications For Research and Practice

Nutrition interventions have attempted to reduce the high tangible costs of serving new vegetables by increasing access through farmers markets, food preparation skills and providing recipes and have had limited impact on vegetable intake.(7,8,37,38) But the influence of past experience and family norms has received little attention. Past experience plus food preparer expectations and deference to male or children's preferences supports a family norm of serving only vegetables liked by all family members. Lack of rules about and interest in trying new foods reinforce the limited vegetable variety served. Our emphasized vegetables were largely ignored due to their unfamiliarity and family norms that prevented experimentation and learning through exposure. Based on our findings, interventions to increase vegetable consumption of this target audience could consider:

- Altering *family norms* about vegetables served by enlisting representative food preparers who have successfully used rules about introducing and tasting new foods to help target families implement such rules; encouraging families to form teams (i.e. parent and child) that support regularly trying a new vegetable and continued serving of a vegetable liked by the team even if all family members do not like it; having families discuss their expectations of the food preparer, whether these are reasonable and what might be changed; and encouraging open family discussion about serving vegetables not liked by one family member on occasions when they are not present and working up to serving these when they are present with an alternative they like.

- Changing perceptions of *past experiences* by having families discuss positive experiences with new foods in the past; providing recipes that ‘hide’ new mild protective vegetables like kale or cauliflower with encouragement to serve these with no identification and, after eating it several times, discuss the content; and enlisting grandparent help with incorporating new vegetables into cross generation family meals.
- Reducing the *social and personal costs* of serving vegetables by helping families negotiate a rule for introducing new foods like vegetables, which might require everyone present to at least taste one or two bites of the new food; providing ‘test recipes’ that make perhaps two servings for a side dish and encourage repeat serving once or twice a month of those that at least two family members like; and developing short introduction sessions where an unfamiliar vegetable is served raw and cooked in small amounts so family members can examine the taste, texture and smell and training food preparers to do this once a quarter.
- Increasing the *tangible and social rewards* of serving vegetables by providing seeds and instructions for growing and using the emphasized vegetables in home gardens; helping the target audience identify recipes for these vegetables that complement meat main dishes (including venison and game) and match menu patterns; and offering one dish recipes that combine these vegetables with potatoes and or meat.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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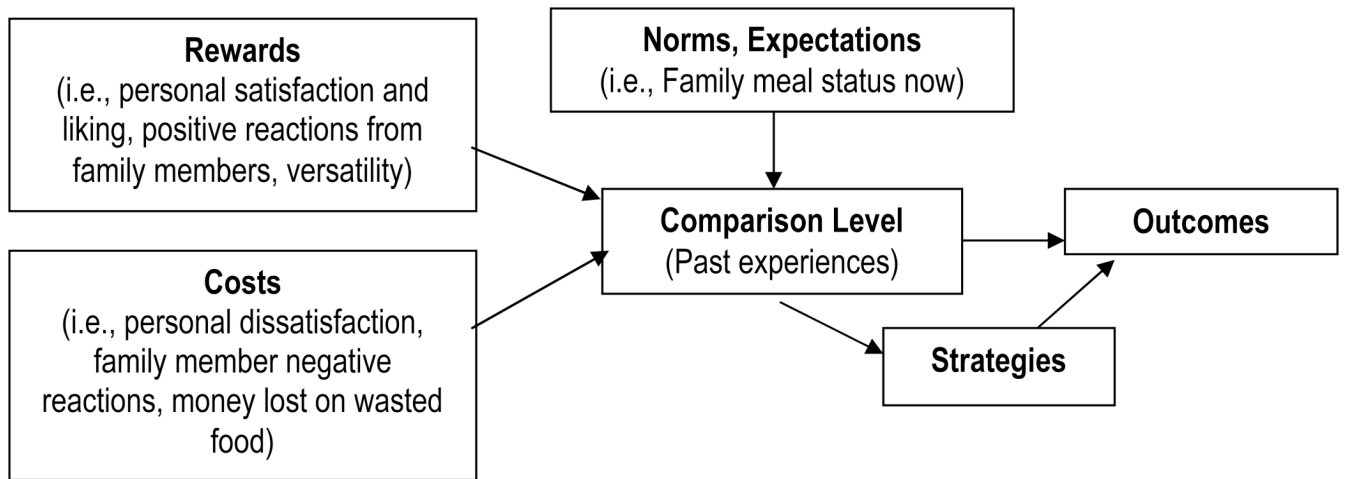
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**Figure 1.** Exchange Theory Model (17) as adapted for this study. Model constructs are in bold, with examples relevant to this study in parentheses.

**Table 1**

## Focus Group Discussion Questions within Exchange Theory Framework

Construct	Topics	Focus group questions (not necessarily asked in this order)
Norms	Definition and ideal meals	What is your definition of a family meal? (Who? When? Where? How often?) What is the composition of a 'good' family meal?
	Roles and responsibilities	Who prepares the family meals in your household? What are the food preparer responsibilities?
Rewards/Costs	Meat and potatoes	What words come to mind when you hear the word: a) 'meat'? b) 'potatoes'? How would your family members answer? What are your favorite forms?
	Vegetables	What words come to mind when you hear the word 'vegetable'? How would your family members answer? What vegetables do you like/dislike and why? What might stand in your way of offering new vegetables?
Comparison Level	Vegetables acceptable now	What vegetables are acceptable/unacceptable for your family meals? What disagreements have you had in your family over vegetables?
	Reactions to new vegetables	What would be your/your family members' reaction to having a new vegetable at family meals? [Show examples of emphasized vegetables.]
Outcomes	Meal patterns	How does the food preparer choose the foods/vegetables for a family meal? How do family members' likes/dislikes affect the vegetables served?
	Freedom to change menus	How much freedom does the food preparer have to change the menus of family meals?
Strategies	Methods to introduce new vegetables	What methods have been used to offer 'new' vegetables at your family meals? What might encourage you to try to offer new vegetables?



**Table 2**Participant Characteristics (N=61)<sup>1,2</sup>

	Men (n=28)	Women (n=33)
<b>Age of self, y (mean ± SD)</b>	49.0 ± 7.2	47.4 ± 6.3
<b>Age of partner, y (mean ± SD)</b>	46.8 ± 9.0	48.9 ± 8.0
<b>Years lived with partner (mean ± SD)</b>	16.4 ± 10.9	16.6 ± 11.1
<b>Ethnicity</b>		
White (non-Hispanic)	26 (93%)	31 (94%)
Black (non-Hispanic)	2 (7%)	1 (3%)
Hispanic	0 (0%)	1 (3%)
<b>Total in household (mean ± SD)</b>	2.9 ± 0.9	3.4 ± 1.3
<b>Education level</b>		
Some high school	8 (29%)	6 (18%)
High school diploma or GED	11 (39%)	16 (49%)
Trade/business school or college	9 (32%)	11 (33%)
<b>Employment status</b>		
Employed	11 (39%)	11 (33%)
Unemployed	12 (43%)	17 (52%)
Retired/Other	5 (18%)	5 (15%)
<b>Income range</b>		
Less than \$10,000	6 (21%)	8 (24%)
\$10,001 to \$20,000	13 (46%)	8 (24%)
\$20,001 to \$30,000	4 (14%)	8 (24%)
\$30,001 to \$40,000	5 (18%)	9 (27%)

<sup>1</sup> Some totals do not sum to 100% due to round-off error.

<sup>2</sup> There were no significant differences between men versus women or vegetable-likers versus dislikers.

**Table 3**

Vegetable liking, intake and serving patterns (*means ± SD*)

	Vegetable-likers			Vegetable-dislikers		
	Men (n=13)	Women (n=18)	Total (n=31)	Men (n=15)	Women (n=15)	Total (n=30)
<b>Liking scores<sup>1</sup></b>						
Cruciferous vegetables <sup>2</sup>	4.3 ± 0.4	4.5 ± 0.6	4.4 ± 0.5 <sup>a</sup>	2.3 ± 1.0	2.9 ± 1.0	2.6 ± 1.0 <sup>a</sup>
Deep orange vegetables <sup>3</sup>	3.6 ± 0.7	3.9 ± 0.9	3.8 ± 0.9 <sup>a</sup>	2.4 ± 0.6	2.8 ± 0.8	2.6 ± 0.7 <sup>a</sup>
Dark green leafy vegetables <sup>4</sup>	3.3 ± 0.7	3.5 ± 0.7	3.4 ± 0.7 <sup>a</sup>	2.0 ± 0.7	2.4 ± 0.9	2.2 ± 0.8 <sup>a</sup>
Corn	4.3 ± 0.6	4.7 ± 0.6	4.5 ± 0.6	4.3 ± 1.0	4.5 ± 0.5	4.4 ± 0.8
Potatoes	4.4 ± 0.5	4.6 ± 0.6	4.5 ± 0.6	4.8 ± 0.4 <sup>b</sup>	4.3 ± 0.5 <sup>b</sup>	4.5 ± 0.5
Tomatoes	4.1 ± 1.0 <sup>b</sup>	4.7 ± 0.5 <sup>b</sup>	4.4 ± 0.8 <sup>a</sup>	3.8 ± 1.3	3.6 ± 1.5	3.7 ± 1.3 <sup>a</sup>
<b>Personal intake over the last month (times/week)</b>						
Cruciferous vegetables	1.7 ± 1.9	1.2 ± 1.2	1.4 ± 1.5 <sup>a</sup>	0.7 ± 0.5	0.4 ± 0.5	0.6 ± 0.6 <sup>a</sup>
Deep orange vegetables	1.8 ± 1.7	1.0 ± 1.0	1.3 ± 1.4 <sup>a</sup>	0.7 ± 0.9	0.5 ± 0.6	0.6 ± 0.7 <sup>a</sup>
Dark green leafy vegetables	1.5 ± 1.7	1.3 ± 1.7	1.4 ± 1.7	0.7 ± 0.9	0.8 ± 1.4	0.7 ± 1.2
Potatoes <sup>5</sup>	2.1 ± 1.2	1.4 ± 1.0	1.7 ± 1.1	2.0 ± 1.0 <sup>b</sup>	1.2 ± 0.9 <sup>b</sup>	1.6 ± 1.0
Tomato sauce	1.3 ± 0.8	1.6 ± 1.7	1.4 ± 1.4	2.4 ± 2.1	1.2 ± 1.7	1.8 ± 1.9
<b>Frequency served at family meals over the last month (times/week)</b>						
Cruciferous vegetables	1.4 ± 1.5	1.5 ± 1.6	1.4 ± 1.5 <sup>a</sup>	0.4 ± 0.6	1.0 ± 1.3	0.7 ± 1.0 <sup>a</sup>
Deep orange vegetables	1.2 ± 1.4	0.8 ± 0.9	1.0 ± 1.1 <sup>a</sup>	0.4 ± 0.3	0.4 ± 0.6	0.4 ± 0.5 <sup>a</sup>
Dark green leafy vegetables	1.5 ± 1.9	1.4 ± 2.0	1.5 ± 1.9 <sup>a</sup>	0.8 ± 1.2	0.3 ± 0.6	0.5 ± 1.0 <sup>a</sup>
Potatoes <sup>5</sup>	1.4 ± 1.0	1.4 ± 1.0	1.4 ± 1.0	1.3 ± 0.8	1.1 ± 0.8	1.2 ± 0.8
Tomato sauce	1.2 ± 0.9	1.3 ± 1.0	1.2 ± 0.9	1.2 ± 0.8	1.2 ± 1.7	1.2 ± 1.3

<sup>1</sup> Based on a scale of 1=strongly dislike, 2=dislike, 3=neutral or don't know, 4=like, and 5=strongly like

<sup>2</sup> Average score for broccoli, cauliflower, cabbage, and Brussels sprouts (Cronbach's alpha = 0.87)

<sup>3</sup> Average score for carrots, pumpkin, butternut squash and acorn squash (Cronbach's alpha = 0.78)

<sup>4</sup> Average score for dark lettuce, spinach, collards, mustard greens, kale, and Swiss chard (Cronbach's alpha = 0.86)

<sup>5</sup> Average score for French fries or fried potatoes and other white potatoes

<sup>a</sup> Scores for total vegetable-likers versus total vegetable-dislikers differ significantly ( $p < .05$ )

<sup>b</sup> Scores for men versus women within same vegetable-likers/dislikers group differ significantly ( $p < .05$ )