Family Chaos and Lack of Mealtime Planning is Associated with Food Insecurity in Low Income
Households

Barbara H. Fiese¹

Craig Gundersen²

Brenda Koester¹

Blake Jones³

¹Family Resiliency Center, 904 W. Nevada, MC-081, University of Illinois at Urbana-Champaign, IL 61801. (p) 217.244.3967. (f) 217.333.9061 bhfiese@illinois.edu

² Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, IL.

³Department of Human Development and Family Studies, Purdue University, West Lafayette, IN.

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1. Introduction

Food insecurity is one of the leading public health challenges facing households with children in the United States today. This is, in part, due to the magnitude of the problem. Food insecurity rates are at an all-time high, and despite the end of the Great Recession, rates have not returned to the levels of 2007. In 2013, 15.8% of all persons (49.1 million) lived in food insecure households and 20.0 percent of children in America (15.8 million) lived in food-insecure households (Coleman-Jensen et al., 2014). Food insecurity has also become a leading public health challenge due to the burgeoning research which has shown the wide array of health consequences for children and adults from being in a food insecure home. (For a review of these and relevant citations, see Gundersen and Ziliak, 2015.) Among other negative outcomes, children in food insecure households are at increased risk for poor health, developmental delays, compromised quality of life, and behavioral difficulties. Women raising children in households that are food insecure also experience health challenges including more depressive symptoms, perceived stress, and anxiety (Laraia et al., 2006) and higher rates of chronic disease (Seligman et al., 2010).

Reducing food insecurity and its attendant consequences requires an understanding of the determinants of food insecurity and an extensive literature has looked at this issue. Work on food insecurity has demonstrated that for example, households with low incomes, renters, and single parent households are all more likely to be food insecure, even after controlling for other factors. (For a review of the factors that influence whether a household with children is food insecure, work showing that some or all of these factors matter see, Gundersen et al., 2011; Gundersen & Ziliak, 2014). In addition, households headed by an African-American or Hispanic, single adult women with children, and less educated persons (high school education or less) are more likely to be food insecure than comparison peers.

Despite this large and growing literature on the correlates of food insecurity, the explanatory power of these variables remains, in general, low. In response, researchers have speculated on what some of these unobserved factors might be. We draw from social ecological theory that posits that children raised in poverty are exposed to adverse social and physical environments with identifiable risk factors (Evans, 2004). Two of these factors are chaos in the home and lack of planning around meals. As has been well-covered in previous studies, low-income families (i.e., those most likely to be food insecure) are more likely to encounter chaotic living conditions than middle- and upper-income families (Evans et al., 2005). Family chaos is characterized by frenetic activity, high levels of background noise, lack of structure, and residential crowding (Evans, 2004). Previous reports have found that residential crowding and multiple moves are associated with food insecurity for households with very young children (Cutts et al., 2011). Family chaos has been associated with poor outcomes for children including poor health (Evans and English, 2002), learning difficulties (A. D. Johnson et al., 2008), and socio-emotional difficulties (Fiese and Winter, 2010). Family chaos is proposed to disrupt daily routines, such as mealtimes, which are considered to be an important factor in child and family health and wellbeing (Fiese et al., 2002; Hammons and Fiese, 2011). Chaos tends to be over-represented in low-income households (Evans et al., 2005). However, not all low-income households experience chaos; just as not all low-income households experience food insecurity. Rather, chaos is considered an indication of highly stressed households that may compromise an individual's ability to respond to the social environment in a deliberate and thoughtful manner (Deater-Deckard et al., 2012). In this report, we consider both of these markers of the social environment that may be over-represented in under-resourced families but heretofore have not been examined directly in relation to food insecurity.

Sharing meals together as a family has been identified as an important correlate of health and nutrition (Fiese et al, 2002; Hammons and Fiese, 2011). An essential ingredient of mealtime routines is planning ahead which may be related to more efficient use of resources and reduced time pressures during meals (McIntosh et al., 2010). The literature on mealtime planning in low income families is relatively sparse. In a qualitative study of 20 low-income mothers, interviews revealed multiple challenges to preparing family meals (Malhotra et al., 2013). The mothers in this study reported that preparing meals was time consuming and that they often felt tired or frustrated when they fed their children. The mothers reported that a major challenge was maintaining a calm atmosphere and a sense of order during the meal. In a national survey of Expanded Food and Nutrition Education Program (EFNEP) low-income participants (two-thirds reported monthly incomes of less than \$500 excluding food stamps), 30% reported seldom or never planning ahead for meals, and mealtime planning was associated with greater nutrient value of home meals (Hersey et al., 2001). This study adds to the literature by examining the relation between food security and mealtime planning.

In this paper we use a data set which, to the best of our knowledge, is the first with information on both family dynamics and food insecurity to examine the role of chaos and mealtime planning. We propose that families facing food insecurity will experience more chaos and engage in less mealtime planning. We expect that those families experiencing the most extreme form of food insecurity, very low food security, will experience the most family chaos and report the least amount of planning around meals. We reason that chaos disrupts the ability to make use of available resources. Further, the ability to plan ahead for meals may also act to reduce the risk of food insecurity.

To understand the relation between food insecurity, family chaos, and mealtime planning we conducted household surveys with families whose children were identified as likely to go hungry over the weekend by school personnel as part of a larger study (see details in procedure). Our results

indicate that while controlling for demographic risk factors commonly associated with food insecurity such as education level and marital status, family chaos and lack of mealtime planning positively predicts food insecurity status.

2. Methodology, Data, and Variables.

Data for this study were drawn from survey responses by parents participating in the Food and Family Project during 2010-2011. The study was approved by the Institutional Review Board at [blinded for review]. The Food and Family Project was part of a program evaluation of a weekend feeding program administered through 16 elementary schools in [blinded for review], and was supported by a regional food bank, [blinded for review]. The purpose of the weekend feeding program was to alleviate childhood hunger over the weekend. In partnership with the local food bank, school personnel identified children who they believed were likely to go hungry over the weekend. As part of the evaluation design, approximately half of the children at each school received a backpack of food for the weekend. The children are all at-risk of food insecurity insofar as they were identified for potential participation in that program. Further evidence of the risk of food insecurity in this population is seen in the Free and Reduced Price Lunch (FRPL) rate of the schools which ranged from 19.8% to 87.4% with 11 of the schools having a FRPL rate of over 40%. The national average during 2010-2011 school year was 48.1. Nine of the 16 schools were above the national average. The statewide average for the study school year was 46.7%. Ten of the 16 schools were above the statewide average.

Flyers were sent home to parents at the beginning of the school year notifying them about the project. During the first quarter (October-November), 308 surveys were sent home and 221 were returned with consent, reflecting a 72% consent to participate rate. Thereafter, surveys were sent home to the initial response pool of 221 every quarter (October-November, January-February, March-April,

May-June). Complete responses were available from 176 of the respondents during the first quarter, 161 during the second quarter, 141 during the third quarter, and 134 during the fourth quarter, reflecting a 79%, 72%, 63% and 61% return rate across the four quarters of those who consented to the project. Those who responded in comparison to those who did not respond did not differ in terms of food security status. The majority of the participants were white, had a high school education or less, were single, and experienced food insecurity (low 40.9%; very low 19.2%) (See Table 1 for details).

We used the 6-item food security scale drawn from the Core Food Security Module (CFSM) (Nord, 2011), as the dependent variable. Following standard procedures (Nord, 2011), we summed the affirmative responses to construct the three food security classifications; 0-1 affirmative responses = food secure (FS), 2-4 affirmative responses = low food security (LFS), and 5-6 affirmative responses = very low food security (VLFS). The same person completed the household CFSM module each quarter to determine household food security.

The family level variables included the short form of the Confusion, Hubbub, and Order Scale (CHAOS) (Matheny et al., 1995) and mealtime planning items of the Dinnertime Scale of the Family Routines Questionnaire (Fiese et al., 2012). Responses to the CHAOS scale range from “1” *Definitely true* to “5” *Definitely untrue*. Sample items from the CHAOS scale include, “You can’t hear yourself think in our home” and “We are usually able to stay on top of things” (reversed scored). For the measure of CHAOS, higher scores indicate that a household is more likely to have a chaotic environment.

The mealtime planning scale includes six items pertinent to family mealtimes and have been found to be protective for adult and child health (Jones et al., 2014). Responses to the mealtime planning scale range include: “1” *Often True*, “2” *Sometimes True*, and “3” *Never True*. Sample items from the mealtime planning scale include “In our family, mealtime is planned in advance” and “In our

family, everyone has a specific job or responsibility during mealtime.” Cronbach’s alpha for this study ranged from 0.72 to 0.81 across the four quarters. For this measure of family meal planning, higher scores indicate that a household is more likely to plan meals.

We included a set of socio-demographic variables commonly used in research on the determinants of food insecurity in households with children (Gundersen and Ziliak, 2014). These included parent education (those with a high school education (GED) versus having less), marital status (married versus non married), parental race (white versus non-white) and ethnicity, household size, and income.

Descriptive statistics were calculated for the total sample and then by household food insecure/food secure. As noted above, food secure households included those households scoring 0 or 1 on the CFSM; all others were included in the household food insecure category. In addition, we compare households that are not VLFS (i.e., those who responded affirmatively to four of fewer questions) with the VLFS households. To test for the statistical significance of differences between household food secure and household food insecure, χ^2 tests were used. Values in the results are listed as means +/- SD or %. A series of logistic regression models were estimated to assess the association between household food insecurity and family dynamics, controlling for other factors (i.e., the list of confounders above). The first model included only the socio-demographic variables. Models two and three also included the separate effects of family chaos and family mealtime planning, respectively. Model four included the combined effects of family chaos and family mealtime planning. In Table 2 the comparison is between household food insecure and household food secure and in Table 3 the comparison is between household VLFS and household not VLFS. The data were collected at four separate time periods. As such, we control for this clustering in the results.

3. Results

Table 1 contains descriptive information about the parents in this study. Over half (60.1 percent) of the households were classified as food insecure. This is more than three times the county rate of food insecurity (16.5 percent) reported in 2011 Map the Meal Gap report, the year of this study (http://www.feedingamerica.org/hunger-in-america/our-research/map-the-meal-gap/2011/il_allcountiesmmg_2011.pdf). (See Gundersen et al., 2014 for more on Map the Meal Gap). This likely reflects the selection effects of the school personnel charged with identifying children who are most likely to go hungry over the weekend.

In bivariate comparisons of food secure and food insecure we found that food secure households had overall higher levels of education, less family chaos, and more planning around mealtimes. With respect to family chaos the average score for food secure households was 6.50 versus 8.80 for food insecure households and for mealtime planning, the values were 14.97 and 13.80. A similar pattern holds when we compare not-VLFS with VLFS where there were significant differences in parent race, household income, and family chaos albeit not for mealtime planning. In results not in the table, we also considered the relationship between chaos and mealtime planning. One way to examine this is through a comparison of the average family planning score between those households who are above and below the median value of 7 for chaos. The values are, as perhaps expected, higher than in families with less chaos (14.90 versus 13.76) but this difference is not large.

In Table 2, we display our estimates for the logistic regression model for the food secure versus food insecure households. In column (1), as a baseline for comparison, we display the results without chaos or mealtime planning. When significant, the variables are all of the anticipated sign. When they are insignificant, the variables are generally of the expected sign but there are quite a few changes across estimations. In column (2), we introduce the chaos measure. As expected, this is positively

associated with a household's probability of food insecurity and the associations were quite large. Assessing the association in terms of income, for the five-item scale, a one unit increase was roughly equivalent to having about \$480 less household income per month in income (i.e., $((0.115/0.258)/12) \times 10000$). In column (3) we introduce the mealtime planning variable without the chaos measure. This variable is of the expected negative sign; in other words, households who did more mealtime planning were less likely to be food insecure. Here, being one unit higher on the mealtime planning variable is equivalent to having about \$497 household income more per month. When both variables are included, column (4), they each remain statistically significant but the magnitude of these each decline slightly. Our central results use data across 4 waves where there is differential attrition which are correlated with observed characteristics. So, in column (5), we consider the same model as in column (4) only using wave 1. We find similar magnitudes of associations of chaos and family meal planning, albeit they are both now statistically insignificant.

In Table 3, we consider the same models as Table 2 except now the comparison is between not-VLFS and VLFS. As seen in columns (3) and (4), the association of mealtime planning is similar to that found in Table 2 albeit the magnitude (as expressed in terms of the dollar comparisons made above) are smaller. Family chaos is statistically significant and positively associated with food insecurity in column (2) but when it is entered in the model with mealtime planning, it becomes statistically non-significant. As done in Table 2, we also consider what occurs when we just use wave 1 for the analysis. We find results similar in this case to those when all four waves are used.

We further consider the robustness of our results in Tables 2 and 3 in Appendix Tables 1 through 4. Namely, in Appendix Table 1 we estimate models where we include, in turn, each of the covariates along with our central variables of interest, the chaos and mealtime planning measures; in Appendix Table 2, we include estimations where we drop one covariate while including all the other covariates;

and in Appendix Tables 3 and 4 we do the same, only looking at VLFS. As seen in Appendix Table 1, the sign and statistical significance of chaos in each of the estimations is the same as in column (4) of Table 2 while the sign is the same for mealtime planning albeit in some cases, statistically insignificant. Similarly, in Appendix Table 2, the results are the same as in column (4) of Table 2 for chaos and mealtime planning except for when household size is dropped and when household head is black is dropped, then mealtime planning is negative but statistically insignificant. The story in Appendix Table 3 is somewhat different from Table 3 insofar as now chaos is statistically significant and, as expected, positive. However, family planning is statistically insignificant but still negative. In Appendix Table 4 it is again the case that chaos is statistically significant and positive for each of the specifications while family meal planning is statistically insignificant. While there are shifts in statistical significance from Table 3, these are not major changes insofar as the p-values are right near the level of statistical significance in Table 3 at a 95% confidence level – $p=0.076$ for chaos and $p=0.041$ for meal planning.

4 Conclusion

Food insecurity continues to be a serious problem in the United States. And, in recent years, the number of households affected by food insecurity reflects a growing public health problem. Concerns regarding food insecurity exist both due to the magnitude of the problem – almost 50 million Americans are food insecure – and the attendant health consequences. In order to alleviate food insecurity, one must understand who is most likely to be food insecure and, once this is ascertained, aid can be directed to those persons.

A vast literature has examined food insecurity and, in a broad sense, we have a good understanding of who is more or less likely to be food insecure (Gundersen and Ziliak, 2014). However, there have remained many unaccounted factors that have thought to influence a household's

probability of being food insecure. In particular, the extent of household chaos and a family's planning skills has been thought of as potential determinants. Testing this speculation has been hampered by the lack of information about these variables on surveys that also included information on food insecurity.

In this study, we address this limitation through the use of a new data set that has information on chaos, lack of family meal planning, food insecurity, and other relevant factors. We found that food insecure households reported more chaos than food secure households. Consistent with previous reports examining low income households and chaos (Deater-Deckard et al., 2012; Evans, et al., 2005), we found that this relation held true while controlling for socio-demographic characteristics such as education and marital status. This finding holds whether we examine household food insecurity versus household food security or household VLFS versus household non-VLFS. Thus, reports of family chaos in low resourced households may not be due to lack of income alone but a marker of how individuals respond in highly stressed environments (Deater-Deckard et al., 2012; Evans et al., 2005). Consistent with previous reports on family structure and instability (Crosnoe, 2012), we found that disruptions at the household level may serve as an added risk factor.

We also focused on mealtime planning as a resource for food insecure households. Consistent with our findings on chaos, food insecure households reported less planning around mealtimes than food secure households. This may be one indication of the disruption of daily routines. Previous reports have found that maintaining predictable daily routines, such as mealtimes, can have nutritional benefits for low income households (Hammons and Fiese, 2011; D. Johnson et al., 2006). For food insecure households, the ability to plan ahead around meals may increase efficiency and reduce waste for families with limited economic resources. In a qualitative analysis of focus group discussions of low income parents, planning meals for the week and shopping accordingly was seen as a way to stretch the family dollar (Darko et al., 2013). However, it should be noted, in the same study, that other

parents waited until they arrived at the store to make their purchasing decisions. Gundersen and Garasky (2012) found that household financial management skills were inversely related to the probability that a household would be food insecure. Family meal planning is part of any concerted strategy to improve financial management skills so adding information about meal planning skills (e.g., grocery shopping, setting a regular time for meals, managing behavior during meals) to education programs with a financial management component may be warranted. We recognize, however, that meal planning is but one of the many challenges facing food insecure households. Attending to chronic health conditions, housing, and family stability are often pressing matters for food insecure households (Gundersen and Ziliak, 2014).

A challenge for many educational programs aimed at improving lifestyle changes in low income and under-resourced households is to identify plausible mechanisms of change that can be sustained over time. Disruption in daily routines and poor self-regulation have been proposed as the mechanisms linking chaos and poor outcomes (Wachs and Evans, 2010). A recent report from Deater-Deckard and colleagues suggests that in low income households, mothers who experience more chaos also evidence poorer executive function skills (Deater-Deckard, et al., 2012). Executive function skills include the ability to self-regulate attention and are related to sensitive and positive parenting practices (Barrett and Fleming, 2011). Relevant to this study, is the potential for chaos to disrupt attention to planning and the effective use of limited resources. Future educational programming may incorporate attentional training in addition to improving content knowledge about financial planning, mealtime organization and reducing household chaos.

The role of the Supplemental Nutrition Assistance Program (SNAP) should also be recognized. By giving low-income families a sizable and predictable benefit, this can help families better plan for meals. In addition, insofar as chaos may partially reflect income uncertainty, the provision of SNAP

benefits has the potential to reduce chaos in the home. In light of the consistent finding that SNAP leads to reductions in food insecurity (Kreider et al., 2012 and references therein), SNAP may also be reflecting its indirect role through improving mealtime planning and reducing chaos. Combining SNAP enrollment efforts with SNAP-ED as an educational platform to bolster mealtime planning and management skills may further reduce food insecurity.

We recognize several limitations to our study as well as make recommendations for future research. First, our sample was drawn from [blinded for review] and is essentially a sample of convenience, relying on school personnel cooperation. Second, our sample was drawn from a project aimed at examining the effects of a weekend feeding program delivered in elementary schools. Thus, by its very nature the sample was selected to represent households that were likely to be food insecure. This limits our ability to robustly compare food secure households with more economic resources with lower income households. However, we do think this is a relatively unique dataset with the inclusion of family chaos and mealtime planning measures in low income households. Third, our analysis is correlational. Even though we controlled for confounders typically reported in other studies such as education and household income, we essentially report patterns of association and not causal relationships.

We conclude with some ideas regarding future research directions. First, we believe further research is needed to examine other traditionally unobserved factors related to food insecurity. While this paper addresses two of these unobserved factors, there are many others that can be examined. Moreover, many of these unobserved factors such as maternal and child health or work may intersect with family chaos and mealtime planning in interesting ways (Anderson, 2012). Second, the efficacy of educational programs to address chaos and family meal planning should be considered. In particular, analyses of the efficacy of education to improve daily routines and financial management

should be considered. While there is emerging evidence that tailored interventions aimed at promoting planning mealtimes is feasible and acceptable to families (Flattum et al., 2015) and may promote better nutrition habits in low income households (Hammons et al., 2013), less is known about targeted interventions to reduce household chaos. Third, the issue of direction of the impact of food insecurity should be examined. Throughout the text, we've implicitly assumed that chaos and family meal planning influence food insecurity status. We have taken this approach to reflect the common speculation that these factors may influence food insecurity status and there has been less speculation, if any, about the converse. Nevertheless, there may be reasons why the causality may go the other direction and this should be examined. Longitudinal studies detecting shifts in food security status and changes in mealtime planning and family chaos may better elucidate these processes. Fourth, along with causal issues, the issue of endogeneity should be examined. We have assumed that family meal planning and chaos are uncorrelated with the error term and we think that this is likely the case but this is worth exploring in more detail. Fifth, to facilitate questions emerging from this paper, future data collection efforts with food insecurity questions may wish to include questions on family chaos and meal planning. Currently, as noted at the outset, the data used in this paper are the only source with food insecurity, chaos, and family planning questions.

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Table 1

Summary statistics: By food security status					
	All	Food Secure	Food Insecure	Not VLFS	VLFS
Household head is black (%)	36.5	40.2	34.7	40.1	23.1*
Household head has less than a high school degree (%)	10.8	3.8	16.3**	10.2	16.4
Household head is not married (%)	61.2	58.6	63.9	62.3	60.4
Household size (n)	4.575 (1.747)	4.565 (0.176)	4.663 (0.200)	4.537 (0.162)	5.000 (0.292)
Household head is employed (%)	60.2	61.4	59.8	61.0	58.2
Monthly household income (\$)	1796.86 (127.33)	2157.61 (213.65)	1571.09** (132.24)	1898.97 (145.86)	1362.64** (154.17)
Chaos measure (n)	7.91 (0.310)	6.50 (0.426)	8.80** (0.337)	7.51 (0.329)	9.62* (0.543)
Mealtime planning (n)	14.25 (0.199)	14.97 (0.250)	13.80** (0.255)	14.43 (0.200)	13.47 (0.514)
Number of observations	619	186	292	364	114

Notes: * $p < .05$; ** $p < .01$ Comparisons are for food insecure versus food secure and not VLFS versus VLFS. Standard errors are in parentheses and control for clustering across waves.

Table 2
Logistic
regression results:
Food insecure
versus food secure

	(1)	(2)	(3)	(4)	(5)
Household head is black	-0.67 [-0.15] (-1.44, 0.10)	-0.32 [-0.07] (-1.12, 0.48)	-0.93* [-0.21] (-1.74, -0.13)	-0.60 [-0.14] (-1.43, 0.24)	-0.85 [-0.20] (-1.89, 0.20)
Household head has less than a high school degree	1.41* [0.32] (0.08, 2.73)	1.12 [0.26] (-0.13, 2.36)	1.06 [0.24] (-0.24, 2.36)	0.95 [0.22] (-0.30, 2.19)	0.80 [0.19] (-0.82, 2.42)
Household head is not married	-0.03 [0.01] (-0.92, 0.86)	0.28 [0.06] (-0.72, 1.28)	-0.05 [-0.01] (-1.03, 0.94)	0.24 [0.06] (-0.81, 1.30)	0.05 [0.01] (-1.14, 1.23)
Household head is employed	0.49 [0.011] (-0.19, 1.18)	0.29 [0.07] (-0.41, 0.98)	0.32 [0.07] (-0.38, 1.01)	0.22 [0.05] (-0.47, 0.91)	-0.20 [-0.05] (-1.07, 0.67)
Household income (\$1,000s per month)	-0.38* [-0.09] (-0.68, -0.08)	-0.33* [-0.08] (-0.64, -0.02)	-0.41* [-0.09] (-0.74, -0.08)	-0.35* [-0.08] (-0.67, -0.02)	-0.30 [-0.07] (-0.69, 0.09)
Household size	0.08 [0.19] (-0.11, 0.27)	0.04 [0.01] (-0.15, 0.23)	0.10 [0.02] (-0.11, 0.31)	0.06 [0.01] (-0.15, 0.26)	0.03 [0.01] (-0.23, 0.30)
Chaos measure		0.19** [0.04] (0.10, 0.28)		0.15** [0.03] (0.05, 0.25)	0.11 [0.02] (-0.06, 0.27)
Mealtime planning			-0.24** [-0.06] (-0.37, -0.11)	-0.16* [-0.04] (-0.30, -0.02)	-0.10 [-0.02] (-0.32, 0.13)
Constant	0.72 (-0.71, 2.14)	3.858** (1.655, 6.061)	4.38** (1.66, 7.10)	5.64** (2.99, 8.30)	1.74 (-3.07, 6.55)
Number of observations	508	481	484	478	120

Notes: Columns (1) through (4) include information from all four waves, column (5) includes information from the first wave. 95% confidence intervals are in parentheses and control for clustering across waves. *p < .05; **p < .01. Marginal effects, evaluated at mean levels, are in brackets.

Table 3
Logistic
regression
results: Very
low food secure
(VLFS) versus
not VLFS

	(1)	(2)	(3)	(4)	(5)
Household head is black	-1.08* [-0.14] (-1.99, -0.17)	-1.02* [-0.13] (-2.01, -0.04)	-1.36** [- 0.18] (-2.34, -0.39)	-1.22* [-0.16] (-2.26, -0.19)	-2.41** [-0.24] (-3.95, -0.87)
Household head has less than a high school degree	0.13 [0.02] (-1.25, 1.50)	-0.04 [-0.01] (-1.30, 1.23)	-0.26 [-0.03] (-1.59, 1.06)	-0.26 [-0.03] (-1.52, 1.00)	-1.42 [-0.14] (-3.38, 0.54)
Household head is not married	-0.28 [-0.04] (-1.31, 0.74)	0.07 [0.01] (-1.15, 1.28)	-0.26 [-0.03] (-1.37, 0.84)	-0.05 [-0.01] (-1.28, 1.18)	0.72 [0.07] (-1.00, 2.43)
Household head is employed	0.26 [0.03] (-0.52, 1.05)	0.05 [0.01] (-0.78, 0.88)	0.11 [0.01] (-0.73, 0.91)	-0.03 [-0.01] (-0.84, 0.79)	-0.96 [-0.09] (-2.19, 0.26)
Household income (\$1,000s per month)	-0.54** [- 0.07] (-0.88, -0.19)	-0.49* [-0.06] (-0.87, -0.10)	-0.57** [- 0.08] (-0.96, -0.18)	-0.53* [-0.07] (-0.93, -0.12)	-0.70* [-0.07] (-1.30, -0.09)
Household size	0.23* [0.03] (0.04, 0.43)	0.20 [0.03] (-0.01, 0.40)	0.23* [0.03] (0.03, 0.43)	0.20 [0.03] (-0.01, 0.41)	0.35 [0.03] (-0.02, 0.72)
Chaos measure		0.13* [0.02] (0.02, 0.23)		0.089 [0.01] (-0.01, 0.19)	0.11 [0.01] (-0.066, 0.293)
Mealtime planning			-0.20** [- 0.03] (-0.35, -0.05)	-0.15* [-0.02] (-0.30, -0.01)	-0.36** [-0.04] (-0.61, -0.11)
Constant	-1.40 (-3.04, 0.23)	0.68 (-1.64, 2.99)	1.78 (-1.08, 4.63)	2.49 (-0.68, 5.67)	3.00 (-2.21, 8.21)
Number of observations	508	481	484	478	120

Notes: Columns (1) through (4) include information from all four waves, column (5) includes information from the first wave. 95% confidence intervals are in parentheses and control for clustering across waves. * $p < .05$; ** $p < .01$. Marginal effects, evaluated at mean levels, are in brackets.

Appendix Table 1

Logistic regression results: Food insecure versus food secure when single covariates are included in models from column (4) of Table 2

	(1)	(2)	(3)	(4)	(5)	(6)
Household head is black	-0.01 (-0.57,0.54)					
Household head has less than a high school degree		.60 (-0.19,1.40)				
Household head is not married			0.63** (0.08,1.19)			
Household head is employed				-0.04 (-0.56,0.48)		
Household income (\$1,000 per month)					-0.35** (-0.55,0.15)	
Household size						0.04 (-0.11,0.18)
Chaos measure	0.17** (0.10,0.24)	0.17** (0.10,0.23)	0.19** (0.12,0.26)	0.17** (0.10,0.24)	0.18** (0.10,0.26)	0.16** 0.08,0.24
Mealtime Planning	0.11* (-0.22,-0.00)	-0.10 (-0.21,0.00)	-0.09 (-0.20,0.02)	-0.11** (-0.22,-0.00)	-0.08 (-0.20,0.04)	-0.18** (-0.31,-0.04)
Constant	0.615 (-1.19,2.43)	0.434 (-1.32,2.18)	-0.260 (-2.04,1.52)	0.620 (-1.15,2.39)	0.780 (-1.26,2.82)	1.606 (-0.60,3.81)
Observations	644	644	644	644	525	518

Notes: 95% confidence intervals are in parentheses and control for clustering across waves; * $p < 0.05$; ** $p < .01$

Appendix Table 2

Logistic regression results: Food insecure versus food secure when single covariates are dropped from models from column (4) of Table 2

	(1)	(2)	(3)	(4)	(5)	(6)
Household head is black	-0.46 (-1.18,0.26)	-0.58 (-1.38,0.21)	-0.59 (-1.43,0.24)	-0.56 (-1.39,0.27)	-0.60 (-1.41,0.22)	
Household head has less than a high school degree	0.89 (-0.16,1.94)	1.32** (0.14,2.50)	0.87 (-0.34,2.08)	0.90 (-0.38,2.18)		0.95 (-0.24,2.13)
Household head is not married	0.02 (-0.88,0.93)	0.94* (0.09,1.80)	0.26 (-0.78,1.31)		0.15 (-0.85,1.15)	0.13 (-0.85,1.11)
Household head is employed	0.37 (-0.29,1.03)	0.08 (-0.62,0.77)		0.23 (-0.47,0.93)	0.11 (-0.57,0.79)	0.21 (-0.49,0.91)
Household income (\$1,000 per month)	-0.39* (-0.69,-0.09)		-0.32 (-0.64,0.01)	-0.39** (-0.65,0.13)	-0.40** (-0.72,0.09)	-0.31* (-0.62,0.00)
Household size		0.11 (-0.07,0.28)	0.05 (-0.15,0.26)	0.05 (-0.16,0.26)	0.05 (-0.15,0.26)	0.02 (-0.17,0.21)
Chaos measure	0.16** (0.07,0.24)	0.16** (0.08,0.25)	0.15** (0.06,0.25)	0.15** (0.05,0.24)	0.16** (0.06,0.25)	0.17** (0.08,0.24)
Mealtime Planning	0.11* (-0.22,-0.00)	-0.10 (-0.21,0.00)	-0.09 (-0.20,0.02)	-0.11** (-0.22,-0.00)	-0.08 (-0.20,0.04)	-0.18** (0.08,0.26)
Constant	1.04 (-1.71,3.78)	0.70 (-1.57,2.96)	1.93 (-0.95,4.91)	2.18 (-0.35,4.72)	2.35 (-0.58,5.29)	1.00 (-1.86,3.87)
Observations	525	518	478	478	478	478

Notes: 95% confidence intervals are in parentheses and control for clustering across waves; * p<0.05, ** p<0.01

Appendix Table 3

Logistic regression results: VLFS versus non-VLFS when single covariates are included in models from column (4) of Table 3

	(1)	(2)	(3)	(4)	(5)	(6)
Household head is black	-0.46 (-1.21,0.29)					
Household head has less than a high school degree		0.13 (-0.85,1.10)				
Household head is not married			0.24 (-0.48,0.97)			
Household head is employed				-0.26 (-0.93,0.41)		
Household income (\$1,000 per month)					-0.36** (-0.62,-0.11)	
Household size						0.18* (0.02,0.34)
Chaos measure	0.15** (0.07,0.22)	0.17** (0.09,0.24)	0.18** (0.10,0.26)	0.17** (0.10,0.24)	0.16** (0.08,0.25)	0.13** (0.05,0.20)
Mealtime Planning	-0.11 (-0.24,0.02)	-0.09 (-0.22,0.04)	-0.09 (-0.22,0.04)	-0.10 (-0.23,0.03)	-0.06 (-0.20,0.08)	-0.11 (-0.26,0.03)
Constant	-1.14 (-3.28,0.99)	-1.73 (-3.69,0.22)	-2.04 (-4.11,0.03)	-1.53 (-3.54,-0.48)	-1.54 (-3.63,0.54)	-1.82 (-4.17,0.53)
Observations	644	644	644	644	525	518

Notes: 95% confidence intervals are in parentheses and control for clustering across waves; * p<0.05, ** p<0.01

Appendix Table 4

Logistic regression results: VLFS versus non-VLFS when single covariates are dropped from models from column (4) of Table 2

	(1)	(2)	(3)	(4)	(5)	(6)
Household head is black	-0.92 (-1.92,0.08)	-1.06* (-2.01,-0.10)	-1.22* (-2.26,-0.19)	-1.23* (-2.24,-0.23)	-1.22* (-2.26,-0.18)	
Household head has less than a high school degree	-0.12 (-1.27,0.87)	0.24 (-0.84,1.33)	-0.25 (-1.52,1.01)	-0.25 (-1.44,0.95)		-0.22 (-1.44,1.00)
Household head is not married	-0.26 (-1.39,0.87)	0.68 (-0.29,1.65)	-0.05 (-1.27,1.18)		0.00 (-1.18,1.19)	-0.36 (-1.51,0.79)
Household head is employed	0.01 (-0.81,0.83)	-0.26 (-1.06,0.54)		-0.03 (-0.84,0.78)	0.01 (-0.80,0.83)	-0.03 (-0.88,0.82)
Household income (\$1,000 per month)	-0.51** (-0.91,-0.11)		-0.53* (-0.93,-0.12)	-0.52** (-0.83,-0.20)	-0.50** (-0.87,-0.13)	-0.47* (-0.86,-0.08)
Household size		0.25** (0.07,0.20)	0.20 (-0.00,0.41)	0.21* (0.00,0.41)	0.21 (-0.00,0.41)	0.14 (-0.06,0.34)
Chaos measure	0.11** (0.02,0.20)	0.12** (0.03,0.21)	0.09 (-0.09,0.19)	0.09* (0.00,0.18)	0.09 (-0.01,0.19)	0.12** (0.03,0.22)
Mealtime Planning	-0.10 (-0.24,0.04)	-0.14 (-0.28,0.00)	-0.15* (-0.30,-0.01)	-0.15* (-0.30,-0.00)	-0.15 (-0.29,0.00)	-0.10 (-0.25,0.05)
Constant	0.15 (-2.83,3.12)	-1.69 (-4.30,0.93)	0.27 (-2.82,3.37)	0.22 (-2.48,2.91)	0.05 (-3.02,3.13)	-0.71 (-3.80,2.38)
Observations	525	518	478	478	478	478

Notes: 95% confidence intervals are in parentheses and control for clustering across waves; * p<0.05, ** p<0.01