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Allocation of household responsibilities influences change in dietary behavior

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Abstract

This study was undertaken to understand dietary behavior as situated within the household, an important social context that serves to either inhibit or promote a healthy diet. Data were collected as part of a worksite-based health behavior intervention trial that took place between 1999 and 2003 in small manufacturing businesses in New England, USA. The subjects were a cohort of 790 male and female workers who participated in the intervention trial and responded to both the baseline and the 18-month follow-up surveys. Regression models were built to determine whether proportion of household responsibility predicted daily fruit and vegetable consumption and weekly red meat consumption at 18-months. The results indicate that participants who were responsible for earning most or all of the money to support the household ate more servings of fruits and vegetables per day at 18-month follow-up than those without this responsibility. Further, those responsible for earning about half ate fewer servings of red meat than those responsible for earning most or all of the money to support the household. The results for red meat consumption differed by sex, such that responsibility for more than half or less than half of the money to support the household had different effects for men and women. The results of this study demonstrate that the distribution of household responsibilities can be an important factor in determining the effectiveness of a worksite-based health behavior intervention and that these effects can be different for women versus men.

Keywords

nutrition; food choice; dietary behavior; work-family; USA; family roles; household labor; households; gender

Sociological research on household labor has provided evidence that it is as important as market labor in the maintenance of society (Coltrane, 2000). However, household labor is often trivialized or ignored all together, as it is performed in private spaces and is not usually part of the formal wage-earning economy. Like all facets of life in the US, household labor

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is embedded in social context and is related to household contextual factors such as marital quality, familial relations, interpersonal power, fairness evaluation, gender ideology and display, as well as the scheduling and amount of paid market labor. Further, in the US the performance of household labor is associated with societal definitions and perceptions of familial love and personal fulfillment, and it structures how individuals perceive, recreate, and reenact structures of gender, race, and class (Coltrane, 2000).

Market labor and the various ways in which family members participate in this type of work influences household dynamics, identity formation, and familial relations. The degree of participation and the type of work performed determines the amount and timing of time away from home in addition to the financial resources that are available to household members. Participation in market labor also influences power relationships within the household. According to resource theory, one of the most widely used explanations for marital dynamics, individuals who engage in paid employment often command more of the financial resources than do other family members (Yodanis & Lauer, 2007). When married couples contribute equally to the household income, household resources tend to be more equally distributed. Further, Yodanis and Lauer (2007) found that, in an international sample drawn from developed countries and in households with two equal co-breadwinners, financial decision-making is more likely to be shared. By extension, research suggests that other household processes and responsibilities are more likely to be shared equally between partners when breadwinning responsibilities are shared (Coltrane, 2000).

A large share of food production and consumption takes place within the household, with food-related responsibilities likely to be distributed in the same fashion as other household tasks. Dietary behavior is also likely to be strongly influenced by household social context (Devine et al., 2003; Devine et al., 2006). Further, dietary behavior is heavily dependent upon the context of peoples' lives and is influenced by factors such as family members, personal preferences, and ideology, as well as more proximate factors such as income, availability, time and energy, and habit (Connors et al., 2001; Furst et al., 1996; Quan et al., 2000). As such, it is important to conceptualize dietary patterns as situated not just within the individual, but within social groups as well. Food preferences are an important part of socialization into a cultural system and are limited and shaped by possibilities of social and physical environments, but, despite the profoundly social nature of food and eating, analysis of dietary behavior has largely focused on the individual and individual cognitions, behaviors, and attitudes (Li et al., 2000; Quan et al., 2000; Wardle et al., 2004). Knowledge about social processes regarding food and eating is accumulating (Furst et al., 1996), and it is important to conceptualize dietary behavior in a way that considers interpersonal relationships and social context, focusing on how individuals manage their diet within the constraints and opportunities of these boundaries (Bove et al., 2003).

Within most households, particularly when there are children present, food preparation responsibilities tend to be performed by women. DeVault (1999) asserts that women may be more invested in family meal production because they perceive this facet of family life to be central to their gender role and family identity. Food preparation responsibilities can combine with other work-related responsibilities to create role overload, affecting the performance of both domestic and work-related tasks, and there is evidence that the performance of dual roles (i.e., engaging in both paid employment and maintaining responsibility for food procurement and production) can negatively affect the nutritional quality of meals that are prepared within the household (Devine et al., 2003; Devine et al., 2006). However, while performing multiple roles may create role overload for many, there is evidence that there are also benefits to having a significant roles in both work and family life (Greenhaus & Powell, 2006). Possible benefits of performing dual roles include: better mental health (Grzywacz, 2000), decreased depressive symptoms (Hammer et al., 2005),

and higher levels of overall psychological well-being (Stephens et al., 1997). However, these effects may be different for women versus men. For example, Schafer and colleagues (1999) found that the resources and energy of wives influences the dietary behavior of husbands, while the resources and energy of husbands has no effect on the wives' dietary behavior; Yodanis and Lauer (2007) found that male-controlled finances resulted in more resources for males, while female-controlled finances did not have the same effect for women, and Hammer and colleagues (2005) found that conflicting roles increased depression in men but had no effect on women. These findings suggest that the meanings attached to household tasks are important and that these meanings may differ according to sex and gender ideology.

This study was undertaken to further understand dietary behavior as situated within one important social context for this behavior, the household. The objective of this analysis was to examine how household context and, specifically, share of money-earning and other household responsibilities influence improvement in dietary behavior among workers in small manufacturing businesses.

METHODS

Sample

The larger study that these data were drawn from was a cluster-randomized health behavior intervention trial, conducted between 1999 and 2003, which took place in small manufacturing businesses in New England, USA. The intervention, which targeted multiple risk-related behaviors, was designed specifically for multi-ethnic, working-class populations and to accommodate the social context of participants' individual lives. The intervention was focused on increasing fruit and vegetable consumption, reducing red meat consumption, increasing physical activity and increasing multivitamin use. The intervention was based upon principles of employee participation and used a social contextual framework that targeted multiple levels of influence. Over the 18-month intervention period, we delivered monthly intervention activities that were focused on individual behavior change (e.g., table-top displays, demonstrations, small-group discussions, and health fairs) and had an average of one contact per month with management regarding environmental support and organizational change (e.g., re-writing or adopting policies aimed at offering healthful food options at company meetings and events, providing facilities and signs aimed at helping workers meet recommendations for physical activity, and maintaining a smoke-free workplace) (Sorensen et al., 2005). Overall, the results of the trial provided evidence that the intervention was effective at increasing multivitamin use when compared to the control group, and physical activity and fruit and vegetable consumption for some subgroups within the sample (Sorensen, et al., 2005; Sorensen et al., et al., 2007).

The present study examines the relationship between proportion of responsibility for earning money to support the household and common household tasks and improvements in dietary behavior among a cohort of 790 workers who participated in the intervention trial and responded to both the baseline and the 18-month follow-up surveys. The cases represent individual workers who were employed at one of 24 participating worksites, and while the sample includes both women and men, they are un-related and are not linked as married/romantic partner couples. The worksites consisted of manufacturing firms that made a range of products, including medical equipment, dog food, and electronics. The worksites employed between 50 and 150 workers at each site. Data were collected through interviewer-administered surveys at both time points. To be eligible for participation in the study, employees had to be considered permanent, work on-site for 20 or more hours per week, and able to complete the survey in English, Spanish, Portuguese, or Vietnamese. The interviews were administered on company time. The response rate for the survey at baseline was 84%

(n=1,740) at the 26 originally participating sites, and 81% (n=1,684) among the 24 sites that completed the study. The response rate for the survey at 18-month follow-up was 77% (n=1,408). From the original cohort of 974, 184 participants were dropped from the analysis due to missing data. Therefore the total number of respondents considered in the present study was 790. The study was approved by the institutional review boards of the Harvard School of Public Health and the Dana-Farber Cancer Institute.

Measures

The number of servings of fruits and vegetables per day was assessed using a screener developed for the National Cancer Institutes 5-A-Day for Better Health research studies (Heimendinger et al., 1996). Responses were recoded to reflect equivalent servings and summed to obtain the total number of servings of fruits and vegetables per day. To assess red meat consumption, an abbreviated form of the semi-quantitative food frequency questionnaire was used (Rohrman et al., 2007). Responses were summed to represent total servings of red meat per week.

In this analysis, there are four areas of household responsibilities that are considered potential predictors of dietary behavior. To assess share of responsibility in each area, respondents were asked the following: How much responsibility do you have for... a) "earning money to support the people you live with"; b) "taking care of your own children or someone else's? Don't count childcare that you get paid for"; c) "food shopping and cooking for the people you live with?"; and d) "taking care of your home. Count things like cleaning, fixing things, cooking, yard work". The response categories for each of these items were: "most or all", "about half", "little or none", and "does not apply to me". Except in the case of childcare, where it was assumed that "does not apply to me" indicated that there are no children in the household, these responses were re-coded as missing data. Therefore, for proportion of household income earned, food shopping/cooking, and taking care of the home there were three response categories: "most or all", "about half", and "little or none". These items were adapted from the eating habits questionnaire and were designed to assess the constraints and demands placed upon participants during their daily lives. As all of the participants were employed by one of the participating worksites, we sought to assess the extent to which they fulfilled additional roles (e.g., as a mother/father, as homemaker) by specifically assessing the amount of responsibility for the home-based role.

Household and personal characteristics were considered potential moderators. The household characteristics we considered were the presence of children under 18 in the household (yes/no) and being married or living with a partner. Personal characteristics included sex, age, race/ethnicity, annual household income, education, and occupation. These characteristics have been shown to relate to dietary behavior in previous studies (Heimendinger et al., 1995; Patterson et al., 1990; Serdula et al., 2004). Sex, age, and race/ethnicity were assessed using standard measures. Annual household income was assessed in \$10,000 increments and was recoded into 3 categories: \$29k or less, \$30k to \$49k, and \$50k or more. To assess level of education, respondents were asked to identify the highest level of education they had completed. This response was recoded into 3 categories: high school or less, some post-high school, and undergraduate degree or more. To assess occupational status we asked respondents to identify their supervisory responsibilities. These responses were coded into a dichotomous variable that distinguished managers from non-managers.

Analysis

All analyses accounted for the clustering of respondents within worksites using general linear mixed modeling methods. To conduct the analysis, the dataset was first stratified by sex. Next, the relationship between each household responsibility and 18-month fruit and

vegetable consumption and red meat consumption was assessed, adjusting for the effect of worksite. For each predictor that was significantly related to either 18-month fruit and vegetable consumption or 18-month red meat consumption in either or both strata, a separate model was built using the complete dataset. Each of these models used the 18-month food behavior as the outcome and adjusted for the baseline dietary behavior and other important confounders. The following variables were considered as potential confounders: age, race/ethnicity, annual household income, education, occupation, presence of children in the household, and marital status. If a potential confounder was related to both the outcome and the predictor variables ($p < .10$) or if it was theoretically important it was included in the multivariate models. The following variables were included in each of the multivariate models: baseline behavior, intervention group, annual household income, sex, race/ethnicity, occupation, and marital status. Follow-up behavior was used as the outcome, controlling for baseline behavior, rather than “change scores” (i.e., the difference between baseline and follow-up) primarily because this analytical strategy has greater statistical power. However, in addition, there has been much discussion of measurement issues inherent to using change scores (Cohen et al., 2003), although the degree of threat posed by these issues depends on the actual measures used and their respective validity and reliability. Two interactions were assessed for each predictor-outcome relationship. First, it was determined whether or not the predictor-outcome relationship differed by sex by creating a model with a predictor by sex interaction term. Second, another model was created that included a predictor by intervention status interaction term to determine if the predictor-outcome relationship differed by intervention status. Finally, in order to thoroughly investigate the effect of annual household income, data were stratified into 3 groups (low=\$29k or less, medium=\$30k - \$49k, and high=\$50k or more), and predictor-outcome relationships were tested in each strata, adjusting for the effect of worksite. Data were analyzed using SAS statistical software package, version 9 (SAS Institute Inc., Cary, NC).

RESULTS

Most of the participants were male (68%) and white/Caucasian (73%). Thirty-two percent were foreign-born and more than half (61%) were between the ages of 35 and 54 (see Table 1). Their earnings were relatively high, as more than half (56%) had a household income of \$50,000 or more, but, given their earnings, their educational attainment was low, as 43% had a high school education or less. Most (79%) were either married or cohabitating with a partner, and almost half (52%) had children under the age of 18 living with them.

The allocation of household responsibilities at baseline appears to be distributed according to traditional gender role patterns, as more men carry the responsibility for earning money to support the household and more women carry the responsibility for household labor. At baseline, 32% of women and 64% of men were responsible for earning most or all of the money to support the household. Women tended to specialize in food-related tasks and childcare, as 64% of women were responsible for most or all of the food shopping and cooking, while only 19% of men claimed the same amount of responsibility for these tasks. Thirty-four percent of women were responsible for most or all of the childcare, while only 18% of men held the same amount of responsibility. Tasks involved in caring for the home (i.e., cleaning, fixing things, cooking, and yard work) seemed to be more equally distributed between the sexes, as 46% of women and 37% of men were responsible for most or all of these tasks.

Daily Fruit and Vegetable Consumption

In the first set of analyses, which were stratified by sex and adjusted for the effects of worksite, there was a significant relationship between responsibility for earning money to support the household and 18-month fruit and vegetable consumption among men ($p=0.03$)

(see Table 2). Men who were responsible for earning little or no (mean, 2.53, s.e., 0.30) or half (mean, 3.16, s.e., 0.14) of the money to support the household ate fewer servings of fruits and vegetables each day compared to those who were responsible for most or all (mean, 3.32, s.e., 0.11). The pattern for women was similar, as those responsible for earning little or no (mean, 3.68, s.e., 0.28) or half (mean, 3.66, s.e., 0.16) of the money to support the household ate fewer servings of fruits and vegetables each day compared to women responsible for most or all (mean, 4.10, s.e., 0.20), although this relationship was not statistically significant ($p=0.17$).

In the second set of analyses, the entire dataset was used (un-stratified) and the following covariates were added to the model to adjust for potential confounding: baseline fruit and vegetable consumption, intervention group, annual household income, sex, race/ethnicity, occupation, and marital status. All analyses adjusted for the effect of worksite. The results of this analysis indicates that there is a significant relationship between 18-month fruit and vegetable consumption and proportion responsibility for earning money to support the household (see Table 3). Participants responsible for earning little or no money to support the household ate, on average, 0.43 fewer servings of fruits and vegetables per day at 18-month follow-up than participants who were responsible for most or all, holding baseline consumption, intervention status, sex, race/ethnicity, occupation, and marital status constant ($p<0.05$). Further, participants who were responsible for earning about half of the money to support the household ate, on average, 0.29 fewer servings of fruits and vegetables per day than participants who were responsible for most or all ($p<0.01$). There was a significant effect for sex, as women, on average, ate 0.42 more servings of fruits and vegetables per day at 18-months than men ($p<0.01$). There were no significant effects for annual household income, race/ethnicity, occupation, or marital status.

To assess differences by sex, another model was created that included a term representing the interaction between proportion of responsibility for earning money to support the household and sex. This interaction term was not statistically significant ($p>0.05$). Finally, a model was created that included a term that represented the interaction between proportion of responsibility for earning money to support the household and intervention status. This interaction term was statistically significant, and indicates that the effect of proportion of responsibility for earning money for the household on 18-month fruit and vegetable consumption differs by treatment status ($p=0.03$). These results provide evidence that there was a benefit to being responsible for earning most or all of the money to support the household over being responsible for half, but that this benefit was only present in the treatment group. See Figure 1 for graphic representation of this relationship.

Finally, we stratified the data by annual household income and assessed the relationship between share of household responsibilities and daily fruit and vegetable consumption in each strata. The results indicated that a similar relationship was present in the medium ($p=0.06$) and high strata ($p=0.04$), but absent in the lowest income group (data not presented).

Weekly Red Meat Consumption

To assess the relationship between household responsibility and weekly red meat consumption, we first stratified the data by sex and tested the relationship between each household responsibility and 18-month red meat consumption. This analysis provided evidence for an association between proportion of responsibility for earning money to support the household and red meat consumption, among both women ($p=0.03$) and men ($p<0.01$) (see Table 2). Among women, those who had little or no (mean, 2.73, s.e., 0.43) or most or all (mean, 3.79, s.e., 0.30) of the responsibility for earning money to support the household ate less meat at 18-months (i.e., had healthier behavior) than those responsible for

about half (mean, 4.05, s.e., 0.23). Among men, the relationship was the opposite, as those who were responsible for earning little or none (mean, 6.23, s.e., 0.71) or most or all of the money to support the household (mean, 6.17, s.e., 0.22) ate more red meat at 18-months than those responsible for about half (mean, 5.08, s.e., 0.31). Further, among women, there were significant differences in 18-month red meat consumption by proportion of childcare performed ($p<0.01$). Women who had responsibility for little or no childcare (mean 2.95, s.e., 0.33) ate fewer servings of red meat per week than women responsible for half (mean 4.78, s.e., 0.43) or most or all of the childcare (mean, 4.34, s.e., 0.28). Among men, the relationship between childcare responsibility and red meat consumption did not reach statistical significance ($p=0.32$).

The results of the multiple regression analyses provided evidence that there is a significant effect for proportion of responsibility for earning money to support the household on 18-month red meat consumption (see Table 3). Participants responsible for earning about half of the money to support the household ate, on average, 0.54 fewer servings of red meat per week than participants responsible for most or all ($p<0.05$). Further, women ate .84 fewer servings of red meat per week compared to men ($p<0.01$), managers ate 0.68 fewer servings of red meat per week compared to non-managers ($p<0.05$), and participants who were married or living with a partner ate 0.38 fewer servings of red meat per week compared to those who were unmarried/not living with a partner ($p<0.05$). The relationship between proportion of childcare performed and red meat consumption was not statistically significant when tested in the full dataset.

A second model was constructed that included a term to assess the interaction between responsibility for earning money to support the household and sex. The results provide evidence that the relationship between proportion of responsibility for earning money to support the household and dietary behavior is different for men than for women ($p=0.02$). For women, responsibility for earning about half the money to support the household is associated with more red meat consumption compared to women who carry either less or more responsibility. Whereas, for men, this same responsibility is associated with less red meat consumption compared to men who carry either less or more responsibility. See Figure 2 for graphic representation of this relationship.

A third model was constructed that included a term representing the interaction between proportion responsibility for childcare and sex. The results of this model indicate that, for women, being responsible for little or no childcare is associated with less red meat consumption, whereas, for men, this same responsibility is associated with greater levels of red meat consumption ($p=0.03$). See Figure 3 for the graphical representations of this relationship.

Models were constructed that included interaction terms for proportion of responsibility for earning money to support the household by intervention status and proportion of childcare by intervention status. Neither of these interaction terms reached statistical significance ($p>0.05$).

Finally, we examined the relationships by income strata. This analysis revealed that responsibility for earning most or all of the money to support the household was associated with greater red meat consumption in all income strata (data not presented). Further, responsibility for about half of the childcare was associated with greater red meat consumption in the low income strata ($p=0.06$) and in the middle income strata ($p=0.01$), but in the high income strata there was no relationship between childcare responsibility and red meat consumption.

DISCUSSION

The main purpose of this study was to shed light on dietary behavior as situated within the household, and to examine how the distribution of labor within the household influences improvements. The results of this study demonstrate that the allocation of household labor can be an important factor influencing dietary behavior. All human behavior, including dietary behavior, takes place within the bounds and constraints of day-to-day life. Food and eating, in particular, are highly social and, as a result, are tightly woven into the many layers of context and meaning that shape individual lives (Bisogni et al., 2002). Thus, the finding that responsibility for food shopping and cooking was not related to dietary behavior, while proportion of responsibility for earning money to support the household and childcare were, provides evidence that the constraints and opportunities provided by the roles one plays, even those that seemingly have little to do with food, can influence dietary behavior. It is possible that the more time-consuming tasks of money-earning and childcare have more influence on dietary behavior than the more directly linked but less time-intensive tasks of food shopping and cooking. There is evidence that the allocation of breadwinning and other household tasks affect marital satisfaction, financial decision-making, resource allocation, and task distribution within the household (Coltrane, 2000; Yodanis & Lauer, 2007), and, thus may also affect dietary behavior, either through these pathways or directly.

The finding that responsibility for earning most or all of the money to support the household was associated with greater daily fruit and vegetable consumption may demonstrate the importance of household dynamics in health production and maintenance. Additionally, we found this relationship to be particularly strong in the intervention group, indicating that the uptake of the intervention may have been influenced by the participant's ability to make the suggested dietary changes at home, and that these abilities may be influenced by his or her expected contribution to the household income. It is possible that the health behavior intervention that took place in the workplace created congruence between norms and expectations for behavior at the workplace and healthful dietary behavior (Edwards & Rothbard, 2000), which, in turn, enabled participants to increase their fruit and vegetable consumption. Further, the result that the relationship between allocation of responsibility for earning money to support the household and daily fruit and vegetable consumption existed in the medium and high income groups, but not in the low income group indicates that perhaps allocation of responsibility for earning money to support the household matters most when the resources to buy fruits and vegetables are more plentiful. There is evidence that, as income increases, Americans tend to increase the quality and convenience of the foods they purchase rather than the quantity (Blisard et al., 2002). Thus, among the higher income groups, decisions regarding purchasing fruits and vegetables (which are relatively expensive) are a matter of resource allocation, rather sufficient/insufficient resources, and it is in households where resources are more plentiful that being the primary breadwinner may be advantageous.

Breadwinning was also related to 18-month red meat consumption, but this relationship differed by sex. Our results indicated that men and women who shared equally in breadwinning ate similar amounts of red meat, while women who had little or most of the responsibility for earning money ate little red meat, and men with little or most of the responsibility for earning money had the highest levels of meat consumption. There was a similar result for responsibility for childcare, as men and women responsible for half or most of the childcare consumed similar amounts of meat, while women responsible for little or no childcare consumed much less meat, and men with the same amount of responsibility consumed greater amounts of meat. It is likely that gender ideology, which affects both meat-eating and the allocation of household labor, explains this relationship. Gender roles and cultural norms have important influences on the types of foods that people eat.

Numerous studies have shown that men and boys consistently eat fewer fruits and vegetables and more meat products than do women and girls (Lake et al., 2006; Patterson et al., 1994; Wardle et al., 2004). In addition, sociological analysis has shown that cultural ideals of 'femininity' are associated with light appetites and 'light' food (e.g., fruit and sweets), while 'masculinity' is associated with large appetites and meat eating (Barker et al., 1995; Roos et al., 2001; Wardle et al., 2004). Thus, men may consume greater portions of meat regardless of household dynamics, as meat-eating is linked with perceptions of masculinity (Roos et al., 2001), whereas, for women, meat-eating is less important to perceptions of a feminine identity (Wardle et al., 2004), so their consumption may be more influenced by household dynamics, resources, time considerations, health beliefs, and other factors.

Further, the greater expectations of emotional permeability and inter-dependence that are part of the feminine role within the family, may influence the relationship between dietary behavior and allocation of household labor, as mothers are likely to sacrifice their own needs for those of their families (DeVault, 2003). This may be the case particularly when resources are limited, and while we did not specifically investigate three-way interactions between sex, allocation of household responsibility and income, this type of investigation would be a fruitful area for future study.

A key assumption of this analysis is that there are multiple individuals present in a household and that these individuals share responsibility for maintaining the household. To help account for this assumption, all models controlled for marital status. However, because a respondent was not married or cohabitating with a romantic partner does not indicate that this person lived alone and/or did not share household maintenance responsibilities with other members of the household. In fact, there was only a very weak relationship between marital/cohabitation or single head of household status and distribution of responsibilities. This indicates that responsibilities tend to be divided between household members, irrespective of their relationship to one another (e.g., parents/children, roommate/roommate, parents/grandparents, etc.). Future studies may seek to examine household composition more closely, as it is likely that the exact composition of the household (e.g., a heterosexual couple with children, a single father with a child and a parent, a lesbian couple with no children, roommates who share in household responsibilities, etc.) will have an important influence on the distribution of labor within the household and the meanings attached to that distribution.

A key strength of this study is the longitudinal design, which serves to establish temporality, a key factor in determining causality. However, because the underlying mechanisms by which allocation of household responsibility influences dietary behavior have not been investigated, the evidence for causality is weakened. Other strengths include the high response rate (84% at baseline and 77% at 18-month follow-up) and the diversity of the sample.

There are also important weaknesses of this study. First, it is possible that unmeasured factors confound the relationship between allocation of household responsibility and dietary behavior. One such factor, the underlying gender ideology of the participants, may affect both the distribution of labor within the home as well as dietary behavior. Further, we have little information on the composition of our respondents' respective households. The pathway through which allocation of household responsibility influences dietary behavior would be illuminated if we had information on other household members, their employment status, and relationship to the respondent. We also did not consider changes to the household that may have taken place during the 18-month intervention period and that may have influenced the dietary behaviors of our participants. For example, we would expect that

important family changes such as the birth of a child, divorce, or moving to a new location may impact upon the dietary behaviors of some of our participants. However, we would not expect these changes to have a systematic effect on dietary behavior (i.e., any of the household changes mentioned could either improve or degrade dietary behavior). We also did not consider changes in the allocation of household labor, as, while it is an interesting question, assessing the relationship between change in allocation of household labor and change in dietary behavior was beyond the scope of this study.

One important factor in dietary behavior is the extent to which food consumed is prepared outside of the home, as there is evidence that eating food prepared outside the home, which tends to be lower in nutrient dense foods like fruits and vegetables and higher in fat, sugar, and salt, is on the rise (Blisard et al., 2002). However, we did not have data on the amount of food prepared outside the home and so we were unable to include this factor in our study. Second, 19% of cases were missing data on one or more of the variables under consideration, and it is possible that these gaps introduced bias into the results, despite the fact that comparisons revealed little difference. Finally, the subjective way in which household responsibilities were assessed may systematically differ between men and women. For example, a man who prepares food for the household may see his contribution as more significant (i.e., ‘about half’) because it is not something that is part of a traditional division of labor and, thus, is more noticeable to him. While his wife may see the same contribution as ‘little or none’, because, as a result of role-expectations she adheres to, she may feel she is ultimately responsible for food production in the household. A second limitation of the measure of household responsibility allocation is that the item, ‘caring for the home’ included responsibilities that were both traditionally male (e.g., maintenance) and those that were traditionally female (e.g., cooking and cleaning). This may account of why there was much less difference between men and women in the distribution of this item.

This study provided an important look at the relationship between the distribution of household labor, a key feature of household context, and dietary behavior. The results of this study indicate that responsibility for earning money to support the household and responsibility for childcare influence dietary behavior, but that these effects can differ by sex and by income level. Based upon the results of this study, we propose that creating a confluence between work roles and healthful dietary expectations can have an important effect on dietary behavior. Additionally, our results point to the importance of considering the allocation of responsibility for market labor when considering household labor, as, while it is not typically considered “household labor”, as it is paid and typically performed in public, participation in market labor contributes to the household in some very important ways, and has important ramifications for resource allocation within the household. Finally, our results have underscored the important influence that sex and gender ideology play in the allocation of household labor and the complex ways in which sex, gender ideology and the allocation of household labor interact to influence dietary behavior.

Future work in this area should be directed to further clarification of the role that household context plays in dietary behavior, shifting from a focus solely on the individual, to a dual focus on both the individual and the household. Results of this study may be used to guide future health behavior interventions and research as the field acknowledges the important role that household context, and other social contexts, play in individual dietary behavior, and grapples with interventions that reach beyond the individual. An example of how this work might be applied to future research is to design and test an intervention targeted toward the household, rather than the individual, that measures and intervenes upon household dietary behavior rather than individual dietary behavior. In an intervention of this type, household members would have a common goal and could work together, supporting one

another in their efforts to improve their diet, and through this support and common purpose possibly arrive at a better outcome than if attempted individually.

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Research Highlights

- Allocation of responsibility for earning money to support the household influences both fruit and vegetable consumption and red meat consumption in the USA.
- Allocation of responsibility for childcare influences red meat consumption.
- The effects of household responsibility allocation on dietary behavior are different for women and men.

Figure 1.
18-month daily fruit and vegetable intake by treatment group and proportion responsibility for earning money to support the household

Figure 2.
18-month weekly red meat intake by sex and proportion of responsibility for earning money to support the household

Figure 3.
18-month weekly red meat intake by sex and proportion of childcare responsibility

Table 1

Study sample characteristics at baseline, stratified by sex

	Total n=790		Women n=257		Men n=534	
	n	%	n	%	n	%
Age group (years)						
17-34	166	20.3%	52	20.3%	114	21.4%
35-54	482	60.2%	154	60.2%	328	61.4%
55-64	128	16.0%	41	16.0%	87	16.3%
65+	14	3.5%	9	3.5%	5	0.9%
Race/ethnicity: White	575	67.2%	172	67.2%	403	75.5%
Annual Household Income						
\$29k or less	116	23.1%	59	23.1%	57	10.7%
\$30k to \$49k	228	34.0%	87	34.0%	141	26.4%
\$50k or more	446	43.0%	110	43.0%	336	62.9%
Education						
High school or less	340	56.6%	145	56.6%	195	36.5%
Some post-high school	294	31.6%	81	31.6%	213	39.9%
Undergraduate degree or greater	156	11.7%	30	11.7%	126	23.6%
Occupation: Manager	147	15.6%	40	15.6%	107	20.0%
Children under 18 present in household	411	44.3%	113	44.3%	298	55.9%
Married or living w/partner	622	71.1%	182	71.1%	440	82.4%
<i>Share of Responsibility for...</i>						
Earning money to support the household						
Little or none	71	15.6%	40	15.6%	31	5.8%
About half	298	52.3%	134	52.3%	164	30.7%
Most or all	421	32.0%	82	32.0%	339	63.5%
Food shopping and cooking						
Little or none	232	5.9%	15	5.9%	217	40.6%
About half	292	30.1%	77	30.1%	215	40.3%
Most or all	266	64.1%	164	64.1%	102	19.1%
Caring for the home						

	Total n=790		Women n=257		Men n=534	
	n	%	n	%	n	%
Little or none	80	5.5%	14	5.5%	66	12.4%
About half	394	48.8%	125	48.8%	269	50.4%
Most or all	316	45.7%	117	45.7%	199	37.3%
Childcare						
Does not apply to me	183	26.6%	68	26.6%	115	21.5%
Little or none	181	24.6%	63	24.6%	118	22.1%
About half	241	14.5%	37	14.5%	204	38.2%
Most or all	185	34.4%	88	34.4%	97	18.2%

Table 2Dietary intake at 18-month follow-up by proportion responsibility for household task, stratified by sex.^a

	Fruit and Vegetable Consumption (Servings per Day)		Red Meat Consumption (Servings per Week)	
	Women n=256	Men n=534	Women n=256	Men n=534
<i>Share of Responsibility for...</i>	<i>Mean (s.e.)</i>	<i>Mean (s.e.)</i>	<i>Mean (s.e.)</i>	<i>Mean (s.e.)</i>
Earning money to support the household	p=0.17	p=0.03	p=0.03	p<0.01
Little or none	3.68 (0.28)	2.53 (0.30)	2.73 (0.43)	6.23 (0.71)
About half	3.66 (0.16)	3.16 (0.14)	4.05 (0.23)	5.08 (0.31)
Most or all	4.10 (0.20)	3.32 (0.11)	3.79 (0.30)	6.17 (0.22)
Food shopping and cooking	p=0.99	p=0.29	p=0.37	p=0.28
Little or none	3.77 (0.44)	3.33 (0.13)	2.87 (0.70)	5.62 (0.28)
About half	3.83 (0.21)	3.21 (0.13)	3.67 (0.31)	5.81 (0.28)
Most or all	3.80 (0.15)	3.02 (0.18)	3.88 (0.21)	6.37 (0.40)
Caring for the home	p=0.90	p=0.23	p=0.38	p=0.64
Little or none	3.72 (0.47)	2.91 (0.21)	2.79 (0.73)	5.90 (0.49)
About half	3.76 (0.17)	3.24 (0.12)	3.85 (0.24)	5.69 (0.25)
Most or all	3.86 (0.17)	3.31 (0.13)	3.77 (0.25)	6.03 (0.29)
Childcare	p=0.90	p=0.81	p<0.01	p=0.32
Does not apply	3.82 (0.22)	3.26 (0.17)	3.18 (0.32)	5.81 (0.37)
Little or none	3.69 (0.23)	3.33 (0.17)	2.95 (0.33)	5.84 (0.37)
About half	3.75 (0.29)	3.17 (0.13)	4.78 (0.43)	6.14 (0.29)
Most or all	3.89 (0.19)	3.16 (0.18)	4.34 (0.28)	5.23 (0.41)

^a All analyses adjusted for the effect of worksite

Table 3

Multiple Regression, Daily Fruit and Vegetable Consumption and Weekly Red Meat Consumption, servings per day at 18-month follow-up.^a Cells contain regression coefficient and standard error. N=790

	Daily Fruit and Vegetable Consumption	Weekly Red Meat Consumption
Intercept	1.37 (0.22)	2.78 (0.48)
Baseline fruit and vegetable consumption	0.54 (0.03) **	
Baseline red meat consumption		0.48 (0.03) **
Intervention group	0.29 (0.13)	-0.02 (0.25)
Responsibility for earning money to support the household		
Little or none	-0.43 (0.20) *	-0.35 (0.43)
About half	-0.29 (0.12) **	-0.54 (0.26) *
Most or all	ref.	ref.
Responsibility for childcare		
Does not apply		-0.06 (.34)
Little or none		-0.13 (.34)
About half		0.50 (.33)
Most or all		ref.
Annual Household Income		
\$29,000 or less	-0.01 (.17)	0.34 (.37)
\$30,000 - \$49,000	0.01 (.13)	0.26 (.27)
\$50,000 or more	ref.	ref.
Sex: Female	0.42 (0.12) **	-0.84 (0.28) **
Race/Ethnicity: White	0.08 (0.12)	0.36 (0.27)
Occupation: Manager	0.03 (0.14)	-0.68 (0.30) *
Married/Partnered	0.13 (0.14)	-0.38 (0.30) *

*
p<.05,

**
p<.01

^a All analyses adjusted for the effect of worksite.