Nonresident Father Involvement and Childhood Hunger

Final Report

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TABLE OF CONTENTS

Page

ABSTRACT 1

EXECUTIVE SUMMARY 2

INTRODUCTION 6

METHODS 11

1. Datasets 11
2. Study Samples 11
3. The Children's Food Security Scale 12

RESULTS 13

1. Family Structure and Child Food Insecurity 13
2. Nonresident Fathers and Child Food Insecurity: Evidence from Longitudinal Data 14

DISCUSSION 17

CONCLUSION 19

ACKNOWLEDGEMENTS 20

APPENDIX A: FAMILY STRUCTURE AND CHILD FOOD INSECURITY

APPENDIX B: NONRESIDENT FATHERS AND CHILD FOOD INSECURITY: EVIDENCE FROM LONGITUDINAL DATA

APPENDIX C: PRESENTATIONS

ABSTRACT

More than one in ten children in the US experience food insecurity, and children in single-mother families are at greatest risk. The overarching goal of this study is to understand the impact of involvement by nonresident fathers on their children's food insecurity -- especially with regard to very low food security. This project takes advantage of unique aspects of four national longitudinal data sets, which have (among them) extensive measures of the different types of nonresident fathers' involvement, as well as the necessary measures of very low food security among children. The data sets are the Fragile Families and Child Wellbeing Study (FFCWS), the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) and Birth Cohort (ECLS-B), and the Panel Study of Income Dynamics-Child Development Supplement (PSID-CDS). Two key conclusions are derived from this study. First, children whose biological parents are cohabiting or whose biological mothers have repartnered have comparable risk for food insecurity to those in single mother households. However, family structure is not related to child food insecurity above and beyond the influence of other factors such as household income, family size, and maternal race, ethnicity and education. Second, more frequent provision of in-kind support by nonresident fathers is associated with lower child food insecurity in both early and middle childhood. These results add to mounting evidence that nonresident fathers' involvement outside of the formal child support system positively impacts children and must be considered in policy discussions related to child support, child poverty, and child well-being.

EXECUTIVE SUMMARY

Purpose and Overview

In 2012, 21.6 percent of U.S. children lived in food insecure households, meaning that a household's access to adequate food was limited due to lack of money and other resources, which resulted in decreased consumption of food or disruption of eating patterns for one or more household members. Food-insecure households are classified as either *low food secure* or *very low food secure.* Low food secure households report few, if any, indications of reduced food intake, while very low food secure households report multiple indications of reduced food intake and disrupted eating patterns due to inadequate resources for food. Ten percent of households with children in 2012 (3.9 million households) reported food insecurity among children, and 1.2 percent reported very low food security among children, even though children are often protected from the effects of food insecurity. Food insecurity poses a serious risk to the health and well-being of children; it has been linked to behavioral problems, developmental risk, poor health in infants and toddlers, and negative academic, social, and psychological outcomes in older children and adolescents.

Despite increased participation by households in federal nutrition assistance programs over the last decade, child food insecurity has remained an intractable problem. The prevalence and severity of child food insecurity, however, vary widely across different household compositions. In particular, in 2012, the rate of child food insecurity for households with children headed by a female with no spouse was triple that for households with children headed by a married couple (18.7 percent vs. 6.3 percent). Compounding the problem is the fact that today more than one-quarter of all U.S. children currently live with only one parent (most often their mother), while the other parent lives elsewhere, and more than half will spend some time growing up outside of a two-parent family. There has been little research on the association of nonresident father involvement and child food insecurity, and the results from these few studies have been inconclusive. These studies emphasize the complexity of the relationship between nonresident father involvement and child food insecurity and the need for further research.

Methodology

1. Datasets

We examine four datasets each containing detailed information on family structure and the USDA's Child Food Security Scale (CFSS), the scale used to measure national levels of food security in official USDA reports. These datasets were: the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B), the Fragile Families and Child Wellbeing Study (FFCWS), the Early Childhood Longitudinal Study Kindergarten Cohort (ECLS-K), and the Panel Study of Income Dynamics – Child Development Supplement (PSID-CDS). Detailed information on each dataset is provided elsewhere. We examined multiple datasets for two main reasons. First, given the lack of recent data on family structure and child food insecurity, the use of multiple, recent datasets

offered the opportunity to provide comprehensive evidence regarding an important child health problem. Second, although there are many similarities among our sources of data, each is also unique in some regards, affording us a more nuanced understanding of the relationship between family structure and food insecurity derived from the strengths of each dataset.

2. Study Samples

For each dataset, we focused on households in which the respondent was the biological mother of at least one child in the household and excluded all other households. To ensure consistency across datasets, we analyzed data regarding one child in a given household, selecting a random child from households with twins in the ECLS-K and the ECLS-B and from households with more than one focal child in the PSID-CDS. In the FFCWS, data are collected only on a single focal child. For our analyses of family structure and child food insecurity, we separated households into four groups based on parental reports of family structure: married biological parent households; cohabiting biological parent households; single mother households; and, repartnered households (where the biological mother is cohabiting with or married to a partner who is not the biological father of the child(ren)). For our investigation of nonresident father involvement using the two ECLS datasets, we restricted our samples to cases where children 1) were living with their biological mothers; 2) had living, nonresident, biological fathers; and 3) had no missing data on questions related to food insecurity or nonresident father involvement.

3. The Children's Food Security Scale

All four datasets use mothers' responses to the USDA's Food Security Module (FSM) to measure household food insecurity. Given our focus on child food insecurity, we utilized the eight child-referenced questions of the FSM, which comprise the CFSS.[1] The CFSS was included in the 9-month, 2-year, 4-year, and 5-year waves of the ECLS-B; the 3-year and 5-year waves of the FFCWS; the Kindergarten, 3rd grade, 5th grade, and 8th grade waves of the ECLS-K; and the CDS I and CDS II waves of the PSID. We examine these waves of data for our analyses in our examination of family structure. For our analyses of nonresident father involvement using the two ECLS datasets, we use all four waves from the ECLS-B, but only the 3rd, 5th, and 8th grade waves of the ECLS-K when information on father involvement was available.

It is important to note that the questions in the CFSS ask about all children in the household and as such, identify whether *any child* in the household was food insecure, but not the food security status of individual children. As per USDA guidelines for assessing food security for households with children,[2] households with CFSS raw scores (number of affirmative responses)

[1] Nord M, Bickel G. Measuring Children's Food Security in U.S. Households, 1995-1999. Washington, D.C.: United States Department of Agriculture; 2002;Food Assistance and Nutrition Research Report Number 25. Available from: http://webarchives.cdlib.org/sw1tx36512/http:/www.ers.usda.gov/Publications/fanrr25/. Accessed February 1st, 2012.

[2] Coleman-Jensen A, Nord M, Andrews M, Carlson S. Household Food Security in the United States in 2010. Washington, D.C.: United States Department of Agriculture; 2011;Economic Research Report Number 125. Available from: http://www.ers.usda.gov/media/121076/err125_2_.pdf. Accessed October 2nd, 2011.

of 0-1 were classified as having children that were food secure, and households with raw scores of 2 or higher were classified as having children that were food insecure. Although this approach follows guidance provided by the USDA, it is a conservative assessment of the inability to meet food needs as even one affirmative response to the CFSS could be cause for concern.

Key Findings

Our cross-sectional examination of the relationship between family structure and child food insecurity using data from four nationally representative U.S. datasets found that rates of child food insecurity in families where biological parents are cohabiting but are not married and in families where biological mothers are repartnered (cohabiting with or married to new partners who are not the biological father of the focal child) were high and often statistically indistinguishable from those in single mother families, the group typically identified as being at highest risk of child food insecurity in federal reports. However, family structure was not related to child food insecurity above and beyond the influence of other factors such as household income, family size, and maternal race, ethnicity, education, and age. Our adjusted results demonstrate that there were few significant differences in predicted probabilities of food insecurity among children in various family structures that were average in other regards. Although our descriptive data indicate differences among our four samples, our bivariate and multivariate results were largely consistent across data sources.

Building on this first study, our longitudinal examination of ECLS-B and ECLS-K data investigated the impact of involvement by nonresident fathers on child food insecurity in their nonresident children's (biological mothers') households. Our results suggest that some types of involvement and support are protective. First, we find consistent evidence that fathers' provision of in-kind support on a more frequent basis is associated with lower food insecurity, holding constant other types of support and involvement, and numerous individual characteristics of fathers, mothers, and children. Neither formal cash support nor informal cash support was associated with child food insecurity, after controlling for individual characteristics. However, among middle childhood youth in the ECLS-K, provision of cash support on a regular basis (without distinguishing the source) was associated with less food insecurity than no provision of cash support. Moreover, results from some models suggest that provision of cash support irregularly was associated with greater food insecurity compared with no cash support. This finding suggests that financial instability may be more harmful than an absolute lower level of finances. This is an important contribution to this literature and needs to be further explored with other data.

Prior studies of family structure and food insecurity have a number of limitations which our studies address. First and foremost, none of the previous studies we identified distinguished between household level food insecurity and food insecurity among children. Second, none of these studies used the full USDA food security module, which is used to generate the official nationally representative estimates of child food insecurity. Previous studies relied instead on small set of questions such as the three questions available in the National Survey of American

Families or the single question available in the Survey of Income and Program Participation. Thus, our study contributes to this literature by focusing specifically on child food insecurity – a more severe and potentially harmful indicator of material hardship – and by using the full CFSS module, which is a more valid and reliable measure of food insecurity and is comparable to national data. In addition, our study is the first, to our knowledge, to compare rates of child food insecurity among single mother families and cohabiting and repartnered families after adjustment for other factors. Explicit comparisons among cohabiting, repartnered, and single mother families is an important contribution given the increasing prevalence of complex and non-traditional family forms and given the long-held assumption that children in single mother families are at highest risk for food insecurity. Also, because of our large sample sizes, we are able to examine very low food insecurity, obviously the most severe indicator of hardship and one that is relatively rare and not possible to analyze with many other datasets.

Conclusion

After controlling for maternal race and ethnicity, maternal education, maternal age, household income, child's age, and the number of adults and children in the household, most of the differences in child food insecurity among the different family structures examined here were no longer statistically significant. This is important as previous research consistently points to less material hardship in married two-parent families compared to cohabiting or single parent families. Future research should seek to confirm the findings presented here using other data sources and the CFSS to investigate whether family structure contributes to child food insecurity and other measures of hardship above and beyond related factors. In seeking to remediate food insecurity, policy makers might focus on children in non-traditional family types given their high levels of risk. However, efforts to eliminate child food insecurity might be better directed to more proximal determinants.

Additionally, our longitudinal study used two comparable datasets with varied measures of father involvement and samples of children at two important stages of development. That we find basically identical strong protective effects of fathers' in-kind support provision in both datasets is an important contribution to the father involvement and child development literatures. It adds to the weight of a number of prior studies suggesting that the involvement and contributions of nonresident fathers outside of the formal child support system contribute to child and family well-being and must be considered in discussions about enhancing policies related to child support, child poverty, and child well-being.

INTRODUCTION

In 2012, 21.6 percent of U.S. children lived in food insecure households, meaning that a household's access to adequate food was limited due to lack of money and other resources, which resulted in decreased consumption of food or disruption of eating patterns for one or more household members. Food-insecure households are classified as either *low food secure* or *very low food secure.* Low food secure households report few, if any, indications of reduced food intake, while very low food secure households report multiple indications of reduced food intake and disrupted eating patterns due to inadequate resources for food. Ten percent of households with children in 2012 (3.9 million households) reported food insecurity among children, and 1.2 percent reported very low food security among children, even though children are often protected from the effects of food insecurity.[3] Food insecurity poses a serious risk to the health and well-being of children; it has been linked to behavioral problems, developmental risk, poor health in infants and toddlers,[4,5] and negative academic, social, and psychological outcomes in older children and adolescents.[6,7]

Despite increased participation by households in federal nutrition assistance programs over the last decade,[8,9,10,11] child food insecurity has remained an intractable problem.[12] The prevalence and severity of child food insecurity, however, vary widely across different household compositions. In particular, in 2012, the rate of child food insecurity for households with children headed by a female with no spouse was triple that for households with children

[3] Coleman-Jensen A, Nord M, Singh AS. Household Food Insecurity in the United States in 2012. Washington, D.C.: United States Department of Agriculture, Economic Research Service; 2013;Economic Research Report Number 155. Available from: http://www.ers.usda.gov/ersDownloadHandler.ashx?file=/media/1183208/err-155.pdf. Accessed September 11, 2013.

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[7] Jyoti DF, Frongillo EA, Jones SJ. Food insecurity affects school children's academic performance, weight gain, and social skills. *J Nutr*. 2005;135:2831-2839.

[8] Leftin, J, E Eslami, and M Mark Strayer. 2011. "Trends in Supplemental Nutrition Assistance Program participation rates: fıscal year 2002 to fıscal year 2009. Mathematica Policy Research." Washington, DC: Food and Nutrition Service, USDA.

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[10] USDA. 2012. "School Breakfast Program Participation and Meals Served." U.S. Department of Agriculture, Food and Nutrition Service, http://www.fns.usda.gov/pd/sbsummar.htm.

[11] USDA. 2012. "WIC Program Participation and Costs." U.S. Department of Agriculture, Food and Nutrition Service. http://www.fns.usda.gov/pd/wisummary.htm.

[12] Nord, Mark and Lynn Parker. 2010. "How adequately are food needs of children in low-income households being met?" *Children and Youth Services Review* 32(9):1175-1185.

headed by a married couple (18.7 percent vs. 6.3 percent).[13] Compounding the problem is the fact that today more than one-quarter of all U.S. children currently live with only one parent (most often their mother), while the other parent lives elsewhere,[14] and more than half will spend some time growing up outside of a two-parent family.[15]

Federal reports do not provide data on child food insecurity in households characterized by other family structures, which are of increasing prevalence and interest. The most common of these family structures is cohabitation. Today, a fifth of all children in the US are born to cohabiting, but not married, parents.[16,17,18] Although there are few consistent estimates in the US of the prevalence of repartnered families where only one of the two adults heading the household is a biological parent of the child(ren) in the household, Census Bureau data suggest that between 10-20 percent of children currently live in repartnered families, and more than one-third of children will experience this type of living arrangement.[19,20] National reports do not provide estimates of child food insecurity for this group; rather, families in which one biological parent has remarried are currently grouped together with families in which both biological parents of the child are married to each other.[21]

There is good reason to believe that the prevalence of child food security in cohabiting or repartnered families may be very different compared to married biological parent families. Most studies find that cohabiting unions are less stable and that these families have fewer resources than married parent families,[22,23,24] although findings on child well-being in

[13] Coleman-Jensen A, Nord M, Singh AS. Household Food Insecurity in the United States in 2012. Washington, D.C.: United States Department of Agriculture, Economic Research Service; 2013;Economic Research Report Number 155. Available from: http://www.ers.usda.gov/ersDownloadHandler.ashx?file=/media/1183208/err-155.pdf. Accessed September 11, 2013.

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[21] Coleman-Jensen A, Nord M, Singh AS. Household Food Insecurity in the United States in 2012. Washington, D.C.: United States Department of Agriculture, Economic Research Service; 2013;Economic Research Report Number 155. Available from: http://www.ers.usda.gov/ersDownloadHandler.ashx?file=/media/1183208/err-155.pdf. Accessed September 11, 2013.

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cohabitating households are mixed. New partners may contribute resources, thereby improving food security,[25] but prior research suggests that step-parents may underinvest in non-biological children because they may be providing resources to their prior biological children in other households or because they are less committed to non-biological children.[26,27] Additionally, the instability that often accompanies repartnering may be harmful for child well-being.[28,29] Economic models for the dynamics of food insufficiency[30,31] suggest that decisions about food consumption are driven in part by families' past and future resources and ability to smooth consumption over time, implying that stability and consistency may be as important for children's food security as absolute level of resources. Thus, while single mother households may have fewer resources, they may not necessarily have a higher risk of food insecurity than these other non-traditional family types (cohabiting parents and repartnered parents) because of the potential instability of these family structures.

Because children in female-headed families are more likely to be food insecure, the role of nonresident fathers is particularly important to understand. Compared to children in two-parent families, children in single-parent families have less access to material resources and parental time as a result of only one parent being in the household. However, the presence of another adult does not always rectify the problem. In particular, children living with a biological mother who has repartnered with someone other than the biological father may also suffer in comparison to those living with both biological parents, because new partners may underinvest in non-biological children,[32,33] and because transitions that accompany repartnering may be

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[32] Hofferth, Sandra. 2006. "Residential father family type and child well-being: Investment versus selection." *Demography* 43(1):53-77.

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deleterious to children.[34,35,36,37] Thus, the material and social involvement of nonresident biological fathers is important and may ameliorate these disadvantages and potentially improve the circumstances of their children.

Nonresident fathers can be involved in a number of ways.[38,39] Material contributions can be in the form of cash delivered through the formal child support system or provided informally to the mother and child. Fathers' contributions can also be in the form of non-cash goods (in-kind contributions), such as the provision of food, clothes, or other items directly to the mother and child. Finally, nonresident fathers can be socially involved as reflected in the frequency and duration of time spent with their children. Research indicates that the patterns and packages of nonresident fathers' involvement and contributions vary substantially across families,[40,41,42] suggesting that different types of involvement may lead to different outcomes. While previous research has documented that the financial contributions of fathers are linked to social involvement with their children,[43,44,45] more recent work indicates more complex relationships. Garasky et al. (2010) examined the relationships among three aspects of father involvement: cash child support, in-kind support, and visitation. They found that these dimensions of involvement were positively related and highly intertwined with the strongest positive

[34] Beck, A. N., C. E. Cooper, S. McLanahan, and J. Brooks-Gunn. 2010. "Partnership Transitions and Maternal Parenting." *Journal of Marriage and Family* 72(2):219-233.

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relationship being between in-kind support and visitation.[46] Nepomnyaschy (2007) found a strong reciprocal relationship between the provision of informal cash support (money provided outside of the formal child support obligation) and visitation, but a much weaker one between formal child support and visitation.[47] Fathers' contributions of money and goods are positively associated with a range of indicators of child well-being including financial security, achievement, and schooling.[48,49,50,51] However, evidence regarding the effects of nonresident fathers' social involvement on child well-being is mixed.[52,53,54] There has been little research on the association of nonresident father involvement and child food insecurity, and the results from these few studies have been inconclusive.[55,56,57,58] These results emphasize the complexity of the relationship between nonresident father involvement and child food insecurity and the need for further research.

[46] Garasky, Steven, Susan Stewart, Craig Gundersen, and Brenda Lohman. 2010. "Toward a Fuller Understanding of Nonresident Father Involvement: An Examination of Child Support, In-Kind Support, and Visitation." *Population Research and Policy Review* 29(3):363-393.

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METHODS

Two manuscripts are provided as appendices: "Family Structure and Child Food Insecurity" is Appendix A and "Nonresident Fathers and Child Food Insecurity: Evidence from Longitudinal Data" is Appendix B. Specific methodological details for each analysis are provided in these appendices. Below we provide an overview of the study methodology.

1. Datasets

We examine four datasets each containing detailed information on family structure and the USDA's Child Food Security Scale (CFSS), the scale used to measure national levels of food security in official USDA reports. These datasets were: the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B), the Fragile Families and Child Wellbeing Study (FFCWS), the Early Childhood Longitudinal Study Kindergarten Cohort (ECLS-K), and the Panel Study of Income Dynamics – Child Development Supplement (PSID-CDS). Detailed information on each dataset is provided elsewhere.[59,60,61,62]

We examined multiple datasets for two main reasons. First, given the lack of recent data on family structure and child food insecurity, the use of multiple, recent datasets offered the opportunity to provide comprehensive evidence regarding an important child health problem. Second, although there are many similarities among our sources of data, each is also unique in some regards, affording us a more nuanced understanding of the relationship between family structure and food insecurity derived from the strengths of each dataset. By adopting this approach, our expectation was that consistent results across datasets would offer more compelling evidence, while divergent findings would prompt reflection on the causes and consequences of those differences and stimulate future research.

2. Study Samples

For each dataset, we focused on households in which the respondent was the biological mother of at least one child in the household and excluded all other households. To ensure consistency across datasets, we analyzed data regarding one child in a given household, selecting a random

[59] Snow K, Thalji L, Derecho A, et al. Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), Preschool Year Data File User's Manual (2005-06). Washington, D.C.: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education; 2007;(NCES 2008-024) Accessed September 15th, 2009.

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[61] Reichman NE, Teitler JO, Garfinkel I, McLanahan SS. Fragile families: Sample and design. *Child Youth Serv Rev*. 2001;23:303-326.

[62] McGonagle KA, Schoenim RF, Sastry N, Freedman VA. The Panel Study of Income Dynamics: Overview, recent innovations, and potential for life course research. *Longit Life Course Stud*. 2012;3:268-284.

child from households with twins in the ECLS-K and the ECLS-B and from households with more than one focal child in the PSID-CDS. In the FFCWS, data are collected only on a single focal child. For our analyses of family structure and child food insecurity, we separated households into four groups based on parental reports of family structure: married biological parent households; cohabiting biological parent households; single mother households; and, repartnered households (where the biological mother is cohabiting with or married to a partner who is not the biological father of the child(ren)). For our investigation of nonresident father involvement using the two ECLS datasets, we restricted our samples to cases where children 1) were living with their biological mothers; 2) had living, nonresident, biological fathers; and 3) had no missing data on questions related to food insecurity or nonresident father involvement.

3. The Children's Food Security Scale

All four datasets use mothers' responses to the USDA's Food Security Module (FSM) to measure household food insecurity. Given our focus on child food insecurity, we utilized the eight child-referenced questions of the FSM, which comprise the CFSS.[63] The CFSS was included in the 9-month, 2-year, 4-year, and 5-year waves of the ECLS-B; the 3-year and 5-year waves of the FFCWS; the Kindergarten, 3rd grade, 5th grade, and 8th grade waves of the ECLS-K; and the CDS I and CDS II waves of the PSID. We examine these waves of data for our analyses in our examination of family structure. For our analyses of nonresident father involvement using the two ECLS datasets, we use all four waves from the ECLS-B, but only the 3rd, 5th, and 8th grade waves of the ECLS-K when information on father involvement was available.

It is important to note that the questions in the CFSS ask about all children in the household and as such, identify whether *any child* in the household was food insecure, but not the food security status of individual children. As per USDA guidelines for assessing food security for households with children,[64] households with CFSS raw scores (number of affirmative responses) of 0-1 were classified as having children that were food secure, and households with raw scores of 2 or higher were classified as having children that were food insecure. Although this approach follows guidance provided by the USDA, it is a conservative assessment of the inability to meet food needs as even one affirmative response to the CFSS could be cause for concern.

[63] Nord M, Bickel G. Measuring Children's Food Security in U.S. Households, 1995-1999. Washington, D.C.: United States Department of Agriculture; 2002;Food Assistance and Nutrition Research Report Number 25. Available from: http://webarchives.cdlib.org/sw1tx36512/http:/www.ers.usda.gov/Publications/fanrr25/. Accessed February 1st, 2012.

[64] Coleman-Jensen A, Nord M, Andrews M, Carlson S. Household Food Security in the United States in 2010. Washington, D.C.: United States Department of Agriculture; 2011;Economic Research Report Number 125. Available from: http://www.ers.usda.gov/media/121076/err125_2_.pdf. Accessed October 2nd, 2011.

RESULTS

1. Family Structure and Child Food Insecurity

Table 2 (Appendix A, page 18) presents results from both the unadjusted and adjusted cross-sectional logistic regression models of child food insecurity on family type. Overall, in our bivariate models, the odds of child food insecurity were higher in other family types compared to married biological parent families. Except in the PSID-CDS, our unadjusted results indicated that the odds of child food insecurity were higher for children in cohabiting, single, and repartnered families compared to those living with married biological parents. In the PSID-CDS, odds of food insecurity were significantly higher for children in single and repartnered families, but not in cohabiting families.

In our adjusted models, there were fewer statistically significant differences between odds of food insecurity for children in married biological parent households and other family structures, and the magnitudes of the statistically significant coefficients were smaller than in the unadjusted results. Compared with children in biological parent families, children in single and repartnered households had significantly higher odds of food insecurity in the ECLS-B and PSID; children in cohabiting and single mother families had higher odds of food insecurity in the ECLS-K, and children in single mother families had higher odds of food insecurity in the FFCWS.

Figure 1 (Appendix A, page 19) presents predicted probabilities of child food insecurity by family structure and dataset based on both the adjusted and unadjusted models, holding all covariates at their means in the adjusted models. Error bars in the Figure indicate 95% confidence intervals for the predictions. Predicted probabilities sharing a letter (lowercase for unadjusted results and uppercase for adjusted results) were not significantly different at the $p<.05$ level. For example, in panel A the letter 'a' shared by cohabitating and repartnered indicates that the difference in the predicted unadjusted probability of child food insecurity in these two family structures was statistically insignificant. Predicted probabilities of child food insecurity varied by family type. Unadjusted predicted probabilities (represented by the darker bars in the Figure) of child food insecurity are between 0.031(ECLS-K) and 0.044 (FFCWS) for married parent families, between 0.056 (PSID) and 0.109 (ECLS-K) for cohabiting parent families, between 0.096 (ECLS-K) and 0.126 (PSID) for single mother families, and between 0.051 (ECLS-K) and 0.092 (ECLS-B) for repartnered families. Predicted probabilities based on our unadjusted models largely replicated the pattern of results summarized in Table 2.

Two sets of results from these unadjusted models are noteworthy. First, in three of the datasets (ECLS-B, FFCWS, and ECLS-K), the predicted unadjusted probabilities for children living with married biological parents were significantly lower than for all other family types. Second, in all four datasets, the probability of child food insecurity in single mother families was statistically indistinguishable from those for children in cohabiting and/or repartnered families. For example, in the ECLS-B, the probability of food insecurity for children in cohabiting and repartnered homes was twice as high as for children from married biological families, but there

was no statistical difference in probabilities between repartnered and single mother households. Similarly, in the FFCWS, the probability of food insecurity was highest for children in single mother households, but was not statistically different from those for children in cohabiting or repartnered households.

The lighter colored bars in Figure 1 present predicted probabilities from the adjusted models. The inclusion of controls and the Bonferroni adjustment for multiple comparisons resulted in a pattern of predicted child food insecurity that was markedly different from the adjusted logistic regression results in Table 2. These results indicate that after controlling for other correlates of food insecurity and family structure (mother's race and ethnicity, mother's education, mother's age household income, the number of children and adults in the family, and child's age), the predicted probability of child food insecurity in an average household was nearly identical among the different family types. Only in the ECLS-K and PSID datasets were any family type comparisons still statistically significant in the adjusted models. In the ECLS-K, the probability of child food insecurity was statistically significantly lower in married biological parent households and repartnered households than in single mother households although these differences were small in magnitude (0.007 and 0.006, respectively). In the PSID, only the difference between cohabiting and single mother families remained statistically significant.

2. Nonresident Fathers and Child Food Insecurity: Evidence from Longitudinal Data

Table 2 (Appendix B, page 35) presents marginal effects (calculated at the mean of covariates) from zero inflated negative binomial regressions of the CFSS raw score on nonresident fathers' involvement controlling for different sets of covariates in each dataset. In Model 1, which includes only father involvement variables, more formal support and more frequent in-kind support provision are associated with lower food insecurity, while a greater likelihood of informal support provision is associated (only at $p<.10$) with more food insecurity for early childhood youth in the ECLS-B. For the middle childhood youth in the ECLS-K, provision of regular support (as opposed to no support) and more frequent in-kind support are associated with less food insecurity.

After adding time-invariant mother and child characteristics (Model 2), frequent in-kind support provision remains statistically significant in both datasets, though coefficients are reduced in magnitude. In the ECLS-B, formal support and informal support are no longer associated with food insecurity. In the ECLS-K, receipt of irregular cash support (compared with no support) becomes positively associated with food insecurity and regular cash support (compared with no support) continues to be negatively associated with food insecurity, though the coefficient is reduced by more than half.

In Model 3, which adds time-varying covariates, and Model 4, which adds fathers' education, there are few further differences. In the fully-adjusted model (Model 4), frequent in-kind support (converted to z-scores for comparability across datasets) continues to be strongly and negatively associated with food insecurity in both datasets. One standard deviation increase in

the frequency of in-kind support provision reduces the CFSS score by 0.04 points in both datasets, which is approximately a 10 percent decrease (from a pooled sample mean of approximately 0.40 in both datasets– not shown). In the ECLS-K, provision of irregular support (vs. no support) is strongly and positively associated with food insecurity, while provision of regular support (vs. no support) is not significantly associated with food insecurity. Fathers' time spent with his children is not associated with food insecurity in these models in either dataset.

The associations of covariates with food insecurity are fairly consistent across datasets, with notable exceptions. In both datasets, mothers who are more educated, report higher household income, are in better health, working, and have fewer children and more adults in the household report lower child food insecurity than those who do not. Mothers' reporting moderate depression report more food insecurity in both datasets (0.20 and 0.16 points higher in the ECLS-B and K, respectively). Further, having older children in the household is associated with more food insecurity: each year of age of the oldest child is associated with a 0.01 increase in the CFFS in both datasets.

In the ECLS-B, but not in the ECLS-K, mothers who were older and married at the birth of the child report more food insecurity. Though mothers with marital births are generally more advantaged than unmarried mothers, this increased risk reflects the focus of our study on children with nonresident fathers. Mothers with very young children (in the ECLS-B) who have gotten divorced so soon after the birth of their child experienced a major transition, which may have been chaotic and financially destabilizing; while mothers who were not married may not have experienced any such transitions during this period. Mothers of children who were born low birth weight and whose fathers were more educated report lower food insecurity in the ECLS-B, though these variables were not significant in the ECLS-K.

In the ECLS-K (middle childhood), but not in the ECLS-B, mothers who have new cohabiting or married partners, even after controlling for household income and number of adults in the household, report much lower levels of child food insecurity (0.14) than those who are single. Finally, children who have health insurance are less likely to be in a household where there is child food insecurity, but only in the ECLS-K data (middle childhood).

Table 3 (Appendix B, page 39) presents marginal effects from probit regression models of the bivariate measures for low and very low food insecurity on nonresident fathers' involvement, controlling for all variables from Model 4 in Table 2. Only father involvement results are presented, but results for control variables are similar in pattern to those in Table 2. Fathers' frequent provision of in-kind support is associated with reduced food insecurity in both datasets at very similar magnitudes. One standard deviation increase in the frequency of in-kind support provision is associated with a 1 percentage point decline in the probability of low food security in both datasets, which corresponds to approximately a 9 percent decrease (11 percent low food security in pooled sample in both datasets- not shown). In the ECLS-K, regular cash support receipt (vs. no cash support) is associated with a 1.7 percentage point decline in the probability of low food security among children.

For very low food security, a very rare outcome (0.5 percent in the pooled sample- not shown), frequent provision of in-kind support in the ECLS-B continues to be protective. One standard deviation increase in frequency of in-kind support provision is associated with a 0.2 percentage point decline in the probability of low food security. Though this coefficient is only marginally significant (p=0.06), it represents a 40 percent decrease in very low child food security. In the ECLS-K, none of the father involvement variables are associated with very low food security.

DISCUSSION

Our cross-sectional examination of the relationship between family structure and child food insecurity using data from four nationally representative U.S. datasets found that rates of child food insecurity in families where biological parents are cohabiting but are not married and in families where biological mothers are repartnered (cohabiting with or married to new partners who are not the biological father of the focal child) were high and often statistically indistinguishable from those in single mother families, the group typically identified as being at highest risk of child food insecurity in federal reports. However, family structure was not related to child food insecurity above and beyond the influence of other factors such as household income, family size, and maternal race, ethnicity, education, and age. Our adjusted results demonstrate that there were few significant differences in predicted probabilities of food insecurity among children in various family structures that were average in other regards. Although our descriptive data indicate differences among our four samples, our bivariate and multivariate results were largely consistent across data sources.

Building on this first study, our longitudinal examination of ECLS-B and ECLS-K data investigated the impact of involvement by nonresident fathers on child food insecurity in their nonresident children's (biological mothers') households. Our results suggest that some types of involvement and support are protective. First, we find consistent evidence that fathers' provision of in-kind support on a more frequent basis is associated with lower food insecurity, holding constant other types of support and involvement, and numerous individual characteristics of fathers, mothers, and children. Neither formal cash support nor informal cash support was associated with child food insecurity, after controlling for individual characteristics. However, among middle childhood youth in the ECLS-K, provision of cash support on a regular basis (without distinguishing the source) was associated with less food insecurity than no provision of cash support. Moreover, results from some models suggest that provision of cash support irregularly was associated with greater food insecurity compared with no cash support. This finding suggests that financial instability may be more harmful than an absolute lower level of finances. This is an important contribution to this literature and needs to be further explored with other data.

Prior studies of family structure and food insecurity have a number of limitations which our studies address. First and foremost, none of the previous studies we identified distinguished between household level food insecurity and food insecurity among children. Second, none of these studies used the full USDA food security module, which is used to generate the official nationally representative estimates of child food insecurity. Previous studies relied instead on small set of questions such as the three questions available in the National Survey of American Families or the single question available in the Survey of Income and Program Participation. Thus, our study contributes to this literature by focusing specifically on child food insecurity – a more severe and potentially harmful indicator of material hardship – and by using the full CFSS module, which is a more valid and reliable measure of food insecurity and is comparable to national data. In addition, our study is the first, to our knowledge, to compare rates of child

food insecurity among single mother families and cohabiting and repartnered families after adjustment for other factors. Explicit comparisons among cohabiting, repartnered, and single mother families is an important contribution given the increasing prevalence of complex and non-traditional family forms and given the long-held assumption that children in single mother families are at highest risk for food insecurity. Also, because of our large sample sizes, we are able to examine very low food insecurity, obviously the most severe indicator of hardship and one that is relatively rare and not possible to analyze with many other datasets.

Our studies have some limitations. Despite its many benefits, the CFSS (like many other scales) measures food security for all children in the household. Thus, we were unable to explore differences in the relationship between family structure and food insecurity by the age of focal children in our datasets, a topic of potential concern to policy makers. However, there are very few datasets that ask about individual child hunger and those that do lack many other important measures of family processes. Further, despite our use of data from relatively large national surveys, at times small subgroup sizes precluded us from performing finer grained analyses. In particular, the ability to separate repartnered families into those who are cohabiting and those who are married would have been desirable.

CONCLUSION

After controlling for maternal race and ethnicity, maternal education, maternal age, household income, child's age, and the number of adults and children in the household, most of the differences in child food insecurity among the different family structures examined here were no longer statistically significant. This is important as previous research consistently points to less material hardship in married two-parent families compared to cohabiting or single parent families. Future research should seek to confirm the findings presented here using other data sources and the CFSS to investigate whether family structure contributes to child food insecurity and other measures of hardship above and beyond related factors. In seeking to remediate food insecurity, policy makers might focus on children in non-traditional family types given their high levels of risk. However, efforts to eliminate child food insecurity might be better directed to more proximal determinants.

Additionally, our longitudinal study used two comparable datasets with varied measures of father involvement and samples of children at two important stages of development. That we find basically identical strong protective effects of fathers' in-kind support provision in both datasets is an important contribution to the father involvement and child development literatures. It adds to the weight of a number of prior studies suggesting that the involvement and contributions of nonresident fathers outside of the formal child support system contribute to child and family well-being and must be considered in discussions about enhancing policies related to child support, child poverty, and child well-being.

This research team continues to investigate the important issues addressed in these two studies and discussed in this Executive Summary. Appendix C provides a list of papers presented by the research team at conferences and workshops during the period of performance of the grant that benefited from the financial support of this grant. We anticipate these papers being published in top tier academic journals and contributing to the understanding of the role of nonresident fathers in meeting the needs of their children.

ACKNOWLEDGEMENTS

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APPENDIX A: FAMILY STRUCTURE AND CHILD FOOD INSECURITY

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Family Structure and Child Food Insecurity

--Manuscript Draft--

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Abstract:	Objectives: This study examined whether food insecurity was different for children in cohabiting or repartnered families compared to those in single mother or married (biological) parent families. Methods: We compared probabilities of child food insecurity across different family structures in four national datasets the Early Childhood Longitudinal Study-Birth Cohort ECLS-B); the Fragile Families and Child Well-Being Study (FFWCS); the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K); and, the Panel Study of Income Dynamics-Child Development Supplement (PSID-CDS). Results: Bivariate probabilities of child food insecurity in cohabiting or repartnered families were generally higher than in married biological parent families and often statistically indistinguishable from single mother families. However, in multivariate models, most differences among family types were attenuated and no longer statistically significant. Conclusion: Children whose biological parents are cohabiting or whose biological mothers have repartnered have comparable risk for food insecurity to those in single mother households. However, family structure is not related to child food insecurity above and beyond the influence of other factors such as household income, family size, and maternal race, ethnicity, education, and age.
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Acknowledgments and Disclosure	This project was supported with a grant from the University of Kentucky Center for Poverty Research through funding by the US Department of Agriculture, Food and Nutrition Service, contract number AG-3198-B-10-0028. The opinions and conclusions expressed herein are solely those of the authors and should not be construed as representing the opinions or policies of the UKCPR, any agency of the Federal Government or the authors' affiliations.
Human Participant Protection statement	Because the study uses analysis of de-identified secondary data, it has been approved as exempt from further review by the Boston University and Rutgers University Institutional Review Boards.

Dr. Mary E. Northridge
Editor-in-Chief,
American Journal of Public Health
New York University
New York, New York

Dear Dr. Northridge,

Thank you for your correspondence and advice regarding our article "Family Structure and Child Food Insecurity." Based on your recommendation, we have decided to submit the manuscript to *AJPH* as a Research Article.

If you have any questions or need further information about the article, please feel free to contact me.

Thank you once again for your attention to our work.

Sincerely,

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Family Structure and Child Food Insecurity

ABSTRACT

Objectives: This study examined whether food insecurity was different for children in cohabiting or repartnered families compared to those in single mother or married (biological) parent families.

Methods: We compared probabilities of child food insecurity across different family structures in four national datasets the Early Childhood Longitudinal Study–Birth Cohort ECLS-B); the Fragile Families and Child Well-Being Study (FFWCS); the Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K); and, the Panel Study of Income Dynamics-Child Development Supplement (PSID-CDS).

Results: Bivariate probabilities of child food insecurity in cohabiting or repartnered families were generally higher than in married biological parent families and often statistically indistinguishable from single mother families. However, in multivariate models, most differences among family types were attenuated and no longer statistically significant.

Conclusion: Children whose biological parents are cohabiting or whose biological mothers have repartnered have comparable risk for food insecurity to those in single mother households. However, family structure is not related to child food insecurity above and beyond the influence of other factors such as household income, family size, and maternal race, ethnicity, education, and age.

INTRODUCTION

In 2012, 10 percent of U.S. households had food insecure children, meaning that access to adequate food for these children was limited by their household's lack of money and other resources.[1] Food insecurity poses a serious risk to the health and well-being of children; it has been linked to behavioral problems, developmental risk, poor health in infants and toddlers,[2, 3] and negative academic, social, and psychological outcomes in older children and adolescents.[4, 5]

Traditionally, households headed by single mothers have had the highest rates of child food insecurity while married-couple households have had the lowest rates: 18.7 vs. 6.3 percent according to the most recent data from the United States Department of Agriculture (USDA).[1] However, federal reports do not provide data on child food insecurity in households characterized by other family structures, which are of increasing prevalence and interest. The most common of these family structures is cohabitation. Today, a fifth of all children in the US are born to cohabiting, but not married, parents.[6-8] There is also little information on child food insecurity in repartnered families where only one of the two adults heading the household is a biological parent of the child(ren) in the household. Although there are few consistent estimates of the prevalence of these types of families in the U.S., Census Bureau data suggest that between 10-20% of children currently live in repartnered families, and more than one-third of children will experience this type of living arrangement.[9, 10] National reports do not provide estimates of child food insecurity for this group; rather, families in which one biological parent has remarried are currently grouped together with families in which the biological parents of the child are married to each other.[1]

There is good reason to believe that the prevalence of child food security in cohabiting or repartnered families may be very different compared to married biological parent families. Most

studies find that cohabiting unions are less stable and that these families have fewer resources than married parent families,[11-13] although findings on child well-being in cohabitating households are mixed. New partners may contribute resources, thereby improving food security,[14] but prior research suggests that step-parents may underinvest in non-biological children, because they may be providing resources to their prior biological children in other households or because they are less committed to non-biological children.[15, 16] Additionally, the instability that often accompanies repartnering may be harmful for child well-being.[17, 18]

Economic models for the dynamics of food insufficiency[19, 20] suggest that decisions about food consumption are driven in part by families' past and future resources and ability to smooth consumption over time, implying that stability and consistency may be as important for children's food security as absolute level of resources. Thus, while single mother households may have the fewest resources, they may not necessarily have a higher risk of food insecurity than these other non-traditional family types (cohabiting parents and repartnered parents), because of the potential instability of these family structures. While a handful of previous studies have examined food insecurity across different family structures, these studies are dated, rely on limited measures to assess food insecurity, or do not distinguish between household and child food insecurity.[21, 22] One recent study of family change using a comprehensive measure of food insecurity, found that transition into a maternal union was associated with lower household food insecurity, but this study did not investigate child food insecurity, nor did it report on rates of food insecurity by different family structures. [23]

This study examined rates of child food insecurity in different family structures using data from four, nationally representative and complementary datasets, each of which contains the full module of questions used to identify child food insecurity in USDA reports. We investigated

two complementary research questions: How do rates of child food insecurity for children in cohabiting and repartnered homes compare to those for children living with married biological parents or single mothers?; and, do any differences in the rates of food insecurity among children in different family structures persist after adjusting for socio-demographic factors typically associated with both family structure and food insecurity? We emphasize the importance of both questions. While findings from our unadjusted models provide comprehensive and contemporary evidence about child food insecurity across various family structures, results from our adjusted (multivariate) models are ultimately those most relevant to efforts to reduce food insecurity, as they inform policies and programs that might target children living in various family types.

METHODS

Datasets

Each of the four datasets contains detailed information on family structure as well as the USDA's Child Food Security Scale (CFSS), the scale used to measure national levels of food security in official USDA reports. These datasets (along with the age of children in our analytic samples) were: the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B; ages 0-6), the Fragile Families and Child Wellbeing Study (FFCWS; ages 2-6), the Early Childhood Longitudinal Study Kindergarten Cohort (ECLS-K; ages 5-14), and the Panel Study of Income Dynamics – Child Development Supplement (PSID-CDS; ages 3-17). Detailed information on each dataset is provided elsewhere. [24-27]

We examined multiple datasets for two main reasons. First, given the lack of recent data on family structure and child food insecurity, the use of multiple, recent datasets offered the opportunity to provide comprehensive evidence regarding an important child health problem.

Second, although there are many similarities among our sources of data, each is also unique in some regards, affording us a more nuanced understanding of the relationship between family structure and food insecurity derived from the strengths of each dataset. By adopting this approach, our expectation was that consistent results across datasets would offer more compelling evidence, while divergent findings would prompt reflection on the causes and consequences of those differences and stimulate future research.

Study Samples

For each dataset, we focused on households in which the respondent was the biological mother of at least one child in the household and excluded all other households. To ensure consistency across datasets, we analyzed data regarding one child in a given household, selecting a random child from households with twins in the ECLS-K and the ECLS-B and from households with more than one focal child in the PSID-CDS. In the FFCWS, data are collected only on a single focal child. We separated households into four groups based on parental reports of family structure: married biological parent households; cohabiting biological parent households; single mother households; and, repartnered households (where the biological mother is cohabiting with or married to a partner who is not the biological father of the child(ren)).

The Children's Food Security Scale

All four datasets use mothers' responses to the USDA's Food Security Module (FSM) to measure household food insecurity. Given our focus on child food insecurity, we utilized the eight child-referenced questions of the FSM, which comprise the CFSS.[28] The CFSS was included in the 9-month, 2-year, 4-year, and 5-year waves of the ECLS-B; the 3-year and 5-year waves of the FFCWS; the Kindergarten, 3rd grade, 5th grade, and 8th grade waves of the ECLS-K;

and the CDS I and CDS II waves of the PSID. We examine these waves of data for our analyses. It is important to note that the questions in the CFSS ask about all children in the household and as such, identify whether any child in the household was food insecure but not the food security status of individual children. As per USDA guidelines for assessing food security for households with children,[29] households with CFSS raw scores (number of affirmative responses) of 0-1 were classified as having children that were food secure, and households with raw scores of 2 or higher were classified as having children that were food insecure. Although this approach follows guidance provided by the USDA, it is a conservative assessment of the inability to meet food needs as even one affirmative response to the CFSS could be cause for concern.

Control Variables

In analyses described below, we controlled for a common set of factors in each dataset. We selected variables that have been established in previous literature as being related to both family structure and child food insecurity, and which might explain any differences in child food insecurity among family structures. These included: mother's race or ethnicity (non-Hispanic white, non-Hispanic black, Hispanic of any race, non-Hispanic other); mother's education (less than high school, high school degree, more than high school); mother's age in years (less than 24, 24-29, 30-35, older than 35); household income (in 2011 thousands of dollars); the number of children and adults in the household; and the focal child's age in years. Descriptive information on each of these variables is provided in Table 1.

Analysis

For each dataset, we created pooled cross-sections of family-wave observations by combining data for cases with complete information from all available waves. To assess the relationship between family structure and child food insecurity, we first specified both

unadjusted and adjusted logistic regression models, clustering standard errors at the individual level to account for the non-independence of repeated observations. Thus, our primary analytic approach was to take advantage of the large sample sizes of our datasets to estimate the cross-sectional relationship between family structure and child food insecurity

To improve interpretability and to produce what we consider to be more realistic estimates, we used the results of the logistic regression analyses to generate predicted probabilities of child food insecurity holding all controls in the adjusted models at their mean values in each dataset. We compared these probabilities among family structure types, employing a Bonferroni adjustment for multiple comparisons. Because our predicted probability results adjust for multiple comparisons and compare food insecurity across different family structures that are average in all other regards, these are our preferred results.

Our unadjusted results indicate whether rates of child food insecurity differ by family structure, an important question given the dearth of recent research and the policy-relevant potential for targeted food assistance programs to alleviate food insecurity. Our adjusted models provide additional insight, helping to clarify whether differences are due to income, family size, or other family characteristics (which are typically understood to influence food insecurity and are related to family structure), or whether family structure is relevant above and beyond the influence of these controls. All analyses were completed using STATA 12 software.

RESULTS

Table 2 presents results from both the unadjusted and adjusted cross-sectional logistic regression models of child food insecurity on family type. Overall, in our bivariate models, the odds of child food insecurity were higher in other family types compared to married biological

parent families. Except in the PSID-CDS, our unadjusted results indicated that the odds of child food insecurity were higher for children in cohabiting, single, and repartnered families compared to those living with married biological parents. In the PSID-CDS, odds of food insecurity were significantly higher for children in single and repartnered families, but not in cohabiting families. In our adjusted models, there were fewer statistically significant differences between odds of food insecurity for children in married biological parent households and other family structures, and the magnitudes of the statistically significant coefficients were smaller than in the unadjusted results. Compared with children in biological parent families, children in single and repartnered households had significantly higher odds of food insecurity in the ECLS-B and PSID; children in cohabiting and single mother families had higher odds of food insecurity in the ECLS-K, and children in single mother families had higher odds of food insecurity in the FFCWS.

Figure 1 presents predicted probabilities of child food insecurity by family structure and dataset based on both the adjusted and unadjusted models, holding all covariates at their means in the adjusted models. Error bars in the Figure indicate 95% confidence intervals for the predictions. Predicted probabilities sharing a letter (lowercase for unadjusted results and uppercase for adjusted results) were not significantly different at the $p<.05$ level. For example, in panel A the letter 'a' shared by cohabitating and repartnered indicates that the difference in the predicted unadjusted probability of child food insecurity in these two family structures was statistically insignificant.

Predicted probabilities of child food insecurity varied by family type. Unadjusted predicted probabilities (represented by the darker bars in the Figure) of child food insecurity are between 0.031(ECLS-K) and 0.044 (FFCWS) for married parent families, between 0.056 (PSID) and 0.109 (ECLS-K) for cohabiting parent families, between 0.096 (ECLS-K) and 0.126 (PSID)

for single mother families, and between 0.051 (ECLS-K) and 0.092 (ECLS-B) for repartnered families. Predicted probabilities based on our unadjusted models largely replicated the pattern of results summarized in Table 1. Two sets of results from these unadjusted models are noteworthy. First, in three of the datasets (ECLS-B, FFCWS, and ECLS-K), the predicted unadjusted probabilities for children living with married biological parents were significantly lower than for all other family types. Second, in all four datasets, the probability of child food insecurity in single mother families was statistically indistinguishable from those for children in cohabiting and/or repartnered families. For example, in the ECLS-B, the probability of food insecurity for children in cohabiting and repartnered homes was twice as high as for children from married biological families, but there was no statistical difference in probabilities between repartnered and single mother households. Similarly, in the FFCWS, the probability of food insecurity was highest for children in single mother households, but was not statistically different from those for children in cohabiting or repartnered households.

The lighter colored bars in Figure 1 present predicted probabilities from the adjusted models. The inclusion of controls and the Bonferroni adjustment for multiple comparisons resulted in a pattern of predicted child food insecurity that was markedly different from the adjusted logistic regression results in Table 1. These results indicate that after controlling for other correlates of food insecurity and family structure (mother‘s race and ethnicity, mother’s education, mother’s age household income, the number of children and adults in the family, and child’s age), the predicted probability of child food insecurity in an average household was nearly identical among the different family types. Only in the ECLS-K and PSID datasets were any family type comparisons still statistically significant in the adjusted models. In the ECLS-K, the probability of child food insecurity was statistically significantly lower in married biological

parent households and repartnered households than in single mother households although these differences were small in magnitude (0.007 and 0.006, respectively). In the PSID, only the difference between cohabiting and single mother families remained statistically significant.

DISCUSSION

Using data from four nationally representative U.S. datasets, this study found that rates of child food insecurity in families where biological parents are cohabiting but are not married and in families where biological mothers are repartnered (cohabiting with or married to new partners who are not the biological father of the focal child) were high and often statistically indistinguishable from those in single mother families, the group typically identified as being at highest risk of child food insecurity in federal reports.[1, 29, 30] However, family structure was not related to child food insecurity above and beyond the influence of other factors such as household income, family size, and maternal race, ethnicity, education, and age. Our adjusted results demonstrate that there were few significant differences in predicted probabilities of food insecurity among children in various family structures that were average in other regards. Although our descriptive data indicate differences among our four samples, our bivariate and multivariate results were largely consistent across data sources.

Few prior studies have examined associations between family structure and food insecurity. These generally found that single mother households had the highest levels of food insecurity, married-couple households had the lowest, with cohabiting households in between[11, 21, 22, 31, 32]. The studies which also examined biological relationships between parents and children in two-parent (cohabiting or married) households also found that these households had lower food insecurity than households with one biological and one non-biological parent; that is, regardless of biology, married households had lower food insecurity.[11, 21, 31, 32] Our unadjusted

results, which point to levels of child food insecurity in cohabiting biological and repartnered mother households that were often indistinguishable from those in single mother families, are only partially consistent with this prior work, though our finding that rates were lowest in married biological parent homes supports the conclusions of previous research. Our adjusted results, indicating substantially attenuated differences between family types after controlling for sociodemographic characteristics are consistent with at least one previous study.[11]

Prior studies[12,22,23,32,33] have a number of limitations which this study addresses. First and foremost, none of these previous studies distinguished between household level food insecurity and food insecurity among children. Second, none of these studies used the full USDA food security module[28], which is used to generate the official nationally representative estimates of child food insecurity. Previous studies relied instead on small set of questions such as the three questions available in the National Survey of American Families,[11, 21, 22, 31, 32] or the single question available in the Survey of Income and Program Participation[22]. Thus, our study contributes to this literature by focusing specifically on child food insecurity – a more severe and potentially harmful indicator of material hardship – and by using the full CFSS module, which is a more valid and reliable measure of food insecurity and is comparable to national data.

In addition, our study is the first, to our knowledge, to compare rates of child food insecurity among single mother families and cohabiting and repartnered families after adjustment for other factors; previous multivariate analyses did not examine single mothers[11] or examined food insecurity as part of a group of material hardships.[21] Explicit comparisons among cohabiting, repartnered, and single mother families is an important contribution given the increasing prevalence of complex and non-traditional family forms[6-10] and given the long-held assumption that children in single mother families are at highest risk for food insecurity. After

controlling for maternal race and ethnicity, maternal education, maternal age, household income, child's age, and the number of adults and children in the household, most of the differences in child food insecurity among the different family structures were no longer statistically significant. This is important as previous research consistently points to less material hardship in married two-parent families compared to cohabiting or single parent families[21, 22]. Future research should seek to confirm the findings presented here using other data sources and the CFSS to investigate whether family structure contributes to child food insecurity and other measures of hardship above and beyond related factors.

Our study had some limitations. Despite its many benefits, the CFSS (like many other scales) measures food security for all children in the household. Thus, we were unable to explore differences in the relationship between family structure and food insecurity by the age of focal children in our datasets, a topic of potential concern to policy makers. Future research focusing on single-child households or using alternative measures of food insecurity might better explore this issue. Further, despite our use of data from relatively large national surveys, at times small subgroup sizes precluded us from performing finer grained analyses. In particular, the ability to separate repartnered families into those who are cohabiting and those who are married would have been desirable. That said, our adjusted models suggest that family structure may be related to child food insecurity through other downstream factors such as household income, parental education, or family size. In seeking to remediate food insecurity, policy makers might focus on children in non-traditional family types given their high levels of risk. However, efforts to eliminate child food insecurity might be better directed to more proximal determinants.

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Table 1: Sample Characteristics by Dataset

	ECLS-B, *n* = 31900[a]	FFCWS, *n* = 5761	ECLS-K, *n* = 41530	PSID-CDS, *n* = 2788
Child Food Insecurity, n (%)	1850 (5.8)	467 (8.1)	1960 (4.7)	189 (6.8)
Family Type				
Married, n (%)	20550 (64.5)	1807 (31.4)	28850 (69.5)	1675 (60.1)
Cohabiting, n (%)	3350 (10.5)	1054 (18.3)	1120 (2.7)	107 (3.8)
Single, n (%)	6800 (21.4)	2192 (38.1)	7830 (18.9)	838 (30.1)
Repartnered, n (%)	1150 (3.6)	708 (12.3)	3730 (9.0)	168 (6.0)
Mother's Race/Ethnicity				
Non-Hispanic White, n (%)	14400 (45.2)	1286 (22.3)	26800 (64.5)	1389 (49.8)
Non-Hispanic Black, n (%)	5200 (16.3)	2860 (49.6)	4380 (10.5)	1130 (40.5)
Hispanic (any race), n (%)	6000 (18.9)	1431 (24.8)	6470 (15.6)	170 (6.1)
Non-Hispanic other, n (%)	6250 (19.6)	184 (3.2)	3890 (9.4)	99 (3.6)
Mother's Education				
Less than High School, n (%)	5250 (16.5)	1491 (25.6)	4320 (10.4)	522 (18.7)
High School or equivalent, n (%)	8650 (27.2)	1598 (27.7)	10760 (25.9)	908 (32.6)
More than High School, n (%)	17950 (56.4)	2672 (46.4)	26450 (63.7)	1358 (48.7)
Mother's Age, years, mean (SD)	30.4 (6.6)	29.0 (6.1)	37.3 (6.69)	36.3 (7.0)
Household Income , thousands, $2011, mean (SD)	66.8 (61.6)	43.8 (53.6)	74.0 (57.0)	75.3 (91.9)
Number of children in household, mean (SD)	2.34 (1.19)	2.44 (1.34)	2.46 (1.13)	2.18 (1.04)
Number of adults in household, mean (SD)	2.16 (0.82)	2.00 (0.89)	2.11 (0.73)	1.90 (0.70)
Child's age, years, mean (SD)	2.4 (1.9)	3.8 (1.1)	8.8 (2.9)	9.1 (3.7)

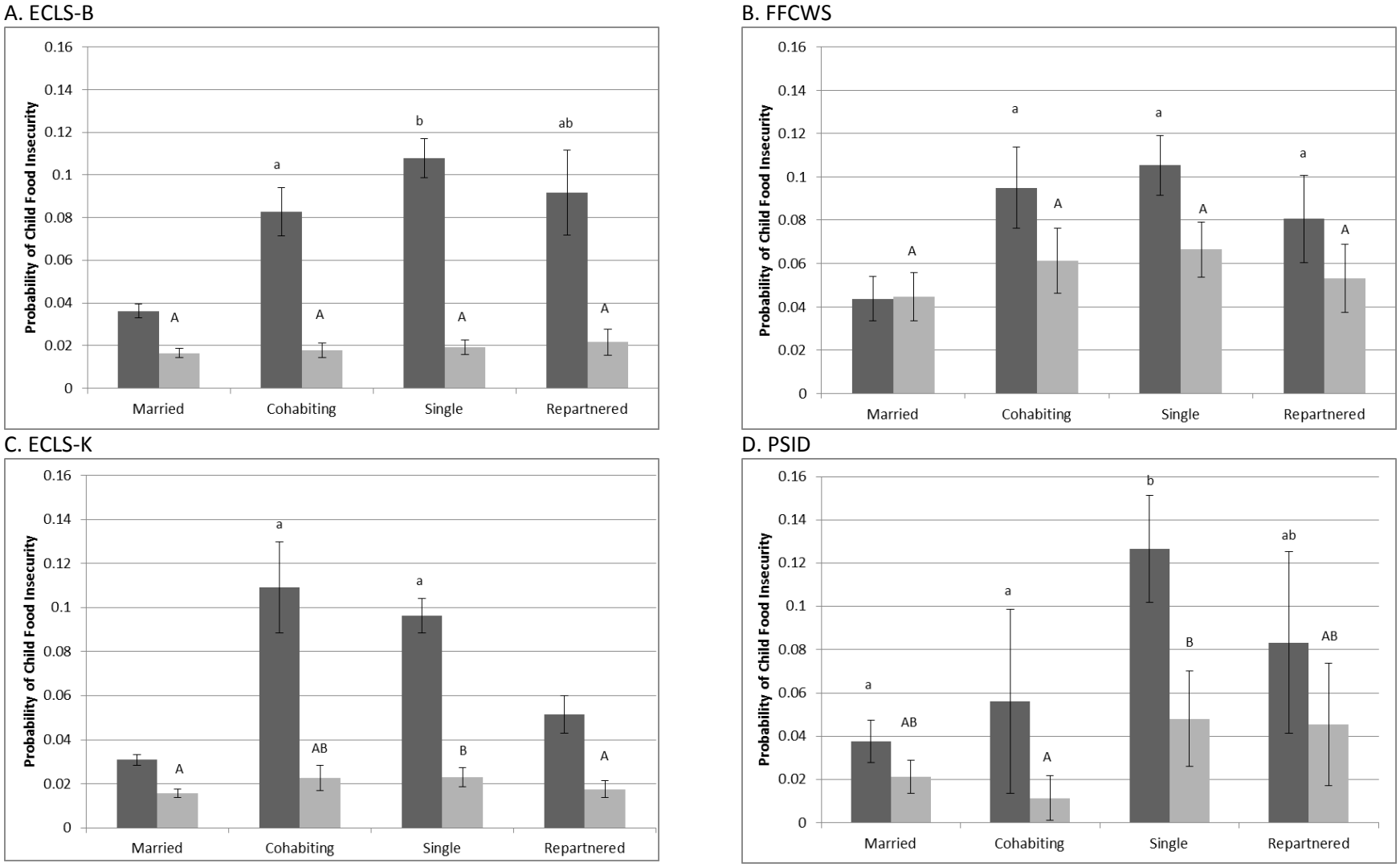
a – As per data license restriction, sample sizes are rounded to the nearest 50 in the ECLS-B and the nearest 10 in the ECLS-K.

Table 2 – Unadjusted and Adjusted Odds of Child Food Insecurity by Family Structure and Dataset

	Odds Ratios (95% Confidence Intervals)							
	ECLS-B		FFCWS		ECLS-K		PSID	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Family Type								
Cohabiting+	2.40***	1.08	2.29***	1.40+	3.85***	1.45**	1.52	0.53
	(2.02-2.85)	(0.91-1.30)	(1.65-3.19)	(0.98-2.01)	(3.07-4.82)	(1.14-1.84)	(0.65 - 3.56)	(0.22-1.31)
Single	3.21***	1.17*	2.58***	1.53*	3.34***	1.47***	3.71***	2.33**
	(2.82-3.66)	(1.01-1.37)	(1.93-3.43)	(1.09-2.14)	(2.96-3.77)	(1.27-1.70)	(2.60 - 5.28)	(1.36-3.98)
Repartnered	2.69***	1.32*	1.92***	1.20	1.70***	1.11	2.33**	2.20*
	(2.08-3.47)	(1.00-1.37)	(1.32-2.77)	(0.80-1.82)	(1.41-2.06)	(0.91-1.36)	(1.26 - 4.30)	(1.11-4.35)
Mother Non-Hispanic Black+		0.92		0.82		1.04		1.23
		(0.77-1.10)		(0.59-1.16)		(0.86-1.26)		(0.77-1.96)
Mother Hispanic (any race)		1.20*		1.09		1.65***		2.67**
		(1.02-1.41)		(0.78-1.53)		(1.42-1.91)		(1.48-4.82)
Mother Non-Hispanic other		1.04		1.08		1.39**		1.34
		(0.86-1.25)		(0.51-2.67)		(1.14-1.69)		(0.57-3.17)
Mother HS or equivalent+		0.76***		0.96		0.76***		0.50**
		(0.66-0.87)		(0.74-1.25)		(0.65-0.87)		(0.33-0.77)
Mother More than HS		0.57***		0.87		0.63***		0.50**
		(0.48-0.67)		(0.66-1.14)		(0.54-0.74)		(0.32-0.79)
Mother 24-29 Years-old+		1.58***		1.24		1.20		2.04
		(1.34-1.85)		(0.93-1.65)		(0.84-1.69)		(0.86-4.82)
Mother 30-35 Years-old		2.00***		1.15		1.52*		1.25
		(1.66-2.42)		(0.81-1.63)		(1.08-2.16)		(0.51-3.06)
Mother >35 Years-old		2.30***		1.95***		1.64**		1.72
		(1.87-2.84)		(1.38-2.77)		(1.16-2.35)		(0.69-4.30)
Household Income (1000s $2011)		0.96***		0.98***		0.97***		0.98***
		(0.96-0.96)		(0.97-0.98)		(0.97-0.97)		(0.97-0.99)
Number of children		1.18***		1.17***		1.23***		1.30***
		(1.13-1.23)		(1.09-1.25)		(1.18-1.28)		(1.13-1.50)
Number of adults		0.99		1.09		1.02		1.47**
		(0.93-1.06)		(0.97-1.22)		(0.95-1.09)		(1.12-1.92)
Child's age		1.04***		0.96		1.01		1.01
		(1.02-1.07)		(0.89-1.04)		(0.99-1.03)		(0.95-1.06)

+ = referent category; * p<.05, ** p<.01, *** p<.001, all standard errors are clustered by child. + Married, Mother Non-Hispanic White, Mother Less than High School, and Mother <24 Years-old are omitted.

Figure 1 – Unadjusted and Adjusted Predicted Probabilities of Child Food Insecurity by Family Structure and Dataset



Predicted probabilities sharing a letter are not significantly different at the $\alpha = .05$ level.

Lower case letters refer to comparisons for unadjusted probabilities. Upper case letters refer to comparisons for adjusted probabilities. Adjusted models control for mother's race/ethnicity, mother's education, mother's age, household income, the number of children and adults in the household, and child age.

APPENDIX B: NONRESIDENT FATHERS AND CHILD FOOD INSECURITY: EVIDENCE FROM LONGITUDINAL DATA

Social Service Review

Nonresident Fathers and Child Food Insecurity: Evidence from Longitudinal Data

--Manuscript Draft--

Manuscript Number:	
Full Title:	Nonresident Fathers and Child Food Insecurity: Evidence from Longitudinal Data
Short Title:	Nonresident Fathers and Child Food Insecurity: Evidence from Longitudinal Data
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Abstract:	More than one in ten children in the US experience food insecurity, and children in single-mother families are at greatest risk. In this study, we examine the associations of nonresident fathers' involvement and children's food insecurity using two nationally representative panel datasets of children in early and middle childhood. Results, which are robust to different model specifications and measures of insecurity, indicate that more frequent provision of in-kind support by nonresident fathers is associated with lower child food insecurity in both early and middle childhood. Among children in middle childhood, we find some evidence that, compared with receiving no cash support, regular support reduces food insecurity and irregular support increases food insecurity. These results add to mounting evidence that nonresident fathers' involvement outside of the formal child support system positively impacts children and must be considered in policy discussions related to child support, child poverty, and child well-being.

Nonresident Fathers and Child Food Insecurity: Evidence from Longitudinal Data

Abstract

More than one in ten children in the US experience food insecurity, and children in single-mother families are at greatest risk. In this study, we examine the associations of nonresident fathers' involvement and children's food insecurity using two nationally representative panel datasets of children in early and middle childhood. Results, which are robust to different model specifications and measures of insecurity, indicate that more frequent provision of in-kind support by nonresident fathers is associated with lower child food insecurity in both early and middle childhood. Among children in middle childhood, we find some evidence that, compared with receiving no cash support, regular support reduces food insecurity and irregular support increases food insecurity. These results add to mounting evidence that nonresident fathers' involvement outside of the formal child support system positively impacts children and must be considered in policy discussions related to child support, child poverty, and child well-being.

In 2011, 22.4 percent of U.S. children lived in food insecure households, meaning that a household's access to adequate food was limited due to lack of money and other resources, which resulted in decreased consumption of food or disruption of eating patterns for one or more household member (Coleman-Jensen, Nord, Andrews, and Carlson 2012). Food-insecure households are classified as either *low food secure* or *very low food secure.* Low food secure households report few, if any, indications of reduced food intake, while very low food secure households report multiple indications of reduced food intake and disrupted eating patterns due to inadequate resources for food (Coleman-Jensen et al., 2012). Though they are often protected from the effects of household food insecurity, still 11.5 percent of children in 2011 (nearly 8.6 million) lived in households that reported food insecurity among children: 10.4 percent with low food security and 1.1 percent with very low food security (Coleman-Jensen et al., 2012).

Despite increased participation by households in federal nutrition assistance programs over the last decade (Leftin, Eslami, and Mark Strayer 2011; USDA 2012a; USDA 2012b; USDA 2012c), child food insecurity has remained an intractable problem (Nord and Parker 2010). However, the prevalence and severity of child food insecurity vary widely across different household compositions. In particular, the rate of child food insecurity for households with children headed by a female with no spouse was triple that for households with children headed by a married couple (18.9 percent vs. 6.3 percent)(Coleman-Jensen, Nord, Andrews, and Carlson 2012). Compounding the problem is the fact that today more than one-quarter of all U.S. children currently live with only one parent (most often their mother), while the other parent lives elsewhere (U.S. Census Bureau 2012), and more than half will spend some time growing up outside of a two-parent family (Kennedy and Bumpass 2008).

Because children in female-headed families are more likely to be food insecure, the role of nonresident fathers is particularly important to understand. Compared to children in two-parent families, children in single-parent families have less access to material resources and parental time as a result of only one parent being in the household. However, the presence of another adult does not always rectify the problem. In particular, children living with a biological mother who has repartnered with someone other than the biological father may also suffer in comparison to those living with both biological parents, because new partners may underinvest in non-biological children (Hofferth 2006; Hofferth and Anderson 2003), and because transitions that accompany repartnering may be deleterious to children (Beck, Cooper, McLanahan, and Brooks-Gunn 2010; Cooper, McLanahan, Meadows, and Brooks-Gunn 2009; Fomby and Cherlin 2007; Osborne and McLanahan 2007). Thus, the material and social involvement of nonresident biological fathers is important and may ameliorate these disadvantages and potentially improve the circumstances of their children.

The objective of the study is to examine whether nonresident father involvement affects child food insecurity. Nonresident fathers can be involved with their children in a number of ways, including making financial contributions, providing in-kind support, and spending time with them. Material resources provided by nonresident fathers may positively impact the food security status of the child's resident family. On the other hand, involved fathers may be a drain on resources (e.g., by eating meals with the custodial family while visiting (Stevens, 2010)), or their involvement could reduce mothers' resources from other domains (e.g., relatives, friends, assistance programs), thereby exacerbating problems related to meeting food needs. Further,

inconsistent support from fathers could increase child food insecurity if this inconsistency disrupts the ability of mothers to effectively budget household income and expenditures.

In this study, we explore several measures of nonresident father involvement including cash transfers, in-kind contributions to the households, and contact with the child to understand the relationship between involvement and child food insecurity. We employ multivariate regression models designed to analyze longitudinal data to estimate the relationship between different types of father involvement and child food insecurity using data from the Early Childhood Longitudinal Study Birth and Kindergarten cohorts (ECLS-B and ECLS-K, respectively). These two datasets include comprehensive information on child food insecurity and provide similarly nuanced, but somewhat different, information on the various types of father involvement. Given their overall similarity, their joint examination not only allows us to investigate the impact of different types of father involvement with multiple data sources, but also to assess whether there is a consistent or differential relationship between these types of involvement and child food insecurity among households with children in early (ECLS-B) and middle (ECLS-K) childhood.

Briefly, we find that the provision of in-kind support is related to lower child food insecurity among both early (ECLS-B) and middle (ECLS-K) childhood youth, and reduced very low child food security among early childhood youth (ECLS-B). These results are generally robust to different model specifications and to the inclusion of numerous controls. Evidence from the ECLS-K (middle childhood youth) further suggests that inconsistent cash support as compared to no support may be related to increased child food insecurity, while consistent provision of cash support is related to decreased food insecurity. There is no relationship

between father-child contact and child food insecurity among either group of children in these data. Overall, the results of this study add to the evidence that the involvement and contributions of nonresident fathers outside of the provision of formal child support positively impact children and must be considered in policy discussions related to child support, child poverty and child well-being.

Background

The consequences of food insecurity for children have been well established. In comparison to children in food secure households and after controlling for other factors, children living in food insecure households are more likely to have poor health (Cook, Frank, Berkowitz, Black, Casey, Cutts, Meyers, Zaldivar, Skalicky, Levenson, Heeren, and Nord 2004), have been hospitalized (Cook et al. 2004), have clinical levels of psychosocial dysfunction (Kleinman, Murphy, Little, Pagano, Wehler, Regal, and Jellinek 1998), have impaired functioning (Murphy, Wehler, Pagano, Little, Kleinman, and Jellinek 1998), have seen a psychologist (Alaimo, Olson, and Frongillo Jr 2001), suffer from chronic illnesses (Weinreb, Wehler, Perloff, Scott, Hosmer, Sagor, and Gundersen 2002), experience anxiety and depression (Weinreb et al. 2002), and have health limitations (Dunifon and Kowaleski-Jones 2003).

Whether or not a child suffers from food insecurity is determined by numerous factors. Lower household income and asset levels, residing with adults with fewer ties to the labor force, not having health insurance, being in a household headed by an African American, being in a household headed by a single parent, lower parental education levels, more persons in the household, parental depression, limited access to social capital, facing domestic violence, illicit drug use, and being homeless have all been associated with a higher probability of food

insecurity (Corcoran, Heflin, and Siefert 1999; Dunifon and Kowaleski-Jones 2003; Furness, Simon, Wold, and Asarian-Anderson 2004; Gundersen, Jolliffe, and Tiehen 2004; Gundersen and Oliveira 2001; Martin, Rogers, Cook, and Joseph 2004; Mazur, Marquis, and Jensen 2003; Nelson, Brown, and Lurie 1998; Ribar and Hamrick 2003; Van Hook and Balistreri 2006). In particular, earlier work has demonstrated that female-headed families are at especially high risk for food insecurity even after controlling for some of these other factors (Ribar and Hamrick 2003; Rose 1999; Winship and Jencks 2002) and that these families may be at high risk for child food insecurity even if mothers are married or cohabiting with a partner other than the biological father (Miller, Nepomnyaschy, Lara-Ibarra, and Garasky 2013).

Given the high risk for food insecurity for children living in female-headed households, non-resident fathers' involvement with children may be particularly important. Nonresident fathers can be involved in a number of ways (Argys, Peters, Cook, Garasky, Nepomnyaschy, and Sorensen 2006; Garasky, Peters, Argys, Cook, Nepomnyaschy, Sorensen, and Waller 2006). Material contributions can be in the form of cash delivered through the formal child support system or provided informally to the mother and child. Fathers' contributions can also be in the form of non-cash goods (in-kind contributions), such as the provision of food, clothes, or other items directly to the mother and child. Finally, nonresident fathers can be socially involved as reflected in the frequency and duration of time spent with their children.

Research indicates that the patterns and packages of nonresident fathers' involvement and contributions vary substantially across families (Cheadle, Amato, and King 2010; King, Harris, and Heard 2004; Manning, Stewart, and Smock 2003), suggesting that different types of involvement may lead to different outcomes. While previous research has documented that the

financial contributions of fathers are linked to social involvement with their children (see e.g. McLanahan, Seltzer, Hanson, and Thompson 1994; Seltzer, McLanahan, and Hanson 1998; Seltzer, Schaeffer, and Charng 1989), more recent work indicates more complex relationships. Garasky et al. (2010) examined the relationships among three aspects of father involvement: cash child support, in-kind support, and visitation. They found that these dimensions of involvement were positively related and highly intertwined with the strongest positive relationship being between in-kind support and visitation. Nepomnyaschy (2007) found a strong reciprocal relationship between the provision of informal cash support (money provided outside of the formal child support obligation) and visitation, but a much weaker one between formal child support and visitation.

Fathers' contributions of money and goods are positively associated with a range of indicators of child well-being including financial security, achievement, and schooling (Amato and Gilbreth 1999; Bartfeld 2000; Menning 2002; Nepomnyaschy, Magnuson, and Berger 2012). However, evidence regarding the effects of nonresident fathers' social involvement on child well-being is mixed (Amato and Gilbreth 1999; King and Sobolewski 2006; Menning 2006).

There has been little research on the association of nonresident father involvement and child food insecurity, and the results from these few studies have been inconclusive. Garasky and Stewart (2007) found that a nonresident father's contact with his children was more protective against measures of food insufficiency than were his financial contributions. Nepomnyaschy and Garfinkel (2011), looking at a broader measure of material hardship which included one measure of food insufficiency, found similar results in some specifications, but also found evidence of reverse causality, suggesting that material hardship in the mother's household may decrease

father involvement. Other evidence points to more food insecurity among single-mother families when fathers stay in the home (Laraia, Borja, and Bentley 2009), or eat food during visits without replacing the food (Stevens 2010). These results emphasize the complexity of the relationship between nonresident father involvement and child food insecurity and the need for further research.

Another important consideration in the relationship between nonresident father involvement and child food insecurity is child age. Some evidence suggests that parents may sacrifice their own consumption to shield the youngest children from the most severe food insecurity (McIntyre, Glanville, Raine, Dayle, Anderson, and Battaglia 2003; Nord and Bickel 2002). In addition, although patterns of father involvement are complex, evidence suggests that some fathers systematically decrease their involvement as children age (Cheadle, Amato, and King 2010). This research suggests that the relationship between nonresident father involvement and child food insecurity may change as children age.

The current study examines the relationship between several indicators of nonresident father involvement and child food insecurity in the household in which their children live. We contribute to prior research by using a well-established indicator of food insecurity, focusing on insecurity specifically among children, using nationally representative data, and estimating effects separately at two important developmental stages of children's lives: early and middle childhood.

Methods

Data

This study takes advantage of two large complementary, population-based, nationally representative, panel datasets from the National Center for Education Statistics (NCES): the ECLS-B and the ECLS-K. The ECLS-B is a birth cohort study that follows a sample of approximately 10,000 children born in the US in 2001. Children were sampled from birth certificates and are representative of all children born in 2001 who survived till their 9-month birthday (the baseline interview) and were not placed for adoption (Bethel, Green, Kalton, and Nord 2005). In addition, the survey oversampled births to American Indian/Native American, Chinese and other Asian/Pacific Islander mothers, and births of low and very low birth weight. Families were followed up with in-person interviews when children were 2, 4, and 5 years old.

The ECLS-K is a cohort study that began with a nationally representative sample of approximately 20,000 US kindergarteners during the 1998-1999 school year. Asian and Pacific Islander children were oversampled (Tourangeau, Nord, Le, Sorongon, and Najarian 2009). Children (along with their families, teachers, and school administrators) were surveyed in kindergarten (the baseline interview) and again when the majority of sample children were in first, third, fifth, and eighth grades.

Study Sample

We conduct parallel analyses using both datasets, and make sample restrictions and measures as similar as possible across the two datasets. For the ECLS-B, we take advantage of four waves of data, when children were 9 months (baseline), 2 years, 4 years, and 5 years old. For the ECLS-K, we take advantage of three waves of data at which food insecurity and father involvement were both measured, when children were in 3rd grade, 5th grade, and 8th grade (approximately 8, 10, and 13 years old). For both datasets, at each wave, the sample is restricted

to children who live with their biological mothers, have living nonresident biological fathers, and have no missing data on questions related to food insecurity and nonresident father involvement.

Within datasets, we pool cross-sections across waves, creating unbalanced panels with multiple observations for some individuals. For the pooled cross-section analyses described below, we include individuals who may have only one wave of data. For the longitudinal analyses that use individual fixed effects and lagged variables, only individuals with at least two observations are retained. This sampling strategy resulted in the ECLS-B study sample being composed of 6,850 observations on 3,050 unique individuals, and the ECLS-K study sample being composed of 7,180 observations on 3,780 unique individuals.[1]

Measures

Food insecurity. — Our measures of food insecurity are based on mothers' responses to the USDA Food and Nutrition Service (FNS) Food Security Module (FSM), which is available at each wave in both datasets. Developed in the early 1990s, the FSM is an 18-item instrument including ten adult- and eight child-referenced questions (Nord and Hopwood 2007). Because our focus is on food insecurity experienced specifically by children in households, we utilize the eight child-referenced questions which comprise the Children's Food Security Scale (CFSS) (Nord and Bickel 2002).[2] The CFSS identifies whether any child in the household experienced being food insecure.

We analyze three measures of food insecurity: (1) a CFSS raw score, calculated as the number of affirmative responses to the eight CFSS questions; (2) a binary measure of food insecurity (or low food security) indicated by a raw score of two or higher, as per USDA

[1] Reported sample sizes are rounded to the nearest 10 for the ECLS-K and the nearest 50 for the ECLS-B as per data license restrictions.

[2] Appendix Table 2 presents the full set of 8 questions from the Child Food Security Scale.

guidelines; and (3) a binary measure of very low food security indicated by a raw score of five or higher (Coleman-Jensen, Nord, Andrews, and Carlson 2012).

Nonresident father involvement.— Both datasets include mothers' reports of broad domains of involvement by nonresident fathers, such as provision of cash child support, provision of non-cash (or in-kind support), and measures of time spent with their children. Specific indicators of these domains are reviewed in detail below.

Cash support. In both datasets, at each wave, mothers are asked whether they have a legal (formal), informal, or no agreement with the focal child's father to provide child support. Mothers are then asked whether they are supposed to receive any child support payments. In the ECLS-B, mothers are then asked how much child support they receive from the father in a typical month. For mothers who reported a formal or legal agreement, we use this question to construct a measure for the amount of formal child support received in a typical month. For mothers who said that they had either an informal agreement or no agreement, but then also reported some amount of support received or that they received any cash from the father, we construct a binary variable for receipt of any informal cash support.

In the ECLS-K, mothers are not asked for an amount of support received, but are asked about the regularity of receipt. We construct a three-level categorical measure coded as follows: 0 for mothers who had no type of agreement and/or no cash support received or were not supposed to receive any support; 1 for mothers who were supposed to receive cash support but did not receive it regularly; and 2 for mothers who were supposed to receive cash support and could count on receiving it regularly.

In-kind support: For both datasets, we include an index of nonresident fathers' provision of non-cash or in-kind support. In the ECLS-B, mothers are asked about the frequency (1=often, 2=sometimes, 3=never) with which the father: purchases necessary items (clothes, diapers, toys, presents) for the child; pays for health insurance or other medical expenses; and pays for child care. Answers across these three items are reverse coded and summed creating an index ranging from 3 to 9, with higher scores indicating more frequent provision of in-kind support.

For in-kind support in the ECLS-K, mothers are asked about the frequency (3=often, 2=sometimes, 1=hardly ever, 0=never) that the father paid for child's medical insurance, doctor bills, or medicines; and whether he paid for other bills and medical expenses. As with the ECLS-B, these answers are summed to generate a measure ranging from 0-6. To make the two measures of in-kind support as comparable as possible across datasets, we convert them to z-scores within each dataset and interview wave (mean=0, standard deviation=1).

Contact with child: In the ECLS-B, the only question about father contact with the child asked consistently of mothers across all waves was about the last time that the father saw the child, coded as: (1) no contact; (2) more than a year ago; (3) less than a year, but more than one month ago; and (4) within the past month. In the ECLS-K, we use mothers' report of the number of days in the past 4 weeks that the father saw the child (0-28), with 0 days coded for fathers who did not see the child in the past 4 weeks. Unfortunately, a similar question in the ECLS-B was not asked at the 9-month survey.

Covariates: We include characteristics of the mother, her household, the father, and the child which may be associated with both fathers' involvement and food insecurity in the mothers' household. Some characteristics are measured at each wave and entered as time-

varying variables and some are measured at baseline and entered as time-invariant; and all are reported by the mother. In both datasets, we consider the baseline survey to be the first wave of data collection, which was the 9-month interview in the ECLS-B and the kindergarten interview in the ECLS-K.

The following time-invariant variables were measured identically in both datasets: mother's age at the birth of the focal child, her race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and other non-Hispanic), nativity (born outside the US), whether she was married at the focal child's birth, child's sex (male), and whether the child was born low birth weight (<2500g).

Another set of variables, which could vary over time, are only included from baseline in order to reduce the possibility that fathers' involvement could affect them: mother's education (less than HS, HS degree or GED, some college, and BA or higher), average household income (logged), whether mother was in excellent health (vs. good, fair, or poor), and whether she was moderately depressed (binary indicator). Depression is assessed using the modified Center for Epidemiological Studies Depression Scale (CES-D) based on mothers' responses for how many days in the past week (0=none to 3=every day) she had any of 12 depression related symptoms. Moderate depression was indicated if the summed score was 10 or higher across these 12 items, as recommended by (Nord, Edwards, Hilpert, Branden, Andreassen, Elmore, Sesay, Fletcher, Green, Saunders, and Dulaney 2004). Respondents with 3 or more missing depression items were coded to missing, resulting in a 3-level categorical variable: no depression (the reference group), moderate depression, missing on depression. As mentioned earlier, depression is associated with greater likelihood of experiencing material hardship and particularly food

insecurity (Corcoran, Heflin, and Siefert 1999; Laraia, Borja, and Bentley 2009; Nepomnyaschy and Garfinkel 2011; Sullivan, Turner, and Danziger 2008)

We include one baseline measure about the nonresident father which was available in both surveys, his education at the birth of the child (less than HS, HS degree, some college, and BA or higher, father's education unknown).

Variables measured at each wave include, whether the mother worked for pay in the past week, number of children and adults in the household, age of the oldest child in the household, whether the mother has a cohabiting or married partner, and whether the child has any health insurance.

Analytic Strategy

We first present descriptive statistics for all analysis variables in both datasets, using weighted data to account for oversamples of specific populations and attrition across waves. Next, we present results from parallel regression analyses of the three measures of food insecurity on indicators of nonresident fathers' involvement from both datasets. For the continuous raw score of food insecurity, we use zero-inflated negative binomial regression. This technique is required because the raw score is a count variable and its distribution is over-dispersed (high proportion of zeros resulting in the variance being much larger than the mean) (Long and Freese 2006). Probit regression is used for the binary measures of low and very low food security. For ease of interpretation and comparison across models, for all estimates, we present marginal effects calculated holding all covariates at their means. Marginal effects can be interpreted as approximately the change in the dependent variable associated with a one unit change (or discrete change for binary variables) in the independent variable. We first estimate

models including just the father involvement variables, then add time invariant characteristics of mothers and children, then time-varying characteristics, and finally add the nonresident fathers' education level. Models are based on pooled cross-sections of each dataset; standard errors are adjusted for repeated observations on individuals.

In the next set of analyses, we explore issues of endogeneity. First, we estimate models with lagged independent variables (all indicators of nonresident father involvement measured at the prior wave) to test for bi-directionality, whether child food security impacts father involvement as opposed to the hypothesized direction. Next, we estimate individual fixed effects models to explore whether results are being driven by unobserved differences between involved and uninvolved fathers. Because individual fixed effects models are particularly taxing on data, especially for binary and rare outcomes, we use ordinary least squares (OLS) regressions for the continuous raw score measure and linear probability models (LPM) for the binary low and very low food security outcomes (Allison 2009). These results are directly comparable to the marginal effects results from the first part of the analysis.

Results

Descriptive Results

Table 1 presents weighted descriptive statistics for all the variables in the analyses for both datasets using the baseline survey for time-invariant variables and each wave for the time-varying variables. In the ECLS-B, there is no clear pattern of change in child food insecurity from wave to wave as the focal child ages from infancy to approximately 5 years old. Child food insecurity is initially 10 percent, drops to 7 percent, doubles to 15 percent and decreases to 10

percent. The other measures exhibit a similar lack of pattern. In the ECLS-K, food insecurity increases from the 3rd to the 5th grade (from 8 percent to 11 percent), but does not increase from the 5th to the 8th grade. This pattern holds for the other measures of food insecurity. Very low food security among children is experienced by relatively few households in both datasets (less than 1 percent across all waves).

The amount of formal support receipt reported by mothers increases as the focal child ages in the ECLS-B, going from $29 in a typical month for 9-month old children to $90 for 5-year old children. The prevalence of informal cash support receipt declines over this same period from nearly 50 percent of mothers to less than one-third (31 percent) 5 years later. The degree to which fathers provide regular payments does not change over time in the ECLS-K; however, from the 5th to the 8th grade, a few more mothers report receiving irregular payments as opposed to no payments. The frequency of fathers' provision of in-kind support decreases steadily over time in the ECLS-K data, and also decreases in ECLS-B, but with a less clear pattern. Finally, fathers' time spent with children decreases slightly as children age in both datasets. In the ECLS-K, the number of days in the past month that fathers saw their children declines from 5 days in the 3rd grade to 3.9 in the 8th grade.

While mothers were approximately the same age at the birth of the focal child in both datasets (24.7 in ECLS-B and 24.1 years old in the ECLS-K), the samples differ in an important way. The first wave of included data in the ECLS-B is when children are 9 months old, while the first wave of included data in the ECLS-K is when children are in 3rd grade or approximately 8 years old. Because we focus on families with nonresident fathers, the ECLS-B sample includes a much larger proportion of children born to unmarried mothers (74 percent) than the ECLS-K

sample (55 percent), since there is a very short time between the child's birth and the 9-month data collection for married parents to have gotten divorced. Thus, the ECLS-B sample, which is representative of very young children with nonresident fathers (most of whom were never married to their mothers), is more disadvantaged than the ECLS-K sample. Reflecting this difference, the majority of mothers in the ECLS-B are of minority racial and ethnic background (36 percent non-Hispanic black, 22 percent Hispanic) compared with the ECLS-K (27 percent non-Hispanic black, 15 percent Hispanic). Similarly, nearly one-third of mothers in the ECLS-B have not completed high school and only 6 percent have a college degree, while these figures are 18 percent and 11 percent in the ECLS-K, respectively. Nonetheless, average baseline household income is slightly higher in the ECLS-B sample ($34,900) than in the ECLS-K sample ($33,500). As expected, the age of the oldest child in the household was lower in the ECLS-B (5.5 vs. 11.3 years old at the first included wave) than in the ECLS-K.

Though the ECLS-B sample is more disadvantaged in some ways, a higher proportion of mothers report excellent health 29 percent vs. 20 percent than in the ECLS-K. This is probably related to the much younger ages of mothers (approximately 10 years younger on average in the pooled sample– not shown) in the ECLS-B as opposed to the ECLS-K. Rates of self-reported depression were strikingly similar in both datasets, with 67 percent and 69 percent of mothers reporting moderate levels of depression in the ECSL-B and ECLS-K, respectively.

Half of ECLS-B mothers worked when the focal child was 9 months old, but this proportion increased substantially by the time children entered kindergarten (67 percent). Most of ECLS-K mothers (77 percent) were working when the focal child was in 3rd grade and this did not increase much as children got older (81 percent in 8th grade). Only 5 percent of ECLS-B

mothers were repartnered (cohabiting or married to a man who was not the focal child's biological father) at the 1st wave, but this increased to 24 percent five years later. A little less than one-third (31 percent) of ECLS-K mothers were repartnered and this proportion increased to 36 percent by 8th grade. Nearly all the children (96 percent) were covered by health insurance in both datasets and across all waves. Finally, similar to mothers, nonresident fathers in the ECLS-B had lower levels of education compared to those in the ECLS-K (39 percent vs. 11 percent had not completed high school).

Multivariate Results

Table 2 presents marginal effects (calculated at the mean of covariates) from zero-inflated negative binomial regressions of the CFSS raw score on nonresident fathers' involvement controlling for different sets of covariates in each dataset. In Model 1, which includes only father involvement variables, more formal support and more frequent in-kind support provision are associated with lower food insecurity, while a greater likelihood of informal support provision is associated (only at $p<.10$) with more food insecurity for early childhood youth in the ECLS-B. For the middle childhood youth in the ECLS-K, provision of regular support (as opposed to no support) and more frequent in-kind support are associated with less food insecurity.

After adding time-invariant mother and child characteristics (Model 2), frequent in-kind support provision remains statistically significant in both datasets, though coefficients are reduced in magnitude. In the ECLS-B, formal support and informal support are no longer associated with food insecurity. In the ECLS-K, receipt of irregular cash support (compared with no support) becomes positively associated with food insecurity and regular cash support

(compared with no support) continues to be negatively associated with food insecurity, though the coefficient is reduced by more than half.

In Model 3, which adds time-varying covariates, and Model 4, which adds fathers' education, there are few further differences. In the fully-adjusted model (Model 4), frequent in-kind support (converted to z-scores for comparability across datasets) continues to be strongly and negatively associated with food insecurity in both datasets. One standard deviation increase in the frequency of in-kind support provision reduces the CFSS score by 0.04 points in both datasets, which is approximately a 10 percent decrease (from a pooled sample mean of approximately 0.40 in both datasets– not shown). In the ECLS-K, provision of irregular support (vs. no support) is strongly and positively associated with food insecurity, while provision of regular support (vs. no support) is not significantly associated with food insecurity. Fathers' time spent with his children is not associated with food insecurity in these models in either dataset.

The associations of covariates with food insecurity are fairly consistent across datasets, with notable exceptions. In both datasets, mothers who are more educated, report higher household income, are in better health, working, and have fewer children and more adults in the household report lower child food insecurity than those who do not. Mothers' reporting moderate depression report more food insecurity in both datasets (0.20 and 0.16 points higher in the ECLS-B and K, respectively). Further, having older children in the household is associated with more food insecurity: each year of age of the oldest child is associated with a 0.01 increase in the CFFS in both datasets.

In the ECLS-B, but not in the ECLS-K, mothers who were older and married at the birth of the child report more food insecurity. Though mothers with marital births are generally more

advantaged than unmarried mothers, this increased risk reflects the focus of our study on children with nonresident fathers. Mothers with very young children (in the ECLS-B) who have gotten divorced so soon after the birth of their child experienced a major transition, which may have been chaotic and financially destabilizing; while mothers who were not married may not have experienced any such transitions during this period. Mothers of children who were born low birth weight and whose fathers were more educated report lower food insecurity in the ECLS-B, though these variables were not significant in the ECLS-K.

In the ECLS-K (middle childhood), but not in the ECLS-B, mothers who have new cohabiting or married partners, even after controlling for household income and number of adults in the household, report much lower levels of child food insecurity (0.14) than those who are single. Finally, children who have health insurance are less likely to be in a household where there is child food insecurity, but only in the ECLS-K data (middle childhood).

Table 3 presents marginal effects from probit regression models of the bivariate measures for low and very low food insecurity on nonresident fathers' involvement, controlling for all variables from Model 4 in Table 2. Only father involvement results are presented, but results for control variables are similar in pattern to those in Table 2. Fathers' frequent provision of in-kind support is associated with reduced food insecurity in both datasets at very similar magnitudes. One standard deviation increase in the frequency of in-kind support provision is associated with a 1 percentage point decline in the probability of low food security in both datasets, which corresponds to approximately a 9 percent decrease (11 percent low food security in pooled sample in both datasets- not shown). In the ECLS-K, regular cash support receipt (vs. no cash

support) is associated with a 1.7 percentage point decline in the probability of low food security among children.

For very low food security, a very rare outcome (0.5 percent in the pooled sample- not shown), frequent provision of in-kind support in the ECLS-B continues to be protective. One standard deviation increase in frequency of in-kind support provision is associated with a 0.2 percentage point decline in the probability of low food security. Though this coefficient is only marginally significant (p=0.06), it represents a 40 percent decrease in very low child food security. In the ECLS-K, none of the father involvement variables are associated with very low food security.

Robustness Checks

In the final table, Table 4, we test the robustness of these results in two ways. The top panel substitutes lagged measures of nonresident father involvement, measured at the prior wave to rule out the possibility that there may be reverse causality in the association of fathers' involvement and food insecurity: whether food insecurity in the mothers' household could reduce (or increase) fathers' provision of support or his involvement. Because lagging measures of nonresident father involvement establishes a clearer temporal ordering, results in these models that are comparable to those reported in previous tables would minimize concerns about reverse causality. In these models, sample sizes are reduced because one wave of data is lost in each dataset and the sample is limited to individuals who were interviewed in at least two waves of each survey.

Results from the lagged models generally confirm the prior findings: more frequent provision of in-kind support is associated with less food insecurity. In the ECLS-B, this is true

across all three measures of the outcome, and the magnitudes of the coefficients are very similar to, or larger than, those from the previous models. In the ECLS-K, the association only holds up for the low food security outcome. In both datasets, a one standard deviation increase in the frequency of in-kind support provision at the prior wave is associated with a 1 percentage point decrease in the probability of child food insecurity. The fact that this association between more frequent provision of in-kind support and less food insecurity is robust across two datasets, one representing children in early childhood and another in middle childhood, using contemporaneous and lagged measures of nonresident fathers' involvement gives us more confidence that these results are not spurious. In the ECLS-K, the associations of the provision of regular and irregular cash support (as compared to none) for the CFFS and low food security outcomes are very similar to, and a bit larger than, the associations found in prior models; however, these associations are not significant at conventional levels.

The bottom panel presents results from individual fixed effects models, which estimate change only within individuals and only for those individuals who experienced a change on both the independent and dependent variable. Individual fixed effects models are a very conservative test for the potential presence of unobserved differences that may be driving our findings because so few households report being food insecure, and fewer report a change in their food insecurity status over time. In addition, although fixed effects models provide a stronger test of causality because they discard between-individual variation (which is the likely source of bias from unobserved factors), they also often result in higher standard errors if there is little within-individual variation for predictors (Allison 2009). This is a concern for our analyses given previous literature suggesting the stability of involvement over time for a large group of fathers

(Cheadle, Amato, and King 2010), and because there appears to be only limited change over time in our father involvement variables in either dataset (see Table 1).

As expected, although some of the coefficients in the fixed effects results are comparable in magnitude to those from Tables 2 and 3, few associations are statistically significant. Unexpectedly, in these models, fathers' more recent contact with children (as opposed to less recent) is associated with lower food insecurity raw scores in the ECLS-B (marginally significant), and fathers' days of contact is associated with lower probability of very low food security in the ECLS-K.

Conclusion

In this study, we examined the impact of involvement by nonresident fathers on child food insecurity in their nonresident children's (biological mothers') households in two large nationally representative panel datasets. Our results suggest that some types of involvement and support are protective. First, we find consistent evidence that fathers' provision of in-kind support on a more frequent basis is associated with lower food insecurity, holding constant other types of support and involvement, and numerous individual characteristics of fathers, mothers, and children. These results are consistent with Garasky and Stewart (2007), but not consistent with Nepomnyaschy and Garfinkel (2011) who found no association of in-kind support and food insufficiency, though food insufficiency was just one item in a larger material hardship scale.

Neither formal cash support nor informal cash support was associated with child food insecurity, after controlling for individual characteristics. However, among middle childhood youth in the ECLS-K, provision of cash support on a regular basis (without distinguishing the

source) was associated with less food insecurity than no provision of cash support. Moreover, results from some models suggest that provision of cash support irregularly was associated with greater food insecurity compared with no cash support. This finding is consistent with a previous quantitative study which looked at the question of the regularity of support (Ha, Cancian, and Meyer 2011), and suggests that financial instability may be more harmful than an absolute lower level of finances. This is an important contribution to this literature and needs to be further explored with other data.

We are surprised that higher levels of formal support were not more consistently associated with reduced food insecurity. However, prior research suggests that among lower-income, never-married families with young children (approximately 75 percent of the ECLS-B sample), formal support is relatively low and may be a signal of a poor relationship between parents since the mother has chosen to pursue the father through the formal child support enforcement system (Nepomnyaschy and Garfinkel 2010). We suspect that as children and fathers age, formal support should play a more important role and should be higher, as observed in the over-time descriptive data here and as suggested by other studies of similar populations (Nepomnyaschy and Garfinkel 2010). Unfortunately, the ECLS-K did not include a direct measure of formal support and so we are not able to test this hypothesis here.

This study has a number of strengths. First, we use the USDA CFSS, a rich and reliable measure of food insecurity, as opposed to most prior studies which relied on only one or two questions. Second, we measure food insecurity specifically among children in a household, which may reflect a particularly acute degree of hardship, since evidence suggests that parents may limit their own consumption to shield their children from hunger (McIntyre et al. 2003). On

the other hand, one limitation of this measure is that we cannot assess food insecurity for a specific child, only for all children in a household. However, there are very few datasets that ask about individual child hunger and those that do lack many other important measures of family processes. Third, because of our large sample size, we are able to examine very low food insecurity, obviously the most severe indicator of hardship and one that is relatively rare and not possible to analyze with many other datasets. Finally, we use two comparable datasets with varied measures of father involvement and samples of children at two important stages of development. That we find basically identical strong protective effects of fathers' in-kind support provision in both datasets is an important contribution to the father involvement and child development literatures. It adds to the weight of a number of prior studies suggesting that the involvement and contributions of nonresident fathers outside of the formal child support system contribute to child and family well-being and must be considered in discussions about enhancing policies related to child support, child poverty, and child well-being.

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Table 1: Descriptive Statistics of Analysis Variables in the ECLS-B & ECLS-K Datasets

	ECLS-B					ECLS-K			
	Time Invariant	Time Varying				Time Invariant	Time Varying		
		9 mo	2-yr	4-yr	5-yr		3rd gr	5th gr	8th gr
Child Food Insecurity									
CFSS Raw Score (0-8)		0.38 (0.93)	0.25 (0.72)	0.50 (1.02)	0.35 (0.84)		0.29 (0.78)	0.38 (0.91)	0.37 (0.91)
Food Insecure (CFSS>=2)		0.10	0.07	0.15	0.1		0.08	0.11	0.11
Very Low Food Security (CFSS>=5)		0.005	0.003	0.009	0.005		0.004	0.006	0.005
Nonresident Father Involvement									
Regularity of cash support									
No cash support (omitted)							0.38	0.38	0.36
Any cash support - Irregular payments							0.27	0.27	0.3
Any cash support - Regular payments							0.35	0.35	0.34
Amount of formal support per month ($)		29 (109)	34 (126)	74 (192)	90 (207)				
Any informal cash support		0.49	0.27	0.35	0.31				
In-kind support scale		4.77 (1.8)	4.92 (1.9)	4.75 (1.8)	4.63 (1.8)		1.49 (2.2)	1.42 (2.1)	1.33 (2.0)
In-kind support scale - standardized		0.0 (1.0)	0.0 (1.0)	0.0 (1.0)	0.0 (1.0)		0.0 (1.0)	0.0 (1.0)	0.1 (0.9)
Fathers' Contact with Child									
Number of days in past month							5.0 (7.6)	4.5 (7.3)	3.9 (6.8)
Last saw child (0=never, 4= w/in month)		3.4 (1.0)	3.2 (1.1)	3.2 (1.1)	3.2 (1.1)				
Parent and Child Characteristics									
Mother's Age at Focal Child's Birth	24.7 (5.9)					24.1(5.7)			
Mother's Race/Ethnicity									
White, non-Hispanic (omitted)	0.39					0.54			

Black, non-Hispanic	0.36					0.27			
Hispanic, any race	0.22					0.15			
Other	0.03					0.04			
Mother's Education									
Less than HS (omitted)	0.31					0.18			
High school	0.38					0.37			
Some college	0.25					0.34			
College degree or better	0.06					0.11			
Mother born outside of US	0.13					0.11			
Mother married at birth	0.26					0.45			
Household income ($2011)	34,884					33,504			
	(39,294)					(39,407)			
Logged household income	9.98					9.96			
	(1.03)					(1.34)			
Mother in excellent health	0.29					0.20			
Information is missing	-					0.07			
Mother's depression									
Not Depressed	0.67					0.69			
Moderately or Severely Depressed	0.24					0.25			
Information is missing	0.10					0.06			
Child was low birth weight (<2500gm)	0.10					0.08			
Child is male	0.50					0.50			
Mom working		0.5	0.56	0.65	0.67		0.77	0.78	0.81
Number of children in household		2.2 (1.3)	2.2 (1.3)	2.3 (1.2)	2.4 (1.3)		2.44 (1.2)	2.50 (1.2)	2.42 (1.2)
Number of adults in household		2.0 (1.1)	1.9 (1.1)	1.8 (1.0)	1.8 (0.9)		1.70 (0.8)	1.68 (0.8)	1.75 (0.8)
Age of the oldest child in household		5.5 (5.7)	5.8 (4.9)	7.1 (4.1)	7.8 (3.8)		11.0 (3.2)	12.6 (2.7)	14.4 (1.9)
Mother has repartnered		0.05	0.10	0.20	0.24		0.31	0.34	0.36
Child has health insurance		0.96	0.95	0.95	0.95		0.96	0.95	0.96
Father's education at baseline									
Less than HS (omitted)	0.39					0.11			
High school	0.31					0.30			
Some college	0.18					0.10			
College degree or better	0.05					0.04			

Information is missing	0.07					0.45			
Total observations	6850	2050	1700	1700	1450	7250	2980	2340	1930
Unique observations	3050					3820			

Note: All sample sizes have been rounded to the nearest 50 for the ECLS-B and the nearest 10 for the ECLS-K as required by the National Center for Education Statistics

Figures in table are proportions or means and standard deviations in parentheses

Estimates are based on weighted data.

Table 2: Child Food Security Scale Raw Score (0 - 8) and Nonresident Fathers' Involvement

	ECLS-B				ECLS-K			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Nonresident Father Involvement								
Regularity of Cash Support (none = reference)								
Irregular cash support					0.020	0.070*	0.075**	0.077**
					(0.65)	(2.47)	(2.77)	(2.85)
Regular cash support					-0.128***	-0.055*	-0.039+	-0.035
					(-4.95)	(-2.30)	(-1.70)	(-1.52)
Formal support per month ($00)	-0.020*	-0.010	-0.013	-0.010				
	-(2.00)	-(1.09)	-(1.33)	-(1.04)				
Any informal cash support	0.049†	0.043	0.036	0.036				
	(1.82)	(1.60)	(1.37)	(1.37)				
Frequency of In-kind Support Scale (std)	-0.065***	-0.045**	-0.048*	-0.044**	-0.054***	-0.035**	-0.039***	-0.037**
	-(4.36)	-(3.06)	-(3.30)	-(3.05)	(-4.03)	(-2.92)	(-3.43)	(-3.26)
Contact with Child								
How recently saw child	-0.005	-0.004	-0.016	-0.018				
	-(0.36)	-(0.35)	-(1.26)	-(1.38)				
Number of days past month					-0.001	-0.000	-0.001	-0.001
					(-0.71)	(-0.03)	(-0.61)	(-0.62)
Non-Time Varying Family Characteristics								
Mother's age at birth of child		0.0167***	0.010***	.010***		0.006**	0.002	0.002
		(7.04)	(3.83)	(4.08)		(3.00)	(1.00)	(1.03)
Mom's Race/Ethnicity (white, non-Hipsanic = reference)								
Black, non-Hispanic		0.052	0.013	0.015		0.061+	0.007	0.008

	(1.56)	(0.39)	(0.46)	(1.94)	(0.23)	(0.27)
Hispanic	0.056	0.053	0.043	0.046	0.024	0.023
	(1.43)	(1.36)	(1.09)	(1.14)	(0.62)	(0.59)
Other race/ethnicity	0.010	0.021	0.021	0.100	0.041	0.032
	(0.19)	(0.45)	(0.45)	(1.51)	(0.69)	(0.58)
Mom Education (less than high school = reference)						
Mom - High school graduate	-0.086**	-0.062*	-0.057†	-0.139**	-0.085*	-0.081*
	-(2.77)	-(1.98)	-(1.83)	(-3.28)	(-2.26)	(-2.18)
Mom - Some college	-0.142**	-0.112**	-0.094*	-0.152***	-0.086*	-0.078*
	-(3.71)	-(2.93)	-(2.54)	(-3.46)	(-2.21)	(-1.98)
Mom - BA or better	-0.349***	-0.296**	-0.257**	-0.275***	-0.198***	-0.192***
	-(4.23)	-(3.70)	(3.10)	(-5.43)	(-4.20)	(-4.17)
Mom - Foreign Born	0.043	0.064	0.073	0.028	0.040	0.038
	(0.93)	(1.39)	(1.58)	(0.64)	(0.88)	(0.86)
Mother's Marital Status at Birth						
Marital Birth	0.094**	0.071*	.074*	0.037	0.018	0.015
	(2.96)	(2.33)	(2.42)	(1.40)	(0.74)	(0.61)
Marital Birth Missing				-0.182***	-0.168***	-0.169***
				(-3.86)	(-3.52)	(-3.49)
Mother's Household Income (log)	-0.079***	-0.054***	-0.052***	-0.099***	-0.075***	-0.073***
	-(5.90)	-(3.97)	(3.82)	(-5.25)	(-3.46)	(-3.51)
Mother's Health at Baseline						
Mother in excellent health	-0.069*	-0.069*	-0.066*	-0.091***	-0.091***	-0.092***
	-(2.11)	-(2.10)	-(2.02)	(-3.75)	(-3.99)	(-4.06)
Excellent health missng				0.044	0.036	0.037
				(0.45)	(0.36)	(0.38)
Mother's Depression at Baseline						
Mom felt depressed	0.203***	0.202***	0.204***	0.177***	0.161***	0.162***

	(6.96)	(7.05)	(7.11)	(5.66)	(5.43)	(5.51)
Depression Missing	0.018	0.029	0.028	-0.001	-0.021	-0.020
	(0.38)	(0.64)	(0.60)	(-0.02)	(-0.24)	(-0.23)
Child was Low Birthweight (<2500gm)	-0.060*	-0.058*	-0.058*	-0.053	-0.034	-0.037
	-(2.03)	-(1.98)	-(1.97)	(-1.60)	(-1.01)	(-1.10)
Male Child	0.016	0.020	0.021	0.020	0.022	0.021
	(0.62)	(0.80)	(0.82)	(0.93)	(1.06)	(1.03)
Time-Varying Family Characteristics						
Mom - worked in past week		-0.053*	-0.053*		-0.093**	-0.090**
		-(2.17)	-(2.18)		(-3.28)	(-3.24)
Number of children in household		0.031**	0.029**		0.040***	0.040***
		(2.79)	(2.68)		(4.13)	(4.21)
Number of adults in household		-0.101***	-0.101***		-0.031*	-0.030*
		-(6.99)	-(7.04)		(-2.29)	(-2.29)
Age of the oldest child in the household		0.010**	0.010**		0.014***	0.014***
		(2.89)	(2.84)		(4.33)	(4.30)
Mother has new partner		-0.041	-0.043		-0.144***	-0.142***
		-(1.08)	-(1.15)		(-6.36)	(-6.26)
Child has health insurance		-0.078	-0.080		-0.125*	-0.129*
		-(1.54)	-(1.60)		(-2.46)	(-2.49)
Father's Education - non-time varying						
High school graduate			-0.045			0.004
			-(1.51)			(0.13)
Some college			-0.071†			-0.053
			(1.69)			(-1.35)
BA or better			-0.123†			-0.011

				(1.74)				(-0.15)
Education missing				-0.050				0.012
				-(1.01)				(0.36)
Observations	6,850	6,850	6,850	6,850	7,250	7,250	7,250	7,250

Estimates are marginal effects with covariates set to means from zero-inflated negative binomial regression models

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 3: Low and Very Low Child Food Security and Nonresident Father Involvement

	Low Food Security		Very Low Food Security	
	ECLS- B	ECLS-K	ECLS-B	ECLS-K
Regularity of Cash Support (none = reference)				
Irregular Cash Support		0.010		0.001
		(1.22)		(1.11)
Regular Cash Support		-0.017*		-0.001
		(-2.26)		(-0.88)
Formal support per month ($00)	-0.001		.0001	
	-(0.47)		(0.13)	
Any informal cash support	0.008		.002	
	(0.87)		(0.92)	
Frequency of In-kind Support Scale (std)	-0.010*	-0.012**	-0.002†	0.000
	-(2.09)	(-3.28)	(-1.89)	(0.14)
Contact with Child				
How recently saw child	-0.004		-.001	
	-(0.81)		(-1.45)	
Number of Days Past Month		-0.000		-0.000
		(-0.48)		(-0.57)
N	6,850	7,250	6,850	7,220

Estimates are marginal effects computed at the mean of covariates from probit regressions

Models control for all variables in Table 1

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 4: Alternative Specifications of Child Food Insecurity and Nonresident Father Involvement

	Food Insecurity Score		Low Food Security		Very Low Security	
	ECLS-B	ECLS-K	ECLS-B	ECLS-K	ECLS-B	ECLS-K
Lagged Nonresident Father Involvement Models (from prior wave)						
Regularity of Cash Support (none = reference)						
Irregular Cash Support		0.084		0.009		0.001
		(1.61)		(0.69)		(1.02)
Regular Cash Support		-0.068		-0.019		-0.001
		(-1.43)		(-1.61)		(-0.46)
Formal support per month ($00)	-0.017		-.005		0.0001	
	-(1.35)		-(1.32)		(0.33)	
Any informal cash support	0.007		.009		0.001	
	(0.22)		(0.17)		(0.27)	
Frequency of In-kind Support Scale (std)	-0.049*	-0.013	-0.013†	-0.013*	-0.005*	0.000
	-(2.42)	(-0.53)	-(1.81)	(-2.01)	-(2.14)	(0.49)
Contact with Child						
How recently saw child	-0.005		.002			
	-(0.34)		(0.18)			
Number of Days Past Month		-0.004		-0.000	0.0003	-0.000
		(-1.22)		(-0.27)	(0.30)	(-0.01)
N	3,850	3,300	3,850	3,300	3,850	3,060
Individual Fixed Effects Models						
Regularity of Cash Support (none = reference)						
Irregular Cash Support		0.048		0.009		-0.003

		(-0.09)		(0.52)		(-0.52)
Regular Cash Support		-0.043		-0.022		-0.008
		(-0.09)		(-1.33)		(-1.47)
Formal support per month ($00)	0.005		0.002		0.002	
	(0.70)		(0.77)		(0.69)	
Any informal cash support	0.027		0.002		0.001	
	(0.95)		(0.23)		(0.35)	
Frequency of In-kind Support Scale (std)	-0.013	-0.022	-0.009	-0.006	0.001	-0.001
	(0.76)	(-1.18)	(1.37)	(-0.89)	(0.30)	(-0.20)
Contact with Child						
How recently saw child	-0.036†		-0.01			
	(1.81)	-0.003	(1.53)		0.001	
Number of Days Past Month		(-1.04)		-0.001	(0.57)	-0.001*
				(-0.60)		(-1.96)
N	6850	7250	6850	7,250	6850	7,250

Estimates are marginal effects calculated at means of covariates from Ordinary Least Squares Regression Models

Models control for all variables in Table 1

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Appendix A

Appendix Table 1: Questions from the Children's Food Security Scale Used to Identify Household-Level Child Food Insecurity

1. "We relied on only a few kinds of low-cost food to feed our children because we were running out of money to buy food." Was that **often, sometimes**, or never true for you in the last 12 months?
2. "We couldn't feed our children a balanced meal, because we couldn't afford that." Was that **often, sometimes**, or never true for you in the last 12 months?
3. "The children were not eating enough because we just couldn't afford enough food." Was that **often, sometimes**, or never true for you in the last 12 months?
4. In the last 12 months, did you ever cut the size of any of the children's meals because there wasn't enough money for food? (**Yes**/No)
5. In the last 12 months, were the children ever hungry but you just couldn't afford more food? (**Yes**/No)
6. In the last 12 months, did any of the children ever skip a meal because there wasn't enough money for food? (**Yes**/No)
7. (If yes to question 6) How often did this happen—**almost every month, some months but not every month**, or in only 1 or 2 months?
8. In the last 12 months did any of the children ever not eat for a whole day because there wasn't enough money for food? (**Yes**/No)

Note: Responses in bold indicate an affirmative response.

APPENDIX C: PRESENTATIONS

Garasky, S. Nonresident fathers' involvement and welfare policies: Impacts on childhood hunger. Presented at the Association for Public Policy Analysis and Management 34th Annual Research Conference, Baltimore, MD. November 2012.

Miller, D.P. Changes in family structure and child food insecurity. Presented at the Institute for Research on Poverty, RIDGE Food Assistance Research Seminar Series, University of Wisconsin. Madison, WI. April 2013.

Miller, D.P. Nonresident fathers and childhood hunger: Evidence from longitudinal data. Presented at the Boston University School of Social Work Luncheon Research Seminar Series. Boston, MA. September 2013.

Miller, D.P. and Nepomnyaschy, L. Family structure, family structure transitions, and childhood food insecurity. Poster presented at the 2014 Annual Meeting of the Population Association of America. Boston, MA. May 2014.

Nanda, N. Understanding the role of family mechanisms in non-resident father families on child food insecurity. Presented at the Association for Public Policy Analysis and Management 35th Annual Research Conference. Washington, DC. November 2013.

Nanda, N. Understanding the role of family mechanisms in non-resident father families on child food insecurity. Presented at the National Association for Welfare Research and Statistics Annual Conference. Chicago, IL. August 2013.

Nepomnyaschy, L. Nonresident father involvement and child food insecurity. Presented at the Applied Quantitative Research Master's Program Seminar Series. New York University. September 2013.

Nepomnyaschy, L. Nonresident father involvement and childhood hunger. Presented at the Association for Public Policy Analysis and Management 34th Annual Research Conference. Baltimore, MD. November 2012.

Nepomnyaschy, L. Nonresident father involvement and child food insecurity: Evidence from longitudinal data. Presented at the Society for Social Work and Research Annual Meeting. San Antonio, TX. January 2014.

Nepomnyaschy, L. Nonresident father involvement and child food insecurity: Evidence from longitudinal data. Presented at the Association for Public Policy and Management 35th Annual Research Conference. Washington, DC. November 2013.