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The Consequences of Food Insecurity for Children with Disabilities in the Early Elementary School Years

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Abstract

Although food insecurity has been shown to place children's developmental outcomes at risk, less is known about how children with disabilities fare if they are raised in households experiencing food insecurity. To address this gap in the evidence base, this chapter investigates how food insecurity relates to the behavioral outcomes of young school-aged children with disabilities. Analyses on data from a sample of approximately 1420 children with disabilities from the Early Childhood Longitudinal Survey, Kindergarten Class of 2010-11, show that household food insecurity led to a significant decline in the attentional focus of children with disabilities. Further, results demonstrate that children from homes who exited out of food insecurity and subsequently became food secure experienced significant gains in their attentional focus. Other outcomes, including children's inhibitory control, were not significantly linked to food insecurity. These results demonstrate the negative ramifications of food insecurity on children with disabilities, an understudied group highly vulnerable to food insecurity. Strengthening supports aimed at families raising children with disabilities to help address root causes of food insecurity may not only promote overall family functioning, but it may also have critical implications for improving the developmental wellbeing of children under their responsibility and care.

For families raising children with disabilities, growing up amidst food insecurity may place them at further risk for detriments to their psychosocial development (O'Malley, Klett,

Klein, Inman, & Beck, 2017). However, save for a handful of studies, less attention has been paid to the potential ramifications of food insecurity on the development of children with disabilities. Consequently, they are often overlooked in the broader policy discussions, not only about how food insecurity might disproportionately impact them, but also about supports they might need to ameliorate the negative effects of food insecurity on their developmental outcomes. To address this gap in the current knowledge base, this chapter more deeply investigates how food insecurity relates to the behavioral outcomes of young school-aged children with disabilities across the first two years of their elementary education. It offers new descriptive evidence about food insecurity's consequences on their developmental outcomes, and illuminates targets of opportunity for support and intervention—aimed at both children with disabilities as well as the families and caregivers responsible for their care and wellbeing.

3.1 Children with Disabilities and Food Insecurity: Background and Context

In the US, approximately 7.1 million children aged 3-21 have disabilities, ranging from autism spectrum disorder (ASD) to hearing impairments, which qualify them for special education services under the federal Individuals with Disabilities Education Act (IDEA; National Center for Education Statistics, 2020). As Currie and Kahn (2012) note, more expansive definitions of *children with disabilities* include *children with special health care needs* (CSHCN) who may have a limited capacity to "perform developmentally appropriate activities and participate, as desired, in society" (p. 3). Throughout this chapter, I use the term *children with disabilities* in its most broadest sense (Currie & Kahn, 2012) to refer not only to children who receive special education services as defined under IDEA, but also CSHCN who are at "increased risk for chronic physical, developmental, behavioral, or emotional conditions…" (McPherson et al., 1998, p. 138) such as those with chronic asthma or diabetes. This is due, in

part, to the existing literature on food insecurity and children with disabilities that has also adopted a more expansive view on who is included in the definition of children with disabilities. This broader view also aligns with prior empirical evidence showing that families raising children with special needs as a whole, irrespective of disability type, are at risk of experiencing higher rates of food insecurity (Rose-Jacobs et al., 2016)

In fact, there is strong consensus from the literature that families raising children with disabilities experience higher rates of food insecurity. Further, these growing gaps are likely to be even more pronounced in the wake of the COVID-19 pandemic, during which the rate of food insecurity has tripled among families with children (Schanzenbach & Pitts, 2020). Figure 3.1 displays findings from five key (pre-COVID-19) studies showing the prevalence of household food insecurity among families raising children with disabilities and how those rates compare to families raising children without special needs. Household food insecurity rates range from 33% among families raising children with a limiting health condition (DeRigne, Quinn, Stoddard-Dare, & Mallett, 2014) to 13% for families with a CSHCN (Balistreri, 2019). Further, the difference in food insecurity prevalence between families with and without children with special needs ranges from about 4.7% (Rose-Jacobs et al., 2016) to 11% (Adams, Hoffmann, Rosenberg, Peters, & Pennise, 2015). The variability in rates of food insecurity across these studies can be attributed, in part, to differences in study populations; for example, among studies that focus on families who experience poverty, such as in DeRigne and colleagues' (2014) study, food insecurity rates tend to be higher than in studies that leverage more socio-economically diverse nationwide samples as in Balistreri (2019).

In related work, Parish and colleagues (2008) analyzed 2002 data from the National Survey of America's Families and found that families raising children with special needs,

relative to families with children without special needs, experienced an increased probability of (a) worrying that food would run out (Odds ratio [OR] = 1.78; $p < .01$), (b) running out of food (OR = 1.78; $p < .01$), and (c) skipping meals due to lack of money (OR = 1.89, $p < .01$). The underlying reasons why prevalence rates of food insecurity are higher in families raising children with disabilities are multi-faceted and can include increased medical costs, time allocated toward caring for children with complex needs and, finally, the stress of caring for children with specialized needs (Adams et al., 2015).

3.1.1 How Food Insecurity Influences the Developmental Outcomes of Children with Disabilities: The Family Stress Model

Consistent with prior research on food insecurity and children's development (Gee, 2018; Gee & Asim, 2019; Huang, Matta Oshima, & Kim, 2010; Johnson & Markowitz, 2018), the Family Stress Model (FSM; Conger, Rueter, & Conger, 2000; Masarik & Conger, 2017) helps conceptualize how food insecurity influences the behavioral outcomes of children with disabilities. Broadly, FSM is a sequential, pathways model that captures how economic hardship negatively influences children's development (Figure 3.2). Food insecurity is one of many pathways through which the cascading influences of economic hardship can ultimately impact children's outcomes.

The starting point of the FSM focuses on families who financially struggle to make ends meet, known as *financial strain*. Financial strain leads families to confront a series of often intersecting economic struggles or *economic pressures* (Masarik & Conger, 2017). These pressures can include a family's inability to meet its basic needs, such as struggles accessing stable sources of food, which, in turn, may lead to food insecurity. The psychological distress—including parental depression and anxiety—caused by mounting economic pressures not only

triggers relationship problems between parents and their children, but this distress can also compromise the quantity and quality of parenting interactions that parents or caregivers have with their children. These compromised interactions—the core drivers of children's development (Bronfenbrenner & Morris, 2006)—can then negatively influence children's developmental outcomes. Children can ultimately bear the brunt of these cascading effects—from economic struggles and pressures, which include food insecurity, to heightened psychological distress to parenting practices (Masarik & Conger, 2017)—leading to compromised developmental outcomes.

While the pathways linking family functioning under economic duress to children's outcomes under the FSM are broadly applicable to many families, parents raising children with disabilities may be particularly susceptible to experiencing financial strain, predisposing them to food insecurity thereby increasing the likelihood of suboptimal outcomes for children under their care. For example, for families raising children with disabilities, evidence shows that they can experience higher levels of both financial and psychological stress than those whose children do not have disabilities (Goudie, Narcisse, Hall, & Kuo, 2014). Further, families who care for children requiring more intensive medical supports often shoulder a higher degree of financial strain due to higher out of pocket medical costs and lower rates of insurance coverage (Davidoff, 2004). As a consequence of these medical cost burdens, families raising children with disabilities might buy cheaper foods or cut back on meals (Rose-Jacobs et al., 2016; Sonik, Parish, Ghosh, & Igdalsky, 2016), placing them at higher risk for food insecurity.

A subtler, yet crucial, issue when drawing upon the FSM to conceptualize how food insecurity can influence children with disabilities is a child's disability type. Conceptually, given that the differential supports and resources needed to care for children vary by type and severity

of their disabilities (Stabile & Allin, 2012), the costs—both direct and indirect—associated with these supports might influence the prevalence and severity of a family's experience with food insecurity, as well as the strategies they use to cope in the wake of food insecurity. Given that there are a range of disability types, from mild to more severe disabilities, not all families with children with disabilities could face the same kinds of stressors or tradeoffs when caring for their children. As a result, the developmental consequences of food insecurity might look different across a range of disability types.

Finally, beyond the FSM, food insecurity may also influence children's outcomes through nutrition-related pathways. A robust body of literature suggests that the lack of sufficient access to stable and reliable sources of food can result in poorer nutritional outcomes and, possibly, malnutrition. For instance, children from food insecure households may lack micronutrients, vitamins and minerals (e.g., iron) vital for healthy development (Rose-Jacobs et al., 2008). Consequently, they may be at risk for chronic diseases such as anemia, which impairs their cognitive functioning (Brown & Pollitt, 1996). Importantly, children with certain disabilities, such as cystic fibrosis, may require special nutritional supplementation that can be expensive (Rose-Jacobs et al., 2016)—if families facing food insecurity must also forego purchasing such supplementation due to financial constraints, then the direct lack of such nutrients can leave children with disabilities susceptible to developmental impairments, both physical and psycho-social (Sullivan et al., 2000)

In summary, the FSM posits that food insecurity resulting from economic pressures can influence the outcomes of children with disabilities through several interconnected pathways, including parental stress leading to compromised parent-child interactions. This model is particularly relevant in pinpointing the socio-behavioral pathways through which food insecurity

might shape the developmental outcomes of children with disabilities, given that they are raised in families that can be more highly susceptible to the kinds of financial strains and economic pressures that are underlying drivers of food insecurity.

3.1.2 The Consequences of Food Insecurity for Children with Disabilities

Given the FSM, an emerging strand of literature has focused on the relationship between food insecurity and the outcomes of children with disabilities. For instance, O'Malley, Klett, Klein, Inman, and Beck (2017) found that among a sample of 700 children, aged 2-17, being treated for epilepsy through Cincinnati Children's Hospital Medical Center, those living in food insecure versus secure homes had significantly lower quality of life scores (PedsQL) (76.9 versus 85.9, $p < .001$), a composite of a child's overall physical, emotional and school functioning. O'Malley and colleagues posit that one pathway linking food security to children's outcomes is the extent to which families successfully navigate how to manage their children's chronic conditions. For instance, when adequate supports are in place—like affordable or subsidized home medical care—those supports can help ease the parental stress and anxiety of caring for the complex medical needs of children with disabilities (Adams et al., 2015; Park, Turnbull, & Turnbull, 2002; Scorgie, Wilgosh, & McDonald, 1998). Consequently, it is plausible to suggest that such supports may not only promote stronger interactions with their children but could also help families re-allocate resources towards food, thereby mitigating food insecurity's effects on their children's wellbeing.

However, beyond this single study by O'Malley and colleagues, little attention has been paid to how food insecurity relates to the developmental outcomes of younger children with special needs as they begin their formal schooling, a critical transition point when they can be particularly susceptible to food insecurity and its potentially harmful effects. At the same time,

school entry is an influential developmental time that shapes children with disabilities' future schooling trajectories. Understanding the consequences of food insecurity for young children with disabilities is crucial given that these families raising children with disabilities can also face additional challenges, including poverty, which can negatively and cumulatively impact children's developmental outcomes (Parish, Rose, Grinstein-Weiss, Richman, & Andrews, 2008). When considered within the FSM framework, intersectional pressures on families—food insecurity coupled with poverty—can further compound the disadvantages facing children with disabilities.

3.1.3 Present Study

Thus, to further advance the knowledge base about children with disabilities and food insecurity, the aim of this present study is to examine how household food insecurity relates to children with disabilities' (a) executive functioning (EF) which includes, in part, their attentional focus and inhibitory control, as well as (b) problem behaviors, including their internalizing and externalizing behaviors. This study is guided by one central research question: What is the association between household food insecurity and the developmental outcomes of children with disabilities?

While prior research has found that food insecurity is linked to lowered EF (Gee & Asim, 2019) as well as increased externalizing and internalizing problem behaviors (Gee & Asim, 2019; Huang et al., 2010; Slack & Yoo, 2005; Slopen, Fitzmaurice, Williams, & Gilman, 2010), these findings are applicable to children as a whole and not specific to children with disabilities. Accordingly, at present, whether children with disabilities might have similar behavioral responses is open for further empirical investigation.

Further research is also needed to determine whether transitions into and out of food insecurity also might have different effects on children with disabilities. As researchers have argued (Gee, 2018; Gee & Asim, 2019; Kimbro & Denney, 2015), it is important to move beyond investigating food insecurity as a static phenomenon and to instead examine how the timing and duration of food insecurity can influence children's outcomes. In fact, prior studies have shown that the negative consequences of food insecurity are driven, in large part, by transitions into food insecurity. Adults who became food insecure experienced higher levels of parenting aggravation while parents who transitioned out of being food insecure did not (Gee & Asim, 2019). Likewise, children from homes that transitioned into food insecurity had lower behavioral and health outcomes versus children who remained food secure (Kimbro & Denny, 2015). Knowledge of how children with disabilities behaviorally develop while being raised in households experiencing the dynamics of food insecurity over time can inform ongoing policy discussions of ways to best screen for and identify supports for families raising children with disabilities as they confront complex intersectional challenges, including food insecurity alongside other material hardships (Parish et al., 2008).

3.2 Method

3.2.1 Dataset and Sample

To conduct my analysis, I used data on approximately 1420 children (rounded to the nearest 10 per restricted-used guidelines) with a disability from the restricted use version of the Early Childhood Longitudinal Survey, Kindergarten Class of 2010-11 (ECLS-K: 2011). The ECLS-K is a richly detailed dataset that is nationally representative of children who entered kindergarten in 2010 and is suitable for these analyses because it captures children's disability status, household food insecurity as well as behavioral outcomes on children across time. To

identify the analytic sample of a children with a disability, I used a variable included in the dataset that captures a child's initial disability status in kindergarten (disability status was captured in both spring of kindergarten and first grade). Children were identified as having a disability in kindergarten if their parents reported (a) that their child had a disability based on a professional diagnosis for any conditions that the child experienced (e.g., emotional challenges, difficulty hearing, etc.) or (b) that their child received therapy services or participated in a program for children with disabilities. A total of 2570 children (rounded to the nearest 10) were identified with a disability but because this study uses sampling weights (Tourangeau et al., 2015), any child with a zero-sampling weight did not contribute to model estimations; thus, 1420 were available for analyses.

3.2.2 Measures

Executive Functioning (EF). I used two measures capturing children's EF in spring of kindergarten and first grades: (a) Attentional Focus (i.e., the ability to pay attention) and (b) and Inhibitory Control (i.e., the ability to restrain oneself from inappropriate responses or actions). Each measure was based on the Attentional Focusing and Inhibitory Control subscales (6-items each) of the Children's Behavior Questionnaire (Putnam & Rothbart, 2006). For each item of the subscale, teachers were asked on a 7-point scale how true (*extremely untrue* to *extremely true*) the child would have reacted to particular situations in the past 6 months. Scores were derived by summing the responses to each item in the subscale and range from 1 to 7. Internal consistency reliability as reported in Tourangeau et al. (2012) for the Attentional Focus Scale was $\alpha = .87$ in spring of kindergarten and first grade, respectively. Reliabilities for the Inhibitory Control Scale were $\alpha = .87$ and $\alpha = .86$.

Problem Behaviors. I used two measures capturing children's problem behaviors in spring of kindergarten and first grades: (b) Externalizing Problem Behaviors (b) and Internalizing Problem Behaviors. Each measure was based on externalizing (5-items) and internalizing (4-items) subscales of the Social Skills Rating System (SSRS; Gresham & Elliott, 1990). For each item of the subscale, teachers were asked on a 4-point scale how often (*never* to *very often*) the child exhibited certain behaviors. Scores were derived by summing the responses to each item in the subscale and range from 1 to 4. Internal consistency reliabilities for the externalizing problem behaviors scale were α =.89 and α =.88 while for internalizing problem behaviors, reliabilities were α = .78 and α = .76.

Household Food Insecurity Status. A household's food insecurity status was based on the US Department of Agriculture's (USDA) 18 item Household Food Security Survey Module (HFSSM; USDA Economic Research Service, 2012). The HFSSM asked parents to recall their experiences in the previous 12 months and was administered twice to parents: when their child was in the spring of kindergarten and first grade. Based on cutoffs established by the USDA, households with raw scores of 0 to 2 on the HFSSM were classified as food secure (coded as 0), while households with scores between 3 to 18 were classified as food insecure (coded as 1). Internal consistency reliabilities were α = .92 and α = .89.

Controls. Additional controls are described in Table 3.1 and include other forms of material hardship as well as characteristics of children and their parents and households.

For the analytic sample of 1420 children with disabilities in kindergarten, rates of missingness for each variable ranged from 0 percent (e.g., children's demographic characteristics such as their race/ethnicity and gender) to about 8 percent (e.g., number of places lived since birth). The outcome variables had no missing data. A total of 1230 of children were fully

observed without any missing data (about 87% of the analytic sample), while 14% were missing one or more variables. To handle missing data, I used multiple imputation by chained equations (Royston & White, 2011) where I generated 15 imputed datasets. The number of imputations were based roughly on the total percent of the sample (14%) with missingness on any variable.

3.2.3 Analytic Strategy

To estimate the effect of household food insecurity on outcomes of children with disabilities, I leverage changes in the incidence of household food insecurity between the spring of kindergarten and first grade using a first difference regression model that controls for time stable factors, both observed and unobserved, that are potentially confounded with household food insecurity and whose effects remain stable between both timepoints (Allison, 2009). I account for time-varying factors, such as changes in other material hardships, that are likely to be confounded with changes in food insecurity status. I also account for time-constant factors, such as race/ethnic and gender, whose effects on the outcome may change over time (Allison, 2009). More formally, I fit the following first-difference model:

$$\Delta Y_i = \Delta\alpha_0 + \beta_1(\Delta HHFoodInsecurity)_i + \gamma\Delta X_i + \Delta\delta Z_i + \Delta\varepsilon_i$$

where ΔY_i represents the change in my selected outcomes for child *i* while $\Delta HHFoodInsecurity$ is the change in food insecurity status (where status at each wave is coded as food insecure = 1; food secure = 0) for each child's household. $\Delta\varepsilon_i$ is the idiosyncratic error representing time-varying unobserved determinants of ΔY_i. ΔX_i represents time-varying covariates potentially confounded with changes in household food insecurity status while Z_i are time-invariant characteristics whose effects over time are captured in $\Delta\delta$. In this model, β_1 is the first-difference estimator that captures the association between household food insecurity and

children's outcomes. Given that I focus on a subsample of children with disabilities, I fit this model using Stata's survey commands with the subpopulation option for each of my 15 imputed datasets and pooled the results together. I included survey weights to handle survey non-response while standard errors were estimated using Taylor linearization.

Beyond the overall effect of food insecurity, there may be separate effects of transitioning into and out of food insecurity (Kimbro & Denney, 2015). For instance, based on the FSM, we might expect that children with disabilities from homes that transitioned out of food insecurity (i.e., their households became food secure) to have more positive outcomes. Similarly, children with disabilities from homes facing heightened economic pressures that subsequently transition into food insecurity might experience lowered outcomes. In order to test for these transitional effects of food insecurity, I refit my first difference models. Instead of including a predictor variable capturing changes in food insecurity status (i.e., $\Delta HHFoodInsecurity$), I include a set of indicator variables: (a) transitioned out of food insecurity; (b) transitioned into food insecurity; (c) always food insecure; and (d) always food secure (the reference group).

3.3 Results

Table 3.2 displays descriptive statistics on the analytic (non-imputed) sample of children disaggregated by each wave. For each variable that was captured across both waves, the table also shows the change between waves and the associated *p*-value. The prevalence of household food insecurity was stable across both waves, with roughly 13 and 12 percent of families experiencing food insecurity in 12-month window prior to spring of kindergarten and first grade, respectively. This rate aligns with Balistreri's (2019) estimate (13 percent) based on households caring for CSHCN using nationally representative data from the National Survey of Children's

Health. Notably, these estimates are also lower than estimates from studies that use smaller, more geographically narrow samples summarized in Figure 1 (e.g., Adams, et al., [2015]).

For the main outcomes, children's attentional focus and internalizing problem behaviors significantly increased between waves. As for children's parents and their households, slightly more than a quarter of families were on food stamps in the past 12 months, while a majority were employed and married. Finally, by race and ethnicity, the sample was predominately White (62%) followed by Hispanic (20%). By gender, the sample consisted of a higher proportion of males (62%) relative to females (38%). Finally, roughly half of the sample (47%) that was reported to have a disability in spring of kindergarten were no longer reported to have a disability by spring of first grade.

Table 3.3 displays the main results. These results demonstrate that household food insecurity was related to a significant decline in the attentional focus of children with disabilities (B = -0.33; 95% confidence interval [CI] [-.57, -.07]; $p < .05$), an effect size (ES) of roughly a quarter of a standard deviation (0.25 SD). Although these results also show that household food insecurity was associated with lower inhibitory control (B = -.19; 95% CI [-.44, .07]; $p = .60$) as well as higher externalizing behaviors (B =.11; 95% [-.13, .08]; $p = .06$)—both in the direction we would expect given the FSM—neither of these relationships significantly differed from zero, therefore zero effects could not be ruled out. Interestingly, the effect on internalizing behaviors was in an unexpected direction: a decline of .19 (95% CI [-.45, .07]; $p = .16$). But as with the effect on externalizing behaviors, this estimate was not significantly different from zero. In sum, this evidence shows that food insecurity can negatively influence the EF of children with disabilities, particularly their attentional focus. On the other hand, these results also show that

children's inhibitory control and problem behaviors (externalizing and internalizing) were plausibly unaffected given that zero effects could not be ruled out.

To place these findings in comparative context, Table 3.4 shows results for children *without* disabilities. Whereas children with disabilities demonstrated significantly lower attentional focus due to food insecurity, children without disabilities did not have significantly lower attentional focus. Consistent with the findings for children with disabilities, these findings show that food insecurity was also unrelated to inhibitory control as well as internal and externalizing behaviors of children without disabilities.

Food Insecurity Transitions. Next, I focus on outcomes for children in families who experienced food insecurity transitions (i.e., either exited out of or entered into food insecurity) relative to those from persistently food secure homes. As shown in Table 3.5, for children's attentional focus, the direction of the effects are expected—children with disabilities from homes that became food insecure experienced a decline in attentional focus (B = -.21; 95% CI [-.65, .24]; p = .36) while those from households who exited food insecurity experienced a gain in their attentional focus (B = .45; 95% CI [.14, .77]; $p < .01$). However, only the effect for families who exited out of food insecurity is significant at conventional levels of significance. Thus, for these children, living in a household that became food secure at some point between the 12 months prior to spring of kindergarten and first grade was related to a .45 point gain, on average, in their attentional focus scores. For inhibitory control, children from households exiting food insecurity, also experienced significant gains as well (B = .35; 95% CI [.00, .70] p = .05) which suggests that these children displayed stronger restraint from inappropriate responses or actions if they were in homes that became food secure. As with the first-difference results, neither transitioning into or out of food insecurity significantly related to either children's internalizing or

externalizing behaviors. Finally, for comparative purposes, results in Table 3.4 show that for children without disabilities, neither entry into or exit out exit out of food insecurity was significantly associated with their behavioral outcomes.

3.4 Discussion and Implications

This study offers new descriptive evidence demonstrating how food insecurity is negatively associated with the behavioral outcomes of children with disabilities and how transitions out of food insecurity can be especially beneficial for children's outcomes. By focusing explicitly on children with disabilities, this work expands and deepens the current evidence base on food insecurity's link to children's developmental outcomes. More specifically, these analyses, which are conceptually grounded in the Family Stress Model (FSM; Masarik & Conger, 2017), demonstrate that among families raising a child with a disability in kindergarten, food insecurity was related to lower attentional focus. When compared to findings of Gee and Asim (2019) who found an indirect effect of adult food insecurity on children's attentional focus of .13 SDs, these findings show much larger effect of household food insecurity at nearly twice the size (.25 SD). These results also show that not all developmental outcomes—especially children's internalizing or externalizing problem behaviors—were affected by food insecurity.

These findings raise important questions about the kinds of behavioral outcomes that are most impacted by food insecurity. For instance, why was household food insecurity linked to children with disabilities' EF, especially their attentional focus, but not their behavioral problems? As Gee and Asim (2019) show, the mechanisms through which food insecurity transmits its influence onto children's outcomes might provide some answers. In their study, they found that adult food insecurity's effect on children's outcomes was mediated by parenting aggravation, a mediating effect that was only relevant for children's EF, but not their

externalizing behaviors. Future studies should further explore additional mechanisms along the pathway linking food insecurity to the behavioral outcomes of children with disabilities, since certain mechanisms seem to play a key role in transmitting food insecurity's influence on certain outcomes, but not others. Beyond finding that food insecurity had a negative relationship with children's attentional focus, this study also reveals how children with disabilities raised in homes that became food secure, also experienced higher attentional focus and inhibitory control skills. These findings suggest that the children who are raised by families that were able to successfully overcome food insecurity—and possibly, the uncertainty, stress, and anxiety in the wake of food insecurity—can developmentally benefit from transitioning into a more food secure environment.

There are several limitations to note. While the first-difference models include time-varying observables to control for changes contemporaneous with changes in household food insecurity status, there are still time-varying unobserved factors unaccounted for in the model, which could have introduced bias into the estimates. Yet, given the relatively short time frame between study waves—a year between spring of kindergarten and first grade—unobserved factors were less likely to change in ways to significantly affect the estimates. Also, I was unable to account for any measurement error from adults misreporting their incidence of household food insecurity or whether their child had a disability. However, studies have shown that parents can validly report their children's chronic health conditions (Stein, Bauman, Epstein, Gardner, & Walker, 2000) while studies of specific disabilities, like autism spectrum disorder, show strong parent-clinician agreement (Kogan et al., 2018). Despite these limitations, these results offer new evidence linking food insecurity to developmental outcomes of children with disabilities as they commence their formal schooling.

In terms of implications for practice and policy, these results underscore the need to ensure that supports—especially broader strategies to tackle the root causes of food insecurity such as alleviating economic pressures—are made available and targeted to families raising children with disabilities. Importantly, from a family systems perspective, helping caregivers of children with disabilities manage both precipitating and perpetuating factors of food insecurity, like stressors within the home, may be an important first step. As Smith, Oliver, and Innocenti (2001) found in their study of 880 families across the US raising children with developmental delays, parenting stress had less to do with the child's disability, but rather the conditions that parents faced, including access to financial resources, time caregivers had to interact with children and social support. Thus, targeting supports and interventions to ease these kinds of conditions could improve family functioning and, subsequently, help buffer families from stress and anxiety brought on by economic pressures like food insecurity.

Fortunately, there are several available mechanisms to counteract food insecurity head-on by leveraging our public education and social service sectors that can have broad reach into the daily lives of children with disabilities and their families. For example, offering the National School Breakfast Program (SBP) has shown to cause reductions in the probability that a child will experience very low food insecurity (Fletcher & Frisvold, 2017). Further, linking caregivers to important safety net services like the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), both of which have been shown to reduce food insecurity (Schanzenbach & Thorn, 2019), may not only mitigate the incidence of food insecurity but may buffer its potentially harmful effects on children. Because these aforementioned studies are applicable to children more broadly, there is

a crucial need for future researchers to examine whether and how programs like NSBP, SNAP and WIC can mitigate food insecurity among families raising children with disabilities.

Given the limited research base on food insecurity and children with disabilities, there are ample avenues for further research on the nexus between food security and development in this population. Children with disabilities are far from a homogeneous population and are cared for in a variety of household types, ranging from single parent households (Levine, 2009) to multigenerational households. Since families headed by single mothers as well as multigenerational households are more prone of food insecurity (Gundersen & Ziliak, 2014), it would be important to examine whether and how the developmental consequences of food insecurity for children with disabilities looks different across various family structure types. Also, adopting a more temporal view of food insecurity over time (Gee, 2018) can yield new insights, adding depth and nuance to the findings of this chapter. For example, there may be critical developmental or transitional periods when food insecurity may be particularly disadvantageous, especially at critical junctures when children with disabilities experience high levels of uncertainty and instability such as the major transitions into and out of formal schooling. Such transitions can be particularly disruptive, both to children and their families, and experiencing food insecurity might further exacerbate that disruption.

In closing, this work expands and deepens our knowledge of the ramifications of food insecurity for children with disabilities, an understudied group highly vulnerable to food insecurity. Strengthening supports aimed at families raising children with disabilities may not only address underlying factors leading to food insecurity thereby promoting overall family health and wellness, but it may also have critical implications for improving the developmental wellbeing for children under their responsibility and care.

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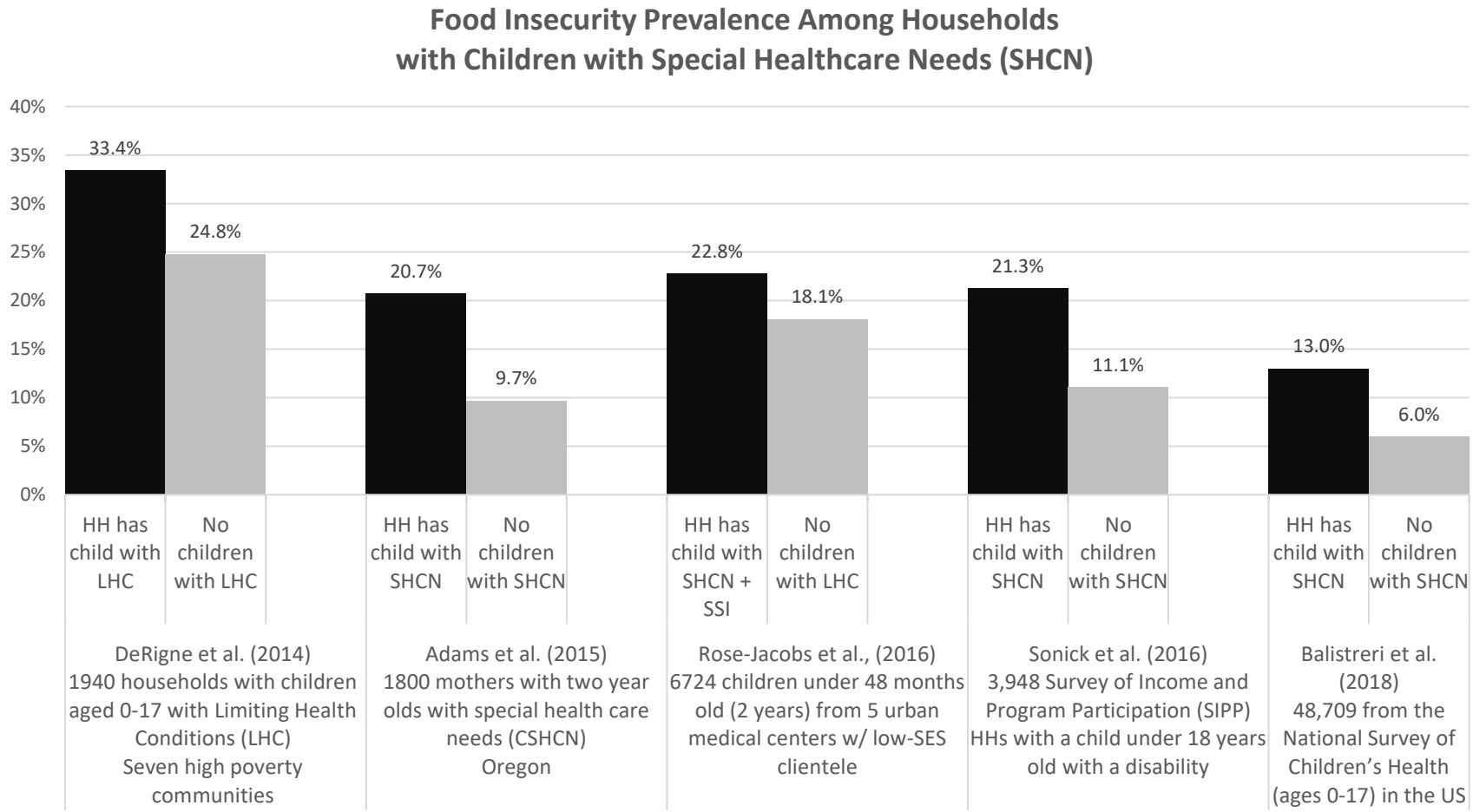
Figures and Tables

Figure 3.1

Evidence from Five Studies Documenting the Prevalence of Food Insecurity Among Households Raising Children With Versus Without Special Needs



Note. HH = Household; LHC = Limiting Health Conditions; CSHCN = Child with Special Healthcare Needs

Figure 3.2

Family Stress Model (Masarik & Conger, 2017)

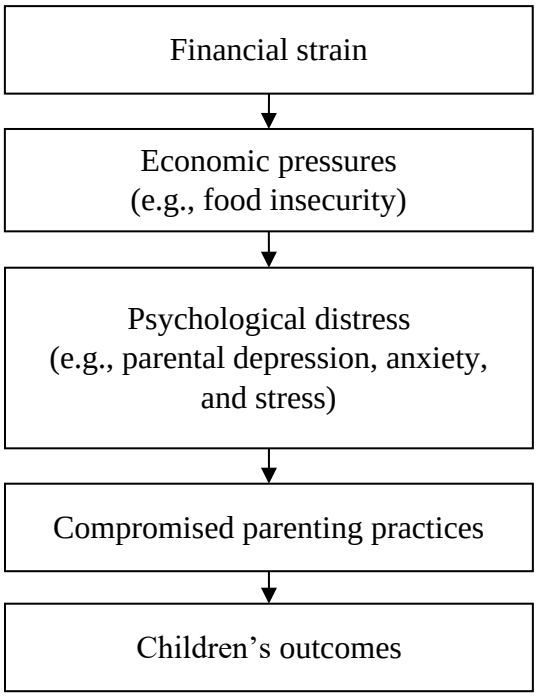


Table 3.1

Description of Control Variables Included in the First-Difference Regressions Estimating the Relationship Between Household Food Insecurity and Outcomes of Children with Disabilities

Time-invariant Child Characteristics	
Race and ethnicity	In five categories (1) Asian non-Hispanic; (2) Black non-Hispanic; (3) Hispanic; (4) Native American, Pacific Islander or Multi-racial; (5) White non-Hispanic.
Gender	Whether a child was male (=1) or female (=0).
Home language	In three categories: (1) English only; (2) Another language other than English; or (3) Two languages equally.
Changed schools	Whether a child switched schools between spring of kindergarten and first grades, coded as switched = 1, 0 otherwise.
Time-varying Parental and Household Characteristics	
Access to medical care	A count variable, ranging from 0 to 3, that was created by summing three underlying indicator variables: whether a child visited the doctor and/or dentist in the past year or not; and whether the child had health insurance.
On food stamps in the last 12 months	Whether the family received food stamps during the past 12 months (=1) or not (=0).
Employment	Whether the parent was employed (=1) or not (=0).
Socioeconomic status (SES)	A National Center for Educational Statistics (NCES)-constructed continuous index based on a composite of parents' education level, their occupational prestige and income.
Married	Whether the parent was married or in a civil union/domestic partnership (=1) or not (i.e., separated, divorced or widowed) (=0).
Parental aggravation	Factor scores derived from a composite of four items of the Aggravation in Parenting Scale. Parents indicated how true, on a four-point scale (completely, mostly, somewhat, not at all), they often felt that: (1) being a parent was harder that they thought; (2) their child did things that really bothered them; (3) they gave up more of their life to meet their child's needs; and (4) they felt angry with their child. Variants of these four items were originally derived from the Parenting Stress Index (PSI) (Abidin, 1990). Reliability of the underlying items were .71 and .72 in the spring of kindergarten and first grade respectively.
Time-invariant Parental and Household Characteristics	
Number of places lived since birth	Number of places was reported by parents.
Parental depression	Based on the 12-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). Reliability was .87.

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K: 2011) Restricted-Use Kindergarten-Second Grade Data File.

Table 3.2

Weighted Descriptive Statistics for a Sample of Children with Disabilities by Wave from the Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K: 2011; n = 1420)

	Spring of kindergarten		Spring of first grade		Difference (Spring of kindergarten to first grade)		*p*-value
	Mean or proportion	*SE*	Mean or proportion	*SE*	Mean or proportion	*SE*	
Household is food insecure	0.13	(0.01)	0.12	(0.02)	-0.01	(0.01)	.60
Behavioral Outcomes							
Attentional focus	4.73	(0.05)	4.58	(0.06)	-0.15	(0.05)	.01
Inhibitory control	4.85	(0.06)	4.80	(0.06)	0.06	(0.02)	.29
Internalizing problem behaviors	1.58	(0.02)	1.64	(0.02)	-0.06	(0.05)	.01
Externalizing problem behaviors	1.72	(0.03)	1.81	(0.03)	0.09	(0.02)	.00
Parental and household characteristics							
Access to medical care	2.80	(0.02)	2.78	(0.02)	-0.02	(0.02)	.47
On food stamps in the last 12 months	0.26	(0.02)	0.28	(0.02)	0.02	(0.01)	.08
Number of places lived since birth	2.03	(0.05)			0.02	(0.01)	
Employed	0.64	(0.02)	0.69	(0.02)	0.05	(0.02)	.00
Socioeconomic status index	-0.05	(0.03)	-0.07	(0.03)	-0.02	(0.01)	.00
Married	0.70	(0.02)	0.70	(0.02)	0.00	(0.01)	.79
Parental aggravation (factor score)	0.03	(0.03)	0.00	(0.03)	-0.04	(0.04)	.41
Parental depression	0.29	(0.01)					
Children's characteristics							
White non-Hispanic	0.62	(0.03)					
Black non-Hispanic	0.11	(0.02)					
Hispanic	0.20	(0.02)					
Asian, non-Hispanic	0.03	(0.01)					
Other (Native American, Pacific Islander, Multi-racial)	0.05	(0.01)					
Male	0.62	(0.02)					
Home language is not English	0.07	(0.02)					
Home language is English	0.92	(0.02)					
English and another language equally	0.01	(0.00)					

at home							
Changed schools	0.12	(0.02)					
Child has a disability	1.00	(.)	0.47	(0.02)	-0.53	(0.02)	.00

Note. Linearized standard errors in parentheses. Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K: 2011) Restricted-Use Kindergarten-Second Grade Data File.

Table 3.3

First-Difference Regression Results for the Effect of Household Food Insecurity on the Behavioral Outcomes of Children with Disabilities

	Attentional Focus		Inhibitory Control		Internalizing Problem Behaviors		Externalizing Problem Behaviors	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
Change in household food insecurity status	-0.33*	(0.12)	-0.19	(0.13)	-0.02	(0.06)	0.11	(0.06)
Changes in parental and household characteristics								
Access to medical care	-0.02	(0.07)	-0.05	(0.06)	-0.04	(0.03)	0.06	(0.03)
Employed	-0.02	(0.10)	-0.12	(0.10)	-0.05	(0.05)	-0.07	(0.06)
On food stamps in the last 12 months	-0.24	(0.16)	0.02	(0.14)	-0.00	(0.05)	0.07	(0.06)
Number of places lived since birth (time-invariant)	-0.00	(0.04)	-0.01	(0.03)	0.01	(0.02)	0.03	(0.01)
Socioeconomic status	0.05	(0.17)	0.17	(0.15)	-0.05	(0.07)	-0.12	(0.08)
Married	0.09	(0.16)	0.35	(0.18)	-0.02	(0.10)	-0.16	(0.08)
Parenting aggravation	-0.02	(0.03)	-0.06	(0.03)	0.03*	(0.01)	0.02	(0.02)
Parental depression (time-invariant)	-0.12*	(0.05)	-0.16*	(0.07)	0.06	(0.03)	0.07*	(0.03)
Children's characteristics (time-invariant)								
Black non-Hispanic	0.23	(0.14)	0.20	(0.13)	-0.07	(0.08)	-0.08	(0.06)
Hispanic	0.06	(0.12)	-0.04	(0.11)	-0.02	(0.05)	-0.02	(0.05)
Asian non-Hispanic	0.28	(0.17)	0.01	(0.17)	0.05	(0.12)	-0.08	(0.12)
Race or ethnicity other than Black, Hispanic or Asian	0.21	(0.19)	0.15	(0.18)	-0.11	(0.08)	-0.02	(0.10)
Female	-0.04	(0.08)	0.05	(0.09)	0.00	(0.03)	0.01	(0.04)
Home language is English	-0.11	(0.15)	-0.14	(0.16)	-0.05	(0.06)	-0.04	(0.06)
Speaks English and another language equally at home	-0.91	(0.47)	-1.09***	(0.30)	0.13	(0.36)	0.15	(0.19)
Changed schools	-0.06	(0.13)	-0.12	(0.13)	0.02	(0.05)	-0.00	(0.06)
Child has a disability	0.10	(0.08)	-0.03	(0.07)	-0.02	(0.04)	0.01	(0.03)
Constant	0.04	(0.17)	0.11	(0.19)	0.11	(0.07)	0.04	(0.08)
Observations (unweighted)	1420		1420		1420		1420	

Note. Linearized standard errors in parentheses. Models fit across 15 imputed data sets where missing data were imputed using multiple imputed chained equations. Survey weights included to account for differential nonresponse. Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K: 2011) Restricted-Use Kindergarten-Second Grade Data File.
* $p < 0.05$, *** $p < 0.001$

Table 3.4

The Effect of Household Food Insecurity (Overall Change as well as Entry and Exits) on the Behavioral Outcomes of Children Without Disabilities

	Attentional Focus		Inhibitory Control		Internalizing Problem Behaviors		Externalizing Problem Behaviors	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
Change in household food insecurity status	0.06	(0.07)	-0.08	(0.06)	0.02	(0.03)	-0.04	(0.04)
Entered Household Food Insecurity	0.09	(0.11)	-0.07	(0.10)	0.02	(0.06)	0.00	(0.06)
Exited Household Food Insecurity (Became Food Secure)	-0.04	(0.11)	0.08	(0.10)	-0.01	(0.04)	0.07	(0.05)
Observations (unweighted)	7820		7820		7820		7820	

Note. Linearized standard errors in parentheses. Models fit across 15 imputed data sets where missing data were imputed using multiple imputed chained equations. Survey weights included to account for differential nonresponse. All models included control variables listed in Table 3.1 (estimates on these controls are not shown). None of the coefficients was statistically significant at $p < .05$ or less. Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K: 2011) Restricted-Use Kindergarten-Second Grade Data File.

Table 3.5

Regression Results for the Effect of Transitions Into and Out of Food Insecurity on the Behavioral Outcomes of Children with Disabilities

	Attentional Focus		Inhibitory Control		Internalizing Problem Behaviors		Externalizing Problem Behaviors	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
Entered Household Food Insecurity	-0.21	(0.23)	0.02	(0.26)	-0.07	(0.09)	0.13	(0.09)
Exited Household Food Insecurity (Became Food Secure)	0.46**	(0.16)	0.35*	(0.18)	-0.01	(0.06)	-0.08	(0.07)
Persistently Food Secure	0.31	(0.16)	0.23	(0.17)	-0.07	(0.09)	0.06	(0.07)
Changes in parental and household characteristics								
Access to medical care	-0.03	(0.07)	-0.06	(0.06)	-0.03	(0.03)	0.05	(0.03)
Employed	-0.03	(0.10)	-0.14	(0.10)	-0.04	(0.05)	-0.06	(0.05)
On food stamps in the last 12 months	-0.25	(0.15)	0.01	(0.14)	-0.00	(0.05)	0.07	(0.07)
Number of places lived since birth (time-invariant)	-0.01	(0.04)	-0.02	(0.04)	0.01	(0.02)	0.02	(0.02)
Socioeconomic status	0.05	(0.18)	0.18	(0.15)	-0.06	(0.07)	-0.11	(0.08)
Married	0.09	(0.16)	0.34	(0.19)	-0.02	(0.10)	-0.17	(0.08)
Parenting aggravation	-0.02	(0.03)	-0.06*	(0.03)	0.03*	(0.01)	0.02	(0.02)
Parental depression (time-invariant)	-0.13*	(0.06)	-0.17*	(0.07)	0.06*	(0.03)	0.06*	(0.03)
Children's characteristics (time-invariant)								
Black non-Hispanic	0.20	(0.14)	0.18	(0.13)	-0.07	(0.07)	-0.07	(0.06)
Hispanic	0.06	(0.11)	-0.05	(0.11)	-0.03	(0.05)	-0.03	(0.05)
Asian non-Hispanic	0.28	(0.18)	-0.00	(0.18)	0.06	(0.12)	-0.08	(0.12)
Race or ethnicity other than Black, Hispanic or Asian	0.21	(0.17)	0.13	(0.17)	-0.11	(0.06)	-0.02	(0.09)
Female	-0.03	(0.08)	0.04	(0.09)	-0.00	(0.03)	0.02	(0.04)
Home language is English	-0.09	(0.16)	-0.11	(0.16)	-0.06	(0.07)	-0.04	(0.06)
Speaks English and another language equally at home	-0.86	(0.47)	-1.03**	(0.32)	0.11	(0.37)	0.15	(0.20)
Changed schools	-0.07	(0.13)	-0.14	(0.13)	0.01	(0.05)	-0.01	(0.07)
Child has a disability	0.09	(0.08)	-0.03	(0.07)	-0.02	(0.04)	0.00	(0.03)

Constant	-0.00	(0.18)	0.07	(0.19)	0.13	(0.07)	0.04	(0.08)
Observations (unweighted)	1420		1420		1420		1420	

Note. Linearized standard errors in parentheses. Models fit across 15 imputed data sets where missing data were imputed using multiple imputed chained equations. Survey weights included to account for differential nonresponse. Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K: 2011) Restricted-Use Kindergarten-Second Grade Data File.
* $p \leq 0.05$, ** $p < 0.01$

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